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ABSTRACT

This study investigates the male-female earnings differential in Canada with particular attention to the effect of trade unions on the gender earnings gap. A male market power model, characterized by monopsony and male dominated unions, is used as the theoretical basis of the study. Gender-specific earning equations are estimated using cross-sectional aggregate data for metropolitan cities and regions in Canada for 1971 and 1981. The empirical results for 1971 indicate that unionization increases the annual earnings of males more than that of females while the 1981 results indicate that trade unions decrease the male-female earnings gap. However, the latter evidence is not statistically significant. The study suggests that the increase in female participation in trade unions was an important factor in reducing the gender-earnings gap over the period 1971-1981.

I. Introduction

The topic of male-female earnings differentials has received much attention in labour economics since the seminal theoretical work on discrimination by Becker (1957). The usual practice in the empirical literature is to estimate earnings equations by gender using the human capital theory, and then decompose the earnings differential into its component parts: one portion due to productivity-related characteristics and another due to wage discrimination.[1] The role of trade unions in the gender earnings differential has received little attention in the existing literature. There are two possible reasons. First, in the traditional theory earning is a function of the endowment of general and specific human capital rather than union membership. Second, it may be self-destructing for unions to support gender wage discrimination, because discrimination would induce females to leave unions and employers to hire females rather than male union members.

Since the late 1960s the male-female earnings gap in Canada decreased steadily (Doiron and Riddell, 1994). The ratio of female to male annual earnings increased to 69.6 per cent in 1991 from 58.4 per cent in 1967 for full-year full-time workers. This increase is more pronounced for all workers, moving from 46.1 per cent in 1967 to 61.5 per cent in 1991. Obviously, a large part of the decrease in male-female earnings differential is attributed to changes in the female annual hours of work, education and enforcement of anti-discrimination laws in the work place. Shapiro and Stelcner (1987) claimed that roughly half of the reduction in the gender earnings differential during 1971-81 in Canada was due to the enhancement of the female productivity-related characteristics and half due to non-discriminatory practices. The impact of unionisation on the gender earnings gap was beyond the scope of their study.

In the Canadian context, the role of trade unions in the gender earnings differential has been addressed by two studies: Maki and Ng (MN, 1990) and Doiron and Riddell (DR, 1994). Using the 1984 Survey of Union Membership they found that unions in general contributed to an increase in the male-female wage gap and unlike

the private sector unions the public sector unions reduced the gender-wage gap in Canada in 1984. However, DR derived a different result. Analysing random samples from the 1981 Survey of Work History, the 1984 Survey of Union Membership (the survey used by MN) and the 1988 Labour Market Activity Survey, DR concluded that unionisation reduced the gender-wage gap, and a fall in gender differences in union membership was an important factor in reducing the gender earnings gap over the period 1981-88.

The role of Canadian trade unions in the gender discrimination is an under-researched area, and given the contradictory findings in the literature it is important to pursue further research. The present study empirically determines the effect of trade unions on the gender earnings gap in the Canadian cities/regions employing data spanning 1971 to 1981. During this period the female-male annual earnings gap decreased in every Canadian city/region except rural areas of Manitoba, Saskatchewan and Alberta (see Figure 1). Over the same period most Canadian cities/regions experienced a quantitatively insignificant increase in the aggregate unionisation rate but a significant increase in the female participation in unions (see Figures 2 and 3).[2] Recognising the potential link between unionisation and the gender earnings gap from the raw data of 1971 and 1981, the study attempts to empirically determine (i) the effect of overall unionisation rate on the gender earnings gap, and (ii) the male versus female unionisation effects, and public versus private unionisation effects on gender earnings. Unlike previous studies the study is based on a well-structured theoretical framework and uses aggregate data set to examine the validity of the existing micro data based results. The unit of analysis is Canadian city/rural area.

(Insert Figures 1, 2 and 3)

II. Theoretical Framework

Consider a labour market that is segmented by gender and participated by the profit maximising monopsonist (a single employer or collective of employers acting in unison with respect to the hiring of labour), male union workers and female non-union workers. In reality females are also unionised but at a much lower rate than males (see Figure 3) and hence, union decisions are likely to be dominated by males. This presumption is compatible with the the median voter theorem. Hence, the proposed theoretical framework can be a useful guide for empirical work despite its restrictive assumption about female unionisation.[3]

A. The Model

Assuming that the employer hires male (M) and female (F) workers who are perfect substitute in production and suppressing the complementary inputs in the production function, the production function can be written as: $Q = f(L)$ where, $L = M + F$. Male employees have union power and receive a union-negotiated wage, W^{mu}. The employer faces a perfectly elastic male labour supply function, $W^m = W^{mu}$. By assumption, females are non-unionised and their inverse labour supply function is $W^f = g(F)$ with $g'(F) > 0$. The employer maximises profit by equating the value of the marginal product (VMP) with the marginal labour cost (MLC) for each gender group.[4]

$$(1) \qquad VMP = W^{mu} = W^f(1 + 1/\eta^f)$$

where, η^f is the wage elasticity of female labour supply. The proportional wage advantage of males over females can be expressed as:

$$(2) \qquad \frac{W^{mu} - W^f}{W^f} = 1/\eta^f$$

The model predicts a higher male wage for any positive value of the wage elasticity of female labour supply and lower the η^f, the larger is the male-female wage gap.

Figure 1 illustrates the basic characteritics of the model. The male labour supply curve, S_L^m is perfectly elastic at the union-negotiated wage rate W^{mu}, while the female labour supply curve, S_L^f is upward sloping which indicates that female labour supply price is less than the corresponding marginal labour cost.

(Insert Figure 4)

Male receive a higher wage rate equal to their VMP, the females receive a wage rate equal to their supply price at the relevant equilibrium employment, which is obviously lower than the that of males with whom they are perfect substitute in production. For $MLC^f < W^{mu}$, the employer hires only females. The male supply curve is operative only when $MLC^f > W^{mu}$. The bold line represents the effective labour supply curve faced by the firm, and OF' and F'M' indicate female and male employment respectively. It is clear from the figure that the higher the male union wage, the higher are the female wage and employment level and hence female annual earnings. The model explains gender differences in both hourly wage and annual hours of work and hence, it can be used to explain gender differences in annual earnings.

B. Implications of the Model

Although the male market power model provides valuable insight in determining the impact of trade unions on the gender-earnings gap, in reality both males and females can be unionised and a pure monopsonistic labour market seldom exists. However, once the existence of job segregation by gender is recognised, an employer will act in a way similar to a seller in the differentiated product market and exercise its market power to maximise profit by offering lower wage to a group with smaller wage elasticity of labour supply. The gender differences in unionisation is one possible factor in yielding gender differences in the elasticity of labour supply. As noted earlier, the female representation in trade unions is significantly less than that of males in Canada (see Figure 3). Hence, union leadership is dominated by males and females have little influence on the union policy. A male-dominated union can

play a role somewhat similar to that mentioned in the male market power model. For example, to exclude competitive workers from the higher paid jobs, a union may support a wage structure tied to seniority, discrimination against part-time workers, and exclusion of females from jobs requiring lifting, night hours, or overtime.[5] As a result, the union-dominated occupations may become male-dominated occupations with relatively higher wages. Within occupations females may receive the same wage as men. Unions are unlikely to support within-occupation wage discrimination because of the potential cost in the form of loss in female union membership.

To explicitly test the male market power model, one needs to estimate the elasticity of labour supply curve faced by an employer, not the elasticity of the market labour supply curve. Given the present state of labour market statistics, it is possible to estimate the latter elasticity, but not the former. Therefore, an indirect method is adopted for empirical testing. The study estimates the unionisation effect from gender-specific earnings equations after taking into account the impacts of human capital and local labour market characteristics on earnings.

III. The Empirical Model and Data

A. Empirical Specification

To empirically determine the role of the trade unions four pairs of male-female earnings equations are specified. They differ from each other only with respect to unionisation variables. The unit of analysis is Canadian city/region.[6] The dependent variable is mean employment income of males (or females) in city/region j, denoted by Y^j. The independent variables include the following sets of variables: (a) industry-mix variables, (b) gender-specific human capital and other control variables and (c) unionisation variables. Variable definitions are given in Table 1.

(Insert Table 1)

The following are the basic earnings equations for male (m) and female (f):

$$(1.1) \qquad Y_m^j = \mathbf{X}_m\beta_m + \alpha_m UNION^j + \varepsilon_{11}$$

$$(1.2) \qquad Y_f^j = \mathbf{X}_f\beta_f + \alpha_f UNION^j + \varepsilon_{12}$$

where, $\mathbf{X}_m\beta_m$ and $\mathbf{X}_f\beta_f$ represent the expected mean earnings in city/region j, attributed to human capital and other local labour market characteristics, for males and females respectively. Both $\mathbf{X}_m$ and $\mathbf{X}_f$ include same set of industry-mix variables, but the productivity-related variables are gender-specific. If the aggregate unionisation rate (UNION) increases the earnings of males by a larger amount than the earnings of females,

then $0 < \alpha_f < \alpha_m$. The discriminatory role of trade unions in male-female earnings differential in city/region j can be computed by a discrimination index DI_u^j :

$$(1.3) \qquad DI_u^j = \frac{(\alpha_m - \alpha_f)UNION^j}{Y_m^j - Y_f^j} * 100$$

Substitution of the estimated parameters and predicted earnings in this formula yields an estimate of the percentage of male-female earnings gap in city/region j attributed to differential unionisation effect.

For further investigation of the unionisation effect at a disaggregated level three pairs of equations are specified:

$$(2.1) \qquad Y_m^j = \mathbf{X}_m\beta_m + \alpha_{1m} MUNION^j + \alpha_{2m} WUNION^j + \varepsilon_{21}$$

$$(2.2) \qquad Y_f^j = \mathbf{X}_f\beta_f + \alpha_{1f} MUNION^j + \alpha_{2f} WUNION^j + \varepsilon_{22}$$

$$(3.1) \qquad Y_m^j = \mathbf{X}_m\beta_m + \gamma_{1m} UNION^j + \gamma_{2m} PWUNION^j + \varepsilon_{31}$$

$$(3.2) \qquad Y_f^j = \mathbf{X}_f\beta_f + \gamma_{1f} UNION^j + \gamma_{2f} PWUNION^j + \varepsilon_{32}$$

$$(4.1) \qquad Y_m^j = \mathbf{X}_m\beta_m + \delta_{1m} GUNION^j + \delta_{2m} PUNION^j + \varepsilon_{41}$$

$$(4.2) \qquad Y_f^j = \mathbf{X}_f\beta_f + \delta_{1f} GUNION^j + \delta_{2f} PUNION^j + \varepsilon_{42}$$

Equations (2.1) and (2.2) are employed to examine the effects of the gender-specific unionisation rates on the male-female earnings gap. If the union sector pays higher wages than the non-union sector, an increase in male (female) unionisation rate raise the mean male (female) earnings relative to that of the opposite gender (i.e., $\alpha_{1m} > \alpha_{1f}$ and $\alpha_{2m} < \alpha_{2f}$). The second pair of equations (3.1 and 3.2) determines the effect of the overall unionisation rate on earnings after taking into account the impact of female representation in trade unions (PWUNION). With an increase in female representation in the union, the marginal cost of discrimination, in the form of loss of union membership increases and females may gain some control over union decisions. Hence, a reduction in the male-female earnings gap is expected ($\gamma_{2f} > 0$ and $\gamma_{2m} < 0$). Finally, equations (4.1 and 4.2) are used to determine the effects of the public versus private sector unionisation. Since the public sector in Canada enforces the equal employment opportunity principle and does not use gender discrimination as a net revenue maximising tool, it provides fewer opportunities for unions to practice gainful gender earnings discrimination than the private sector. Thus the public sector unions are expected to play a neutral role in the gender discrimination process, while the private sector unions are expected to increase the male-female earnings gap (i.e., $\delta_{1m} = \delta_{1f}$ and $\delta_{2m} > \delta_{2f}$).

IV. Empirical Results

A preliminary investigation of the data provides the following stylised facts: (1) a significant increase in the ratio of female to male earnings over the period 1971-81 in most Canadian Cities/regions; (2) a positive association between the unionisation rate and mean city/region earning for both males and females in a given year ; (3) small changes in the unionisation rates over the period 1971-81 in most Canadian cities/regions and (4) significant increases in the female union participation rates between 1971 and 1981 in almost all Canadian cities/regions. The evidence from the raw data indicate that a part of the decrease in gender earnings gap during 1971-81 is

attributed to a decrease in the male-female unionisation gap (the endowment effect) and a reduction in the extent to which unions differentially increase earnings of male and female. The latter effect is speculated based on an increase in female representation or control in unions. The findings from the raw data can be compared with the conditional unionisation effects derived from the OLS estimates of the earnings equations.

A. 1971 Results

The estimated earnings equations for 1971 are reported in Table 2. The results show a very good explanatory power of the empirical model. The lowest R^2 is 0.87 and the F-statistic is highly significant in every equation. Table 1 shows that all but one industry-mix variables are statistically insignificant. However, those variables were not dropped from the equation due to their *a priori* economic significance in reflecting the local labour market structure. Among the human capital variables gender differences in coefficients are evident for all but the university education (EDU). Estimates of equation 1.1 and 1.2 show that aggregate unionisation raises both male and female earnings. A ten per cent increase in the unionisation rate increases average male earnings by $275.30, while the corresponding increase in female earnings is $147.6.[7] Columns 3 and 4 include gender specific unionisation. Male unionisation (MUNION) significantly increases both male and female earnings but the male coefficient is 65% higher than that of female. Female unionisation (WUNION) increases female earnings and reduces male earnings, however, both effects are statistically insignificant. Columns 5 and 6 show that female representation in trade unions (PWUNION) increases female earnings with no statistical significance. The last two columns of Table 2 indicate that government sector unionisation (GUNION) has no significant impact on the earnings of either males or females, while private sector unionisation (PUNION) increases male earnings by a larger magnitude than female earnings. This result is consistent with our *a priori* expectation. The null hypothesis of the equality of male-female

coefficients in 1971 can be rejected at the 5 percent significance level, which provides justification for estimating gender-specific earning equations (see Table A1 in the Appendix).

Let us now summarise the 1971 results with respect to unionisation. First, males have an absolute earnings advantage over females with respect to unionisation. Second, male unionisation significantly affects the earnings of both males and females, but neither female unionisation nor female representation in unions affects gender-earnings significantly. This result may be regarded as the manifestation of male market power as indicated by the theoretical model of the last section.

B. 1981 Results

Table 3 presents the 1981 results. A partial F-test indicates that the industry-mix variables as a whole are not statistically significant in explaining regional variation in mean earnings. Among other determinants of earnings, 'age' and 'full-year work' (FYW) significantly increase female mean earnings, while they have insignificant effects on male mean earnings. Educational attainment and 'full-time work' have expected positive effect on average male earnings.

The aggregate unionisation rate increases female earnings by a larger amount than male earnings. Male unionisation increases male earnings relative to female earnings significantly while female unionisation increases female earnings by a larger amount than male earnings, however, the effect is statistically insignificant. After taking into account the effect of female representation in unions (PWUNION), it is observed that the coefficient of aggregate unionisation in the female equation exceeds that of males by 29%. If the female representation in trade unions increases by 10% the mean female earnings increase to $521 while the mean male earnings increases by $153. The government sector unionisation has no significant impact on earnings of either male or female, while private sector unionisation increases male earning by a larger magnitude than female earning. The null hypothesis of all coefficients in the male earnings equation is identical to that of the female earnings

equation cannot be rejected by the F-test (see Table A2 in the Appendix). The results suggest that the female endowment of earnings-enhancing characteristics as a whole was evaluated in a similar fashion as that of the male in 1981.

C. A Comparison between 1971 and 1981 Results

The empirical evidence reveal substantial differences in coefficients between 1971 and 1981. A Chow test suggest that observed difference in the set of all coefficients over the decade are statistically significant (see Table A3 in the Appendix). The effect of unionisation on the gender earnings gap changed substantially over the decade. Using formula 3.1, the gender earnings gap attributed to the discriminatory role of unions is computed for each Canadian city/region for both 1971 and 1981. Figure 5 presents the estimated gender discrimination index, DI_u^j. The figure suggests that trade unions contributed to an increase in the male-female earnings gap in 1971 and a decrease in the gap in 1981. If unions had not discriminated against females in 1971, the gender earnings gap would be 5 to 15 percent lower in most Canadian cities/regions. The discrimination index for 1981 indicates that unions reduced male-female earnings gap by a magnitude between 1 to 4 percent in every city/region in Canada. However, the 1981 finding was statistically insignificant at the 5 percent level. Furthermore, the variance of the discrimination index was lower in 1981 than that of 1971 which indicate a convergence of unionization effects in Canadian cities/regions. Some possible explanations for the results are the following. First, over the period 1971-81 the male control over unions diminished due to a large increase in female representation in unions in all cities and regions, except Rural Alberta (see Figure 3). Second, social attitudes toward female workers have changed, and it has become difficult for unions to exclude females from higher paid occupations due to the enforcement equal opportunity principle in the work place. Third, discrimination against females involves some costs. More precisely, in 1981 the marginal gain from discrimination in the form of a higher wage (or utility) might

be less than the marginal cost of discrimination in the form of the loss of union membership and erosion of social reputation.

(Insert Figure 5)

5. Conclusions

This study provides some evidence on the impact of trade unions on the gender-earnings differential in the Canadian labour market. The empirical results for 1971 indicate that unionisation increases male earnings more than female earnings while the 1981 results indicate a reverse role of the unions. However, the evidence that unions increased earnings of females by a larger amount than the earnings of males in 1981 was statistically insignificant. The results suggest that a decrease in male-female unionization gap and a reversal in unions' discriminatory role were important factors in reducing the gender earnings gap over the period 1971-1981.

As noted earlier there are only two Canadian studies which investigate the effect of unionisation on the gender earning gap. Those studies use data spanning 1981 to 1988. Analysing the data for 1971 and 1981, the present study fills the gap in the Canadian literature on the unionisation effect. Although the study employed an aggregate data set rather than micro data, the findings of this paper together with those of Doiron and Riddell (DR, 1994) can be used to trace the impact of unionisation on the male-female earnings gap over the period 1971 to 1988. Over this time span, unions' role changed significantly. In 1971, the unions contributed to an increase in the male-female earnings gap, while in 1981 unions reduced the male-female earnings gap. The latter result is derived in both DR and the present study. Investigating three cross-sectional data sets (1981, 1984 and 1988), DR observed a gender-earnings gap reducing role of trade unions over the time span 1981-88. They conclude that the fall in the gender unionisation gap was a major factor contributing to lower male-female earnings gap rather than the change in the extent in which unions differentially affect male and female earnings. The former refers to pure composition effect while the latter refers to unions' discriminatory role. The present

study complements the findings of DR and can be used to identify a secular improvement in the discriminatory role of trade unions in Canada over the period 1971-1988. However, the evidence of this secular trend in union behaviour is not supported by the study of Maki and NG (1990). Using one of the DR data sets, the 1984 Survey of Union Membership, they observed that unions increased the male-female earnings gap in 1984. One possible reason for obtaining a different result from the same survey is the methodological difference between DR and MN.

Table 1

Variable Definitions

Variable name	Definition
Dependent Variable: Y	Mean annual labour income in a city/region
(a) Industry-mix variables:	
MFG	Proportion of employed labour force in manufacturing
CON	Proportion of employed labour force in construction
TCU	Proportion of employed labour force in transportation, communication, and utilities
TRD	Proportion of employed labour force in wholesale and retail trade
FIR	Proportion of employed labour force in finance, insurance, and real estate
CBP	Proportion of employed labour force in community business and personal services
PAD	Proportion of employed labour force in public administration and defence
PRI	Proportion of employed labour force in primary industries
(b) Human capital and other control variables	
AGE	Proportion of employed persons aged 25-64 years
FIW	Proportion of employed persons who worked full-time
FYW	Proportion of employed persons who worked full-year (49-52 weeks)
ED9	Proportion of employed persons with less than grade 9 education
EDS	Proportion of employed persons with more than grade 9 education and without a university degree
EDU	Proportion of employed males persons with university degree
(c) Unionisation variables:	
UNION	Union members in proportion to total employed workers
MUNION	Male union members in proportion to total employed male workers
WUNION	Female union members in proportion to total employed female workers
PWUNION	Female union members in proportion to total union members
GUNION	Proportion of public sector union members in total employed labour force
PUNION	Proportion of private sector union members in total employed labour force

Notes:
1. Data source: 1971 and 1981 Canadian census
1971 and 1981 issues of the Corporations and Labour Unions Returns Act, Part II
2. Units of analysis: 22 metropolitan cities and 10 regions in Canada

Table 1

Estimated Earnings Equations for 1971

Independent variable	Eq.12		Eq.13		Eq.14		Eq.15	
	Male	Female	Male	Female	Male	Female	Male	Female
MFG	4167.5 (.82)	3249.4 (1.52)	1649.9 (0.36)	3354.8 (1.48)	4373.3 (0.85)	3284.6 (1.52)	3173.1 (0.59)	3093.3 (1.38)
CON	4432.3 (0.47)	1805.8 (0.54)	1494.9 (0.18)	1732.3 (0.48)	4473.6 (0.47)	1708.7 (0.50)	4244.6 (0.45)	1574.4 (0.45)
TCU	2193.7 (0.27)	476.6 (0.12)	-3203.4 (-0.42)	199.8 (0.05)	2908.5 (0.34)	316.3 (0.08)	-1125.7 (-0.12)	-14.4 -0.01)
TRD	-6389.4 (-0.81)	-1103.1 (-0.28)	-8092.8 (-1.08)	-127.9 (-0.03	-7893.3 (-0.97)	-301.1 (-0.07)	-5522.5 (-0.69)	-1131.6 (-0.27)
FIR	9456.3 (0.82)	17139.7 (3.05)	10418.3 (1.02)	16622.2 (2.82)	11129.0 (0.94)	16730.6 (2.92)	8600.7 (0.73)	16824.8 (2.88)
CBP	-1442.6 (-0.25)	2993.7 (1.23)	-1167.2 (-0.23)	3037.6 (1.18)	-416.9 (-0.07)	2665.9 (1.06)	-1978.9 (-0.34)	2989.6 (1.20)
PAD	181.1 (0.04)	2490.4 (1.42)	-2461.7 (-0.63)	2485.4 (1.33)	164.9 (0.04)	2596.5 (1.46)	-2621.8 (-0.43)	1926.9 (0.78)
PRI	2380.3 (0.51)	3402.4 (1.63)	813.0 (0.20)	3529.8 (1.60)	2771.4 (0.59)	3357.4 (1.59)	1567.9 (0.32)	3290.2 (1.52)
AGE	-6566.2 (-1.23)	-477.7 (-0.25)	-1253.0 (-0.26)	-641.1 (-0.33)	-5619.1 (-1.02)	-530.1 (-0.28)	-5105.4 (-0.88)	-465.2 (-0.24)
FTW	15011.4 (2.38)	-572.3 (-0.35)	12093.4 (2.10)	-631.5 (-0.37)	13929.2 (2.14)	-292.9 (-0.17)	14279.0 (2.20)	-262.2 (-0.14)
FYW	-2727.9 (-1.07)	-72.7 (-0.03)	-3102.7 (-1.35)	-248.7 (-0.10)	-2424.1 (-0.93)	-523.5 (-0.22)	-2762.6 (-1.07)	-359.8 (0.15)
ED9	-7875.6 (-5.31)	829.5 (0.53)	-6311.1 (-4.28)	869.3 (0.51)	-7768.0 (-5.16)	560.9 (0.34)	-6947.5 (-3.44)	959.6 (0.58)
EDU	7217.6 (1.27)	9871.9 (2.09)	8876.0 (1.74)	9738.4 (1.94)	8172.9 (1.39)	8567.9 (1.68)	6875.3 (1.19)	9481.9 (1.90)
UNION	2753.3 (3.20)	1476.8 (3.31)			2579.1 (2.87)	1570.7 (3.34)		
PWUNION					-944.3 (-0.79)	481.2 (0.73)		
MUNION			3317.2 (4.27)	1176.7 (2.47)				
WUNION			-1133.0 (-0.95)	834.1 (1.07)				
GUNION							7140.7 (1.11)	2643.5 (0.74)
PUNION							2896.4 (3.22)	1530.9 (3.15)
R	0.93	0.88	0.95	0.87	0.94	0.88	0.94	0.88
F-statistic	19.73	9.86	23.30	8.34	18.00	8.95	17.82	8.71

Notes: t-values in parentheses below the coefficients.

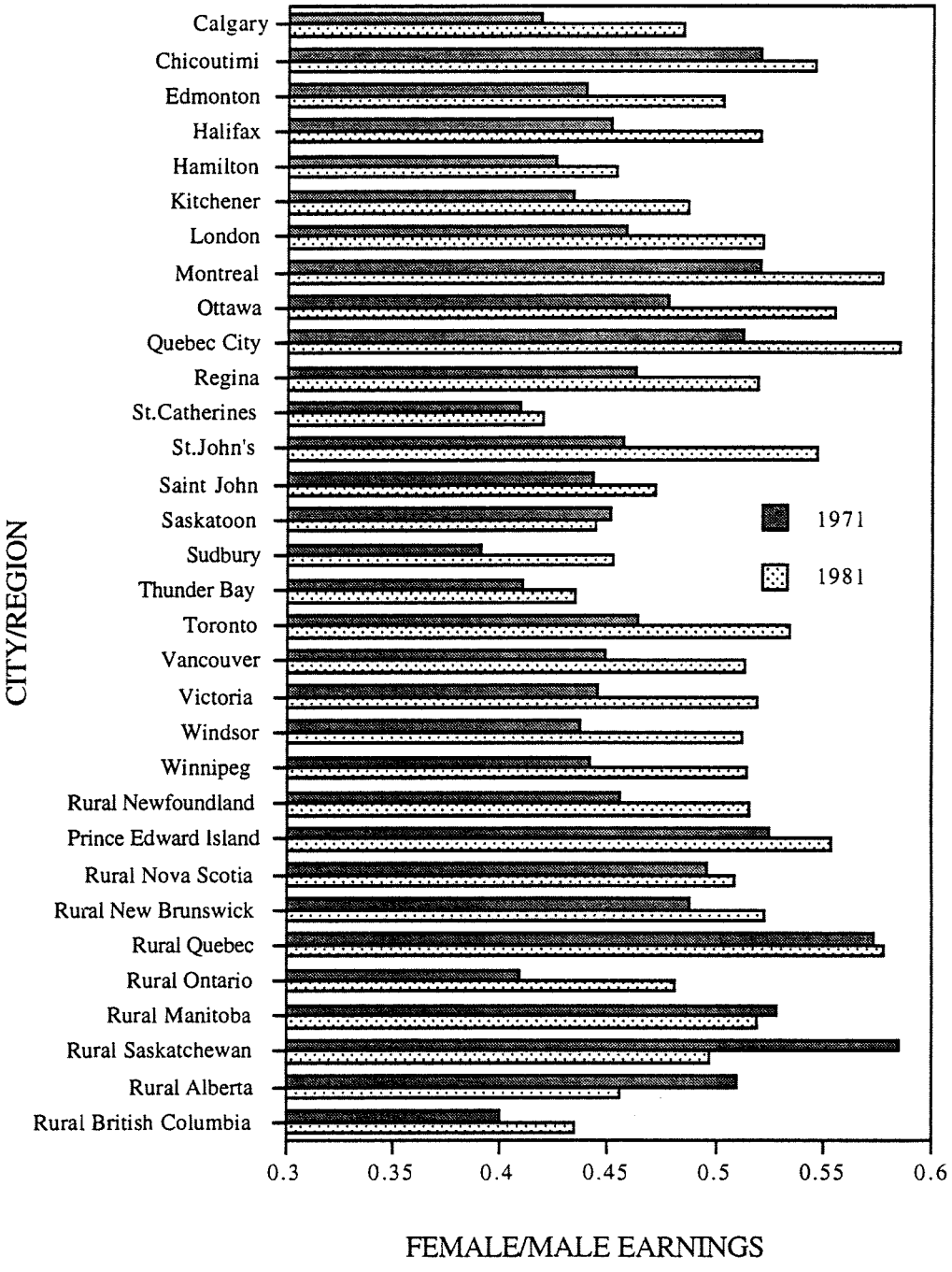
Table 2

Estimated Earnings Equations for 1981

Independent variables	Eq.16		Eq.17		Eq.18		Eq.19	
	Male	Female	Male	Female	Male	Female	Male	Female
MFG	-26024.1 (-1.78)	-24031.8 (-2.94)	-25770.9 (-1.78)	-20270.2 (-3.39)	-26409.9 (-1.77)	-22638.5 (-3.45)	-21927.5 (-1.47)	-23505.6 (-2.79)
CON	-16510.7 (-0.67)	16433.1 (1.70)	-14669.0 (-0.60)	22270.0 (3.15)	-14471.4 (-0.57)	19445.0 (2.50)	-12484.2 (-0.50)	17054.2 (1.72)
TCU	-19068.3 (-1.23)	-29234.0 (-2.80)	-21311.3 (-1.35)	-24783.5 (-3.18)	-19589.8 (-1.23)	-28486.9 (-3.39)	-16710.1 (-1.08)	-28896.3 (-2.70)
TRD	-33012.5 (-1.67)	-20077.3 (-2.26)	-33185.2 (-1.66)	-15712.9 (-2.44)	-32711.6 (-1.61)	-19731.4 (-2.77)	-28842.8 (-1.44)	-19502.4 (-2.13)
FIR	-30522.7 (-1.10)	-8399.1 (-0.44)	-29277.4 (-1.06)	-14148.1 (-1.01)	-33013.8 (-1.14)	-14356.8 (-0.92)	-26207.1 (-0.94)	-7739.4 (-0.39)
CSP	-37406.4 (-2.31)	-19345.6 (-2.14)	-37395.7 (-2.31)	-23275.9 (-3.55)	-39724.5 (-2.30)	-25328.7 (-3.38)	-33638.3 (-2.05)	-18960.5 (-2.04)
PAD	-33799.7 (-2.43)	-23014.4 (-2.97)	-33302.8 (-2.42)	-21649.9 (-3.87)	-34618.8 (-2.42)	-23841.0 (-3.84)	-22753.4 (-1.35)	-20626.2 (-2.22)
PRI	-19316.2 (-1.40)	-19441.3 (-2.52)	-19081.1 (-1.39)	-17492.0 (-3.13)	-20407.7 (-1.42)	-20407.1 (-3.29)	-15189.6 (-1.07)	-18871.4 (-2.37)
AGE	15060.1 (1.26)	23044.7 (2.97)	14142.8 (1.19)	22176.9 (3.96)	15923.2 (1.29)	22477.4 (3.61)	10176.6 (0.81)	22325.7 (2.77)
FTW	40469.2 (2.57)	4967.5 (1.38)	41254.9 (2.66)	3592.1 (1.36)	39736.1 (2.45)	4869.7 (1.68)	40057.2 (2.56)	4895.6 (1.33)
FYW	2169.8 (0.42)	11799.9 (3.08)	1626.1 (0.33)	10059.8 (3.73)	2404.6 (0.45)	10997.9 (3.56)	1615.6 (0.31)	11745.6 (3.00)
ED9	-30486.1 (-4.32)	2060.1 (0.28)	-29569.9 (-4.16)	2724.3 (0.51)	-30030.9 (-4.13)	793.3 (0.13)	-30575.9 (-4.37)	2005.6 (0.27)
EDU	11983.7 (1.13)	4601.5 (0.53)	10030.5 (0.94)	10869.8 (1.68)	12507.2 (1.15)	8728.5 (1.24)	12714.3 (1.21)	4913.4 (0.55)
UNION	4844.6 (1.48)	5411.8 (3.30)			5461.2 (1.52)	7646.0 (5.16)		
PWUNION					1527.4 (0.48)	5212.2 (3.31)		
MUNION			4086.3 (1.58)	1865.7 (1.80)				
WUNION			2439.9 (0.60)	9602.9 (5.10)				
GUNION							-4350.1 (-0.50)	2901.5 (0.54)
PUNION							5765.8 (1.72)	5536.9 (3.26)
R	0.91	0.88	0.92	0.94	0.92	0.93	0.92	0.88
F-stat	14.79	10.26	13.70	19.66	13.17	15.56	14.06	9.14

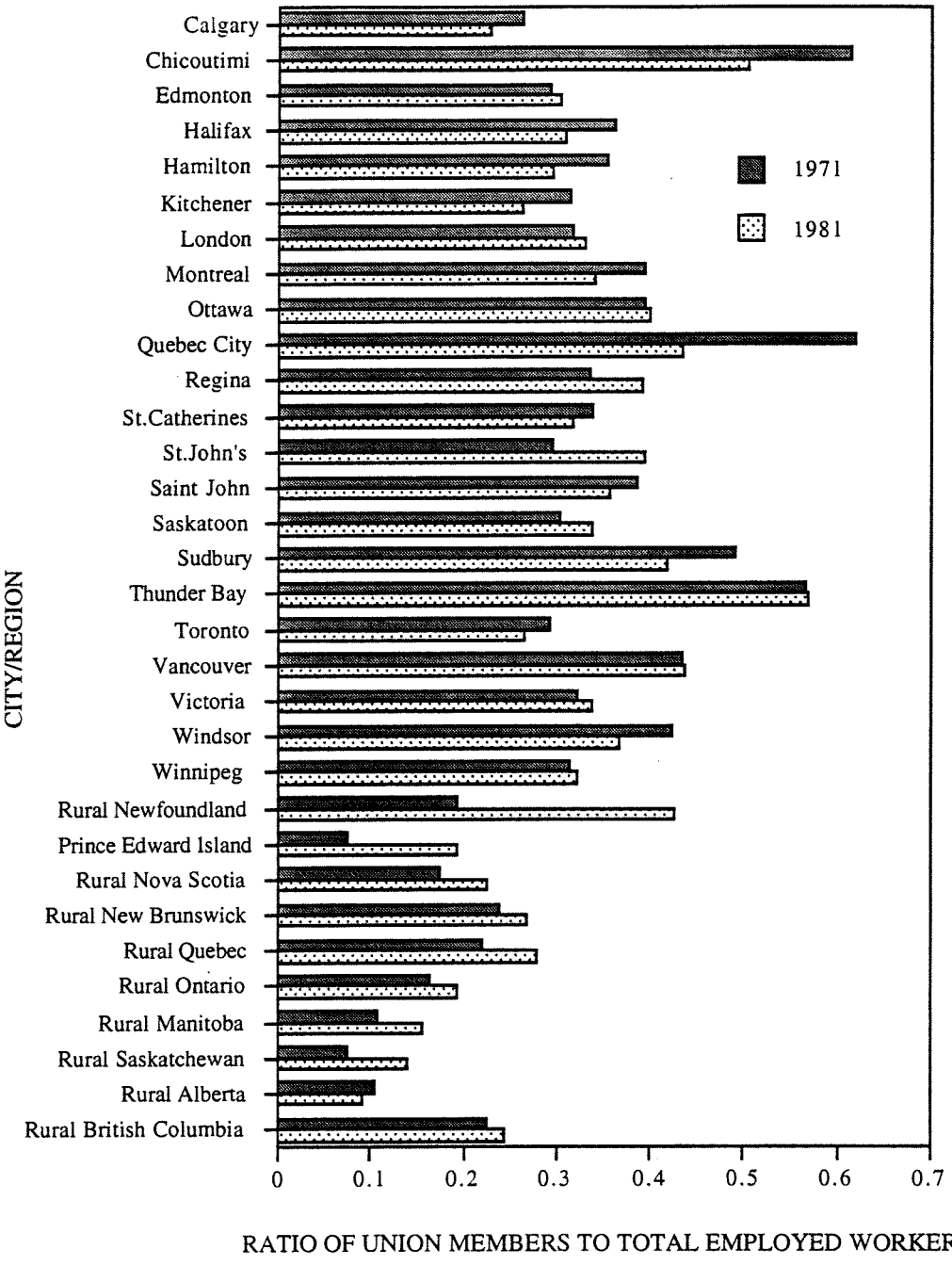
Notes: t-values in parentheses below the coefficients.

FIGURE 1: FEMALE-MALE ANNUAL EARNINGS RATIO IN 1971 AND 1981



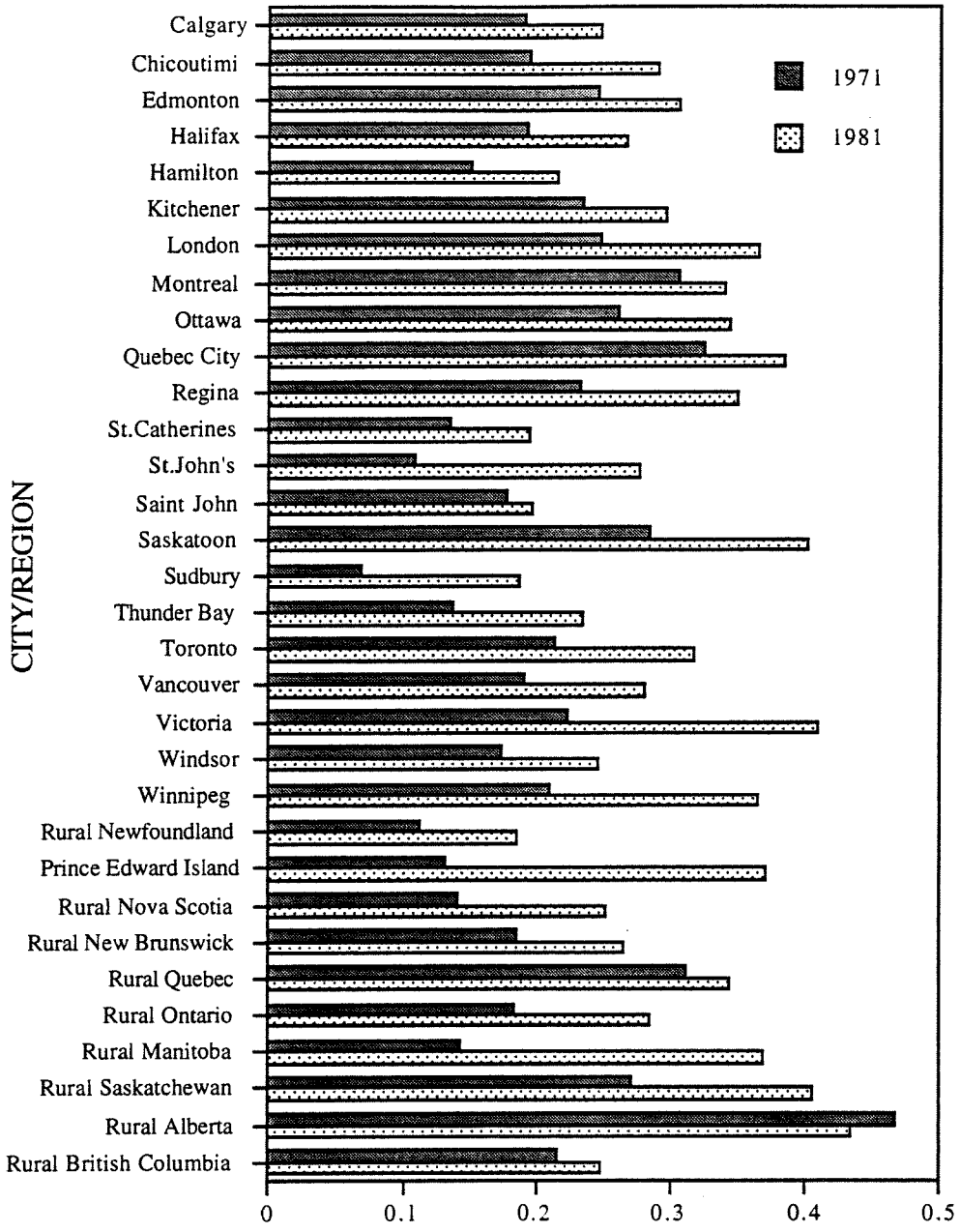
Data source: 1971 and 1981 Canadian Censuses.

FIGURE 2: UNIONIZATION RATES IN 1971 AND 1981



Data source: Corporation and Labour Returns Act, Part II, 1971 and 1981 Report, Ottawa

FIGURE 3: FEMALE UNION PARTICIPATION IN 1971 AND 1981



Data source: Corporation and Labour Returns Act, Part II, 1971 and 1981 Report, Ottawa

Figure 4: The Male Market Power

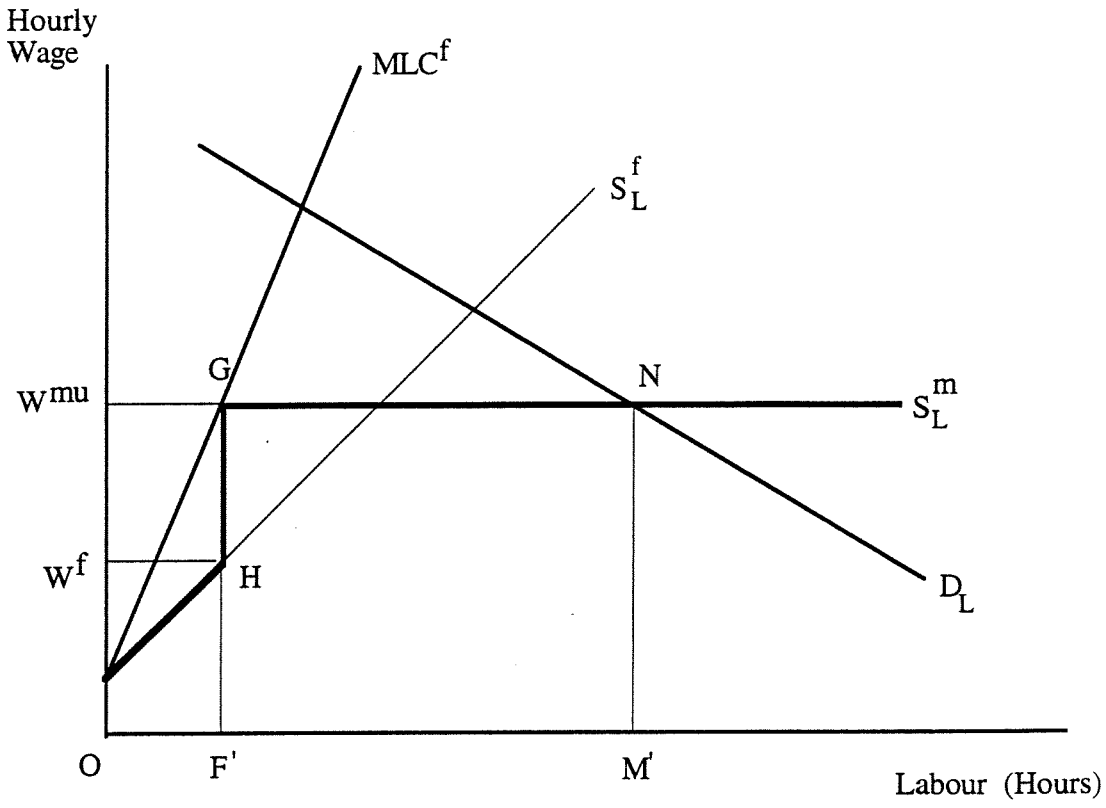
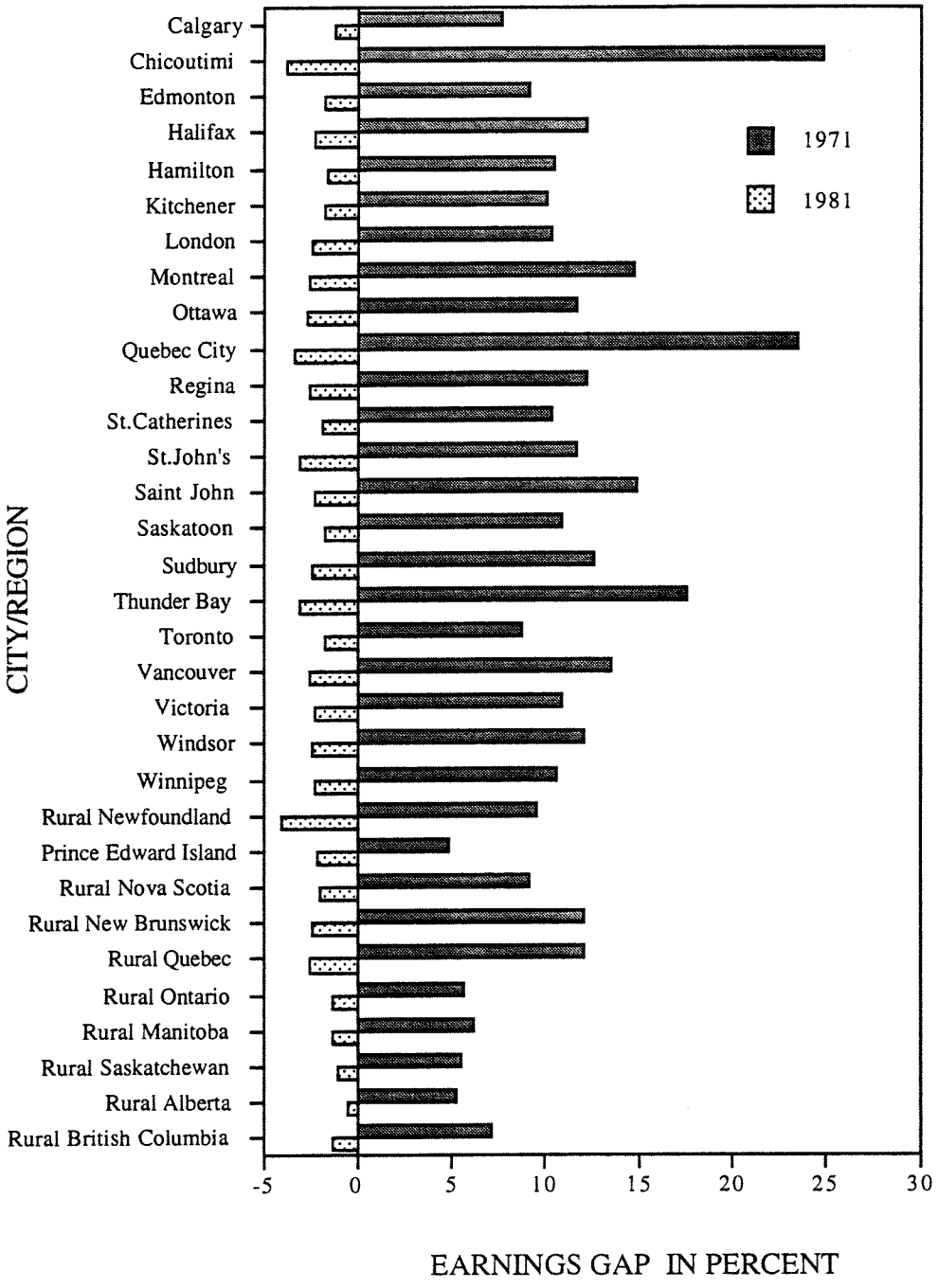


FIGURE 5
PERCENTAGE OF THE MALE-FEMALE EARNINGS GAP
ATTRIBUTED TO UNIONIZATION IN 1971 AND 1981



Source: Estimates equations 1.1 and 1.2 for 1971 and 1981

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Appendix

Canadian Cities and Regions

Notes: Rural area of each province is defined as the area of the province net of metropolitan cities within the province..

1. Calgary, Alberta	2. Chicoutimi, Quebec	3. Edmonton, Alberta
4. Halifax, Nova Scotia	5. Hamilton, Ontario	6. Kitchener, Ontario
7. London, Ontario	8. Montreal, Quebec	9. Ottawa, Ontario
10. Quebec, Quebec	11. Regina, Saskatchewan	12. St. Catherines, Ontario
13. St. John's, Newfoundland	14. Saint John, New Brunswick	15. Saskatoon, Saskatchewan
16. Sudbury, Ontario	17. Thunder Bay, Ontario	18. Toronto, Ontario
19. Vancouver, B. C.	20. Victoria, B. C.	21. Windsor, Ontario
22. Winnipeg, Manitoba	23. Rural Newfoundland	24. Prince Edward Island
25. Rural Nova Scotia	26. Rural New Brunswick	27. Rural Quebec
28. Rural Ontario	29. Rural Manitoba	30. Rural Saskatchewan
31. Rural Alberta minus	32. Rural British Columbia	

Table A1

Test for the Differences in Regression Parameters:
Male Versus Female Earnings Equations: 1971

Equations no.	Computed F-value
Eq. 1.1 and 1.2	3.40
Eq. 2.1 and 2.2	3.00
Eq. 3.1 and 3.2	2.92
Eq. 4.1 and 4.2	2.59

Note: Critical F = 1.88 at the 5% significance level .

Table A2

Test for the Differences in Regression Parameters:
Male Versus Female Earnings Equations: 1981

Equations Number	Computed F-value
1.1 and 1.2	0.85
2.1 and 2.2	0.93
3.1 and 3.2	0.78
4.1 and 4.2	0.78

Note: Critical F = 1.88 at the 5% level of significance.

Table A3

Stability Test of the Earnings Equations: 1971-1981

Equation Number	Computed F-value
1.1 (Male)	7.27
1.2 (Female)	4.95
2.1 (Male)	6.47
2.2 (Female)	6.32
3.1 (Male)	6.17
3.2 (Female)	5.67
4.1 (Male)	6.38
4.2 (Female)	4.52

Note: Critical F = 1.88 at the 5% level of significance.

Footnotes

[1]See Blinder (1973); Holmes (1976); Gunderson (1979); Filer (1983); Shapiro and Stelcner (1987).

[2]Note that mean earnings in 1971 was $6476 and $2980 for males and females respectively, and in 1981 it was $16731 and $8430 for males and females, again respectively. In the presence of this absolute earnings differential in favour of males, even if unions negotiate for higher percentage wage increases for females, it may not necessarily imply a reduction in absolute gender wage gap.

[3]This model can be viewed as an application of Robinson's (1933) monopsony model to an analysis of the effect of unionisation on the gender wage gap. An imperfectly competitive model is less restrictive than a competitive model in analysing the gender earnings gap because, given any difference in male-female wage elasticity of labour supply, in the former model gender earnings gap may result from both wage and employment (number of hours) differential while in the latter model the annual earnings gap arises only from the differences in employment by gender. Becker developed his demand discrimination model (1971) under a competitive market structure in which firm profits are sacrificed in order to enjoy the commodity of discrimination. In this model utility maximising employers equate the value of marginal product of labour net of a gender-specific discrimination coefficient to the nominal wage. Under the assumptions of a distaste for female workers and no distaste in relation to male workers, the Backer model predicts lower female wage. This model has little empirical content since the prediction of this model depends on the prejudice of one group against the other. Moreover, in the long-run discrimination should disappear, because the utility maximising discriminating firm will not be able to compete with the profit maximising non-discriminating firm in a competitive market. Madden (1975) is of the opinion that gender discrimination is the manifestation of male market power rather than an outcome of the acts of utility maximising employers who have distaste for female employees.

[4]It is assumed that the monopsonist is a competitive seller in the product market.

[5] If employers believe that females have a smaller endowment of human capital and are therefore less productive on the average, then gender may serve as a low cost screening device. Consequently, females whose productivity characteristics are above the average or equivalent to males will be subjected to statistical discrimination.

[6]See Appendix I for a list of the cities and regions.

[7]Note that observations on each independent variables can take values between 0 and 1. Therefore the coefficients can not be interpreted as the effect on earnings due to a unit change in the independent variable. For example an increase in the unionisation rate (UNION) by 1 percent increases the average male earnings by $27.53.

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