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The Impact of Recession on the Distribution of Annual Unemployment

Charles M. Beach
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The authors use microdata from the Canadian Annual Work Patterns Survey for 1978, 1980 and 1982 to compare the distributions of the annual unemployment experiences of persons

In this paper we look at cyclical changes in the distribution of unemployment experienced by persons during a year. It should occasion no surprise that when the general degree of slack in the labour market increases, the typical unemployed person tends to suffer more unemployment over any given period. Statistics Canada (1983) has, moreover, already documented from the Annual Work Patterns Survey (AWPS) data¹ that the 1981-82 recession in Canada has had this effect.

The data on annual unemployment experience of persons are summarized in Table 1² for the years 1978, 1980, and 1982. It is seen that the overall mean annual length of unemployment, as well as that for each age-sex group, except for men 55-65, was shortest in 1980 and longest in 1982³. It is also interesting to observe that unemployed women in each age group have, on average, fewer weeks of unemployment within each year than men⁴, and that for each sex the average total weeks of annual unemploy-

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1 For a fuller description of these data, see *Statistics Canada* (1983) and BEACH and KALISKI (1981) and BEACH, KALISKI, and SKULMIS (1983).

2 Our results are derived not from the *Statistics Canada* (1983) publication, but from micro data tapes supplied by them. We have chosen somewhat different years and age aggregations but, where they are comparable, the averages shown in Table 1 correspond to or are compatible with those reported by *Statistics Canada* (1983, Table 4).

3 The exception, moreover, is not significant at the 5 percent level.

4 Despite the well-known fact that unemployment rates, as measured by the Labour Force, are higher for women than for men and highest for young persons under 25.

ment increase monotonically with age except for a single (insignificant) inversion⁵. This is a stronger result than the well established fact that the average duration of an unemployment *spell* is shorter for women and teenagers.

Our purpose in this paper is to present an alternative set of cyclical unemployment comparisons for total annual weeks of unemployment experienced, based upon the *entire distribution* of unemployment experience. This approach has the advantage of utilizing far more of the information contained in a set of micro data than just mean duration figures such as in Table 1. In particular, it will permit us to discuss the impact of the 1981-82 recession on the concentration of unemployment so prominent in recent literature (e.g. Clark and Summers (1979), Hasan and de Broucker (1982, 1985)), and on the degree of equality of the burden of annual unemployment across the population. Clark and Summer (1979), Frank and Freeman (1978), and Bowers (1980) have pointed out, the distributional burden of higher unemployment is not shared uniformly among the unemployed. For example, Clark and Summers found that, for the United States between 1969 (when the unemployment rate was 3.5%) and 1975 (when it was 8.5%), the percent of total weeks of unemployment that was of 1-14 weeks' duration declined from 33.5% to 18.2%, while that of 40 weeks or more increased from 15.8% to 32.5%. This decline in the share of short duration and rise in that of long may suggest that the concentration of the burden of unemployment rises in times of recession and slack labour markets.

The present analysis is carried out in the framework of Lorenz curves and relative unemployment shares. This would seem to be a natural if somewhat novel approach, as it focuses attention on relative shares of total unemployment which is a principal issue of concern in the current debate on different views of the labour market. Lorenz curve analysis also has the advantage over such conventional distributions of unemployment length as those cited above by Clark and Summers or presented by Statistics Canada (1983, pp. 154-6) of permitting formal statistical inference as well as description (Beach and Kaliski (1984)).

THE DISTRIBUTION OF UNEMPLOYMENT BY DURATION

Age-sex Groups

The distributions of unemployment experience for all men and women for 1978, 1980, and 1982 are presented in Tables 2 and 3⁶. Results are

⁵ That between women aged 20-24 and 25-54 in 1980 ($T = 0.86$).

⁶ Similar tables for each of the age-sex groups shown in Table 1, and also by sex and education, sex and marital status, and region are available from the authors.

presented for decile groups of persons with some unemployment in each year. The first column for each year provides shares (for each decile group) of the total weeks of unemployment experienced in the economy that year; and the second column provides the decile level or number of weeks of unemployment that is the upper bound of each decile group. As can be seen, these latter decile levels vary positively with the mean level of unemployment experienced (provided in the last row).

These tables all show a marked degree of concentration of the total unemployment experienced during each year in the upper tail of the distribution⁷. For both men and women, and for each year, the upper three deciles contain more than 60 percent of the total weeks of unemployment experienced. Indeed, if one examines each of the eight age-sex groups in Table 1 individually, these three upper deciles always contain more than 56 percent of the total unemployment for men and more than 59 percent for women⁸. By contrast, the three lowest deciles shown in Tables 2 and 3 never account for as much as 7.5 percent of total unemployment.

The degree of concentration in the upper shares of the distribution, however, is not constant over the three years, but appears to vary cyclically. Cumulative upper shares are, in all cases, lowest in 1982 and highest in 1980. Nor is this observation confined to the upper three deciles. As can be seen from the tables, it holds also for the upper quintile, and for the top decile. All these differences save one are, moreover, highly significant (estimated t-statistics all save one exceed at least 3.24). Cumulative upper and lower decile shares for separate age-sex groups in 1980 and 1982 are summarized in Table 4.

Consistent as these results are, it is clearly hazardous to base any generalization on only three annual sets of observations. There is some suggestion, however, that (perhaps surprisingly in light of the Clark and Summers findings cited above) the extent of concentration in the upper tail of the distribution of annual unemployment experienced by individuals is lower in years characterized by higher unemployment rates. Whether or not this is so in general, it is worth noting that (given the chronology) these changes cannot be the result of the sort of gradual evolution that can be approximated by a time trend. Nor are they likely to result from changes in the demographic composition of the labour force. The pattern observed holds for each age-sex group shown in Table 4, separately. Indeed, for men

⁷ From the tables, the share of unemployment in the upper part is, of course, the complement of the Lorenz curve ordinate (or cumulative share) of the previous decile. Thus, from Table 3, for example, the upper 30 percent of all unemployed men in 1978 experience 62.2 percent of the total number of weeks of unemployment.

⁸ See Table 4 for summary results. The complete tables are available from the authors.

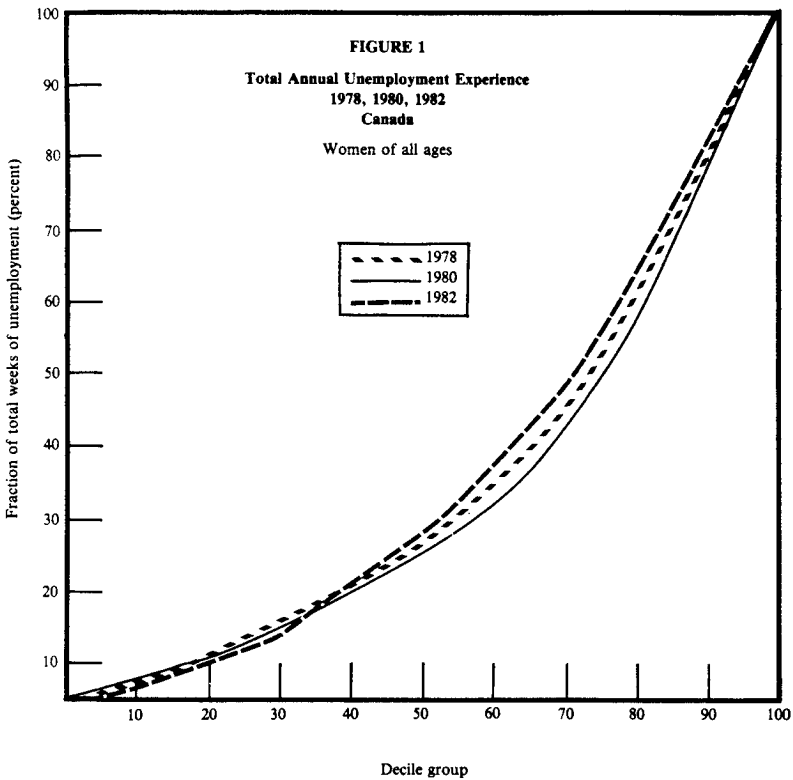
55-65, for whom alone mean total weeks of unemployment are higher in 1978 than in 1982, the concentration in the upper 10, 20 and 30 percent of the distribution is also higher in the latter year. Of course, as one would expect, not all the differences for individual age-sex groups are significant as can be seen from Table 4.

These results do not signify that, overall, the distribution of unemployment experience was more equal in those years in which unemployment was higher, however. For the totals and for most separate age-sex groups⁹, the first decile, and often the first few together contain a larger share of total unemployment in 1980 than in 1978, and in 1978 than in 1982. The differences between first decile shares for men and women of all ages are again highly significant, as can be seen by inspection from Tables 2 and 3. That is, lower shares of unemployment experience appear to increase in periods of expansion and to decrease in periods of recession.

Thus, the results taken together imply that the Lorenz curves for the distributions for each of the three years intersect at the lower extreme. See Figure 1. Years in which unemployment was higher have smaller shares of unemployment at both the top and the bottom extremes of the distributions. This differs markedly from the case of unemployment spells where the Lorenz curve of spell durations is found to shift down or out uniformly in periods of recession (Beach and Kaliski, 1985). In the present case of unemployment experience, the Lorenz curve of durations does not shift uniformly, but pivots near its lower end, so that the bottom end of the curve shifts down while the remainder of the curve shifts up in times of recession.

We have already indicated our initial surprise at finding that the concentration in the upper shares of unemployment experience was inversely related to the unemployment rate. The reader who shares that surprise is likely extrapolating rather loosely from the notion that the unemployment burden of a recession is borne principally by those hardest hit (see the findings cited above by Clark and Summers (1979), and similar results in Bowers (1980)). It should be clear that nothing that we have found negates this. Even in 1982, only 28 percent of those who were in the labour force at any time during the year experienced any unemployment. In 1980 the fraction was 22 percent (Statistics Canada, 1983, 139). Moreover, more than 60 percent of that unemployment was experienced by the 30 percent of all unemployed persons or less than 8 1/2 percent of the annual labour force

⁹ The exceptions are the distributions for men 20-24 and 55-64 in which an equal and smaller share, respectively, is found in the first decile in 1980 than in 1978. Indeed, in both these cases, the 1980 Lorenz curve is over its entire length below the 1978 one indicating greater equality in 1978. Only for the older men is this difference significant, however (estimated $\chi^2 = 136.3$ with 9 degrees of freedom, critical $\chi^2_9 = 21.7$; for men 20-24, the estimated $\chi^2 = 13.7$).



who suffered most unemployment. The average unemployed person was unemployed for a larger portion of the year in 1982 than in more prosperous years (Table 1). What has happened is that the entire distribution of unemployment experience has spread out towards longer durations in periods of recession. See the decile level figures in Tables 2 and 3. The lower bounds, in weeks, of the eighth, ninth and tenth deciles (i.e., the decile levels or upper bounds of the previous decile in Tables 2 and 3) were lowest in 1980 and highest in 1982 with a single exception. Thus, those in the upper tail of the distribution did suffer *more unemployment* in 1982 though *not a larger share* of the year's total unemployment. The use of Lorenz curves and relative shares thus clarifies one's understanding of what happens to the concentration of unemployment experience: while the proportion of long durations (defined by a given duration level such as 40 weeks) increases in a recession, the *relative share* of total unemployment accounted for by the longest 10, 20 or 30% of unemployment experiences decreases.

Viewed in this light, our findings on concentration are perhaps no more surprising than Statistics Canada's (1983) results reported above that the incidence of unemployment was higher in 1982. Indeed, the two may well be aspects of the same phenomenon: the recession extended the experience of unemployment to persons who would not otherwise have been unemployed at all. Not surprisingly, such persons experienced on average a small or moderate amount of unemployment rather than the very largest. Those for whom unemployment is a normal annual occurrence experienced more of it¹⁰.

Regions

Analysis similar to that for age-sex groups can be presented for other aggregations of unemployed persons. In order to reduce this paper to manageable length we confine the comparison to the six major regions of Canada and to the years 1980 versus 1982. The condensed data comparable to those in Table 4 are shown in Table 5. It is seen that the outcome for the regions is very like that for age-sex groups. Except for Québec, the proportion of cases found in both the lowest and the highest deciles and quintiles is higher in 1980 than in 1982. All of the differences in the upper tail and all but two in the lower are significant at the 5 percent level. In Québec there is not significant difference between the lower tails of the two distributions.

SUMMARY AND CONCLUSION

We have examined the distributions of total weeks of unemployment experienced during the year by persons who were unemployed at any time during 1978, 1980 and 1982 as summarized by sets of unemployment deciles and corresponding Lorenz curves. Whether one looks at aggregations into age-sex groups or by major region, the distributions for the recessionary year 1982 typically contain a smaller share of unemployment in both their upper and their lower tails. That is, the Lorenz curve of unemployment durations pivots around its lower end so that the middle and upper parts of the curve rise while the bottom portion falls. We also find that most of these

¹⁰ It should be clear that, since we have only annual segments of labour market experience, this statement is a rationalization of the results and not a direct inference from the data. The analogy with FELDSTEIN'S (1975, 743) suggestion that an unemployment insurance subsidy will increase the *amount* of unemployment but need not increase its average duration is very striking. He argues that although such layoffs as would have taken place regardless are indeed prolonged by the subsidy, additional layoffs of relatively short duration are also likely to occur.

differences are highly significant. It is tempting to interpret these differences as a result of the severe 1981-82 recession. Although at first sight, it may seem odd that a recession would diminish the concentration of unemployment in the upper tail of the distribution, a more careful examination of the impact of labour market slack on both the incidence and the average duration of unemployment provides a sensible interpretation of these results. Only an examination of genuinely longitudinal data can fully verify that interpretation.

So far as we know, none of the studies based upon the only such set of Canadian data in existence — the Employment and Immigration Canada longitudinal data base — have examined this particular question. One of them, Magun (1982, 1983) reports, however, that persons who experience a lot of unemployment in one year are more likely than others to experience a lot in other years. So far as this goes, it is quite consistent with our interpretation.

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TABLE 1

**Mean Duration of Total Employment Experienced During
the Year by Those Having Some Unemployment
(weeks)
AWPS 1978, 1980, 1982**

<i>Group</i>	<i>1978</i>	<i>1980</i>	<i>1982</i>
	(weeks)		
Men, All Ages	15.94 (.14)	14.81 (.13)	19.40 (.13)
15-19	13.78 (.26)	12.29 (.24)	16.41 (.29)
20-24	14.89 (.29)	14.88 (.29)	19.93 (.29)
25-54	16.80 (.21)	15.72 (.20)	20.00 (.19)
55-64	21.87 (.60)	17.90 (.63)	20.88 (.58)
Women, All Ages	14.74 (.15)	13.57 (.14)	16.76 (.15)
15-19	13.15 (.26)	12.15 (.26)	14.28 (.30)
20-24	14.00 (.31)	13.96 (.31)	17.00 (.31)
25-54	15.71 (.22)	13.84 (.21)	17.35 (.21)
55-64	17.51 (.82)	17.11 (.85)	20.14 (.79)
Unemployment Rate (percent):			
Annual average ¹	8.3	7.5	11.0
Excess over 'natural rate' ²	1.7	1.2	n.a.

Standard errors in parenthesis.

1. Statistics Canada (1984, Table 1).

2. Difference between the annual average and the 'natural rate' reported by Riddell and Smith (1982).

Source: AWPS microdata

TABLE 2
Total Unemployment Experience for Women*

<i>Decile Group</i>	<i>1978</i>		<i>1980</i>		<i>1982</i>	
	<i>Decile Shares (%)</i>	<i>Decile Levels (weeks)</i>	<i>Decile Shares (%)</i>	<i>Decile Levels (weeks)</i>	<i>Decile Shares (%)</i>	<i>Decile Levels (weeks)</i>
1	1.46 (.01)	2.16	1.59 (.01)	2.16	1.36 (.03)	4.33
2	2.87 (.05)	4.33	2.68 (.05)	4.33	2.58 (.02)	4.33
3	2.93 (.03)	4.33	3.19 (.03)	4.33	3.02 (.05)	6.50
4	4.78 (.13)	8.66	3.89 (.07)	6.50	4.95 (.05)	8.66
5	5.87 (.06)	8.66	6.21 (.07)	8.66	6.03 (.10)	13.00
6	8.06 (.11)	13.00	7.21 (.12)	13.00	8.09 (.08)	17.33
7	10.41 (.09)	17.33	9.88 (.05)	15.16	10.94 (.06)	21.67
8	13.96 (.11)	23.83	13.67 (.12)	21.67	14.56 (.08)	28.17
9	19.61 (.14)	34.67	19.82 (.15)	32.50	20.00 (.12)	39.00
10	29.98 (.22)		31.82 (.23)		28.42 (.18)	
Mean (weeks)		14.74 (.15)		13.57 (.14)		16.76 (.15)

*Figures in brackets are standard errors.

Source: AWPS microdata.

TABLE 3
Total Unemployment Experience for Men*

<i>Decile Group</i>	<i>1978</i>		<i>1980</i>		<i>1982</i>	
	<i>Decile Shares (%)</i>	<i>Decile Levels (weeks)</i>	<i>Decile Shares (%)</i>	<i>Decile Levels (weeks)</i>	<i>Decile Shares (%)</i>	<i>Decile Levels (weeks)</i>
1	1.35 (.01)	2.16	1.46 (.01)	2.16	1.21 (.02)	4.33
2	2.55 (.04)	4.33	2.25 (.05)	4.33	2.23 (.01)	4.33
3	3.22 (.05)	6.50	2.92 (.02)	4.33	3.73 (.07)	8.66
4	5.12 (.05)	8.66	4.52 (.11)	8.66	4.89 (.03)	10.83
5	6.29 (.10)	13.00	5.99 (.05)	10.83	6.90 (.06)	15.16
6	8.40 (.04)	15.16	8.25 (.05)	13.00	9.06 (.05)	19.50
7	10.84 (.07)	19.50	10.79 (.08)	17.33	11.86 (.07)	26.00
8	14.22 (.09)	26.00	14.14 (.14)	26.00	14.95 (.06)	32.50
9	19.31 (.12)	36.83	19.71 (.11)	34.67	19.52 (.10)	43.34
10	28.64 (.18)		29.93 (.20)		25.60 (.14)	
Mean (weeks)		15.94 (.14)		14.81 (.13)		19.40 (.13)

*Figures in brackets are standard errors.

Source: AWPS microdata.

TABLE 4
Lorenz Curve Ordinates for the Three Lowest and Highest Deciles
Men and Women by Age
1980 and 1982

Decile Group AGE/SEX	1		2		3		7		8		9	
	80	82	80	82	80	82	80	82	80	82	80	82
<i>Men</i>												
15-19	1.46 (.01)	1.21 (.02)	3.71 (.05)	3.44 (.03)	6.64 (.06)	7.18 (.08)	36.21 (.23)	39.91 (.21)	50.35 (.26)	54.87 (.19)	70.06 (.20)	74.39 (.14)
20-24	1.76 (.03)	1.42 (.07)	4.52 (.13)	4.06 (.09)	8.04 (.16)	7.13 (.15)	34.73 (.47)	36.29 (.48)	48.30 (.52)	51.13 (.48)	67.64 (.46)	71.42 (.38)
25-54	1.45 (.02)	1.18 (.05)	3.49 (.10)	3.38* (.11)	6.40 (.13)	7.16 (.17)	35.92 (.50)	40.64 (.42)	50.48 (.55)	55.98 (.42)	70.25 (.43)	75.16 (.28)
55-64	1.37 (.01)	1.18 (.03)	3.54 (.07)	3.51* (.07)	6.66 (.13)	7.38 (.11)	37.36 (.35)	40.98 (.27)	51.68 (.35)	55.74 (.27)	71.05 (.28)	75.00 (.18)
<i>Women</i>												
15-19	1.21 (.04)	1.06* (.10)	3.31 (.16)	3.15* (.20)	6.46 (.47)	6.80* (.31)	38.31 (1.0)	40.47 (.85)	53.13 (.97)	55.42* (.76)	72.73 (.71)	75.29 (.57)
20-24	1.59 (.01)	1.36 (.03)	4.27 (.06)	3.95 (.04)	7.47 (.08)	6.98 (.07)	34.67 (.25)	37.00 (.24)	48.35 (.27)	51.56 (.24)	68.17 (.23)	71.57 (.18)
25-54	1.78 (.03)	1.51 (.03)	4.52 (.14)	4.39* (.12)	8.09 (.18)	7.42 (.16)	35.50 (.55)	35.00* (.53)	48.30 (.60)	48.73* (.56)	66.57 (.54)	68.45 (.45)
55-64	1.55 (.03)	1.31 (.08)	3.91 (.13)	3.86* (.09)	7.01 (.16)	6.99* (.25)	33.62 (.55)	38.15 (.49)	48.11 (.65)	53.12 (.53)	68.74 (.54)	72.60 (.38)
	1.56 (.02)	1.35 (.05)	4.31 (.08)	3.84 (.05)	7.44 (.11)	6.98 (.10)	35.11 (.38)	37.40 (.32)	48.77 (.39)	51.87 (.34)	68.73 (.34)	72.05 (.25)
	1.93 (.16)	1.61* (.12)	4.46 (.24)	4.40* (.26)	8.16 (.60)	8.14* (.43)	36.57 (1.2)	40.70 (1.1)	51.71 (1.4)	56.20 (1.1)	71.54 (1.0)	75.24 (.80)

Standard errors in brackets.

*difference between the two years not significant at the 5 percent level.

Source: AWPS microdata

TABLE 5
Lorenz Curve Ordinates for the Three Lowest and Highest Deciles
All Persons, Regions of Canada, 1980 and 1982

Decile Group Region	1		2		3		7		8		9	
	80	82	80	82	80	82	80	82	80	82	80	82
Atlantic + 11.1 14.3	1.47 (.04)	1.38* (.03)	4.00 (.05)	3.62 (.07)	7.13 (.10)	7.51 (.11)	38.17 (.32)	40.66 (.29)	52.79 (.31)	55.70 (.29)	72.39 (.24)	74.92 (.19)
Québec 9.8 13.8	1.43 (.05)	1.42* (.03)	3.84 (.06)	3.84* (.08)	7.66 (.18)	7.85 (.13)	39.23 (.37)	41.53 (.35)	53.99 (.39)	56.44 (.32)	73.22 (.28)	75.85 (.24)
Ontario 6.8 9.8	1.65 (.02)	1.29 (.01)	3.97 (.10)	3.65* (.06)	7.28 (.12)	6.65 (.12)	35.45 (.42)	36.86 (.37)	49.32 (.45)	51.66 (.37)	68.56 (.38)	71.81 (.28)
Man. & Sask. 5.0 7.7	2.00 (.04)	1.42 (.02)	4.39 (.15)	4.09* (.09)	8.39 (.19)	7.10 (.16)	35.18 (.54)	36.68 (.42)	47.80 (.58)	50.93 (.46)	65.95 (.52)	70.27 (.36)
Alberta 3.7 7.7	2.59 (.06)	1.50 (.02)	5.18 (.12)	3.84 (.10)	9.04 (.26)	6.85 (.13)	36.02 (.62)	35.80 (.47)	47.96 (.66)	50.54 (.54)	66.19 (.65)	70.63 (.42)
Brit. Col. 6.8 12.1	1.89 (.04)	1.48 (.05)	4.09 (.15)	3.79 (.06)	7.88 (.19)	7.62 (.18)	34.14 (.54)	39.51 (.46)	46.97 (.59)	54.31 (.42)	65.88 (.50)	74.04 (.31)

Standard errors in brackets.

+ unemployment rates in 1980 and 1982 shown under each region

* difference between the two years not significant at the 5 percent level.

Source: AWPS microdata

L'impact de la récession sur la distribution du chômage annuel

Dans cet article, nous considérons les changements cycliques dans la distribution des périodes de chômage chez les travailleurs au cours d'une année donnée. On y voit que, pour les années 1979, 1980 et 1982, la longueur moyenne en général des périodes de chômage fut plus courte en 1980 (alors que le taux de chômage était de 7.5%) et plus prononcée en 1982 (lorsque le taux était de 11%). Nous présentons aussi un autre ensemble de comparaisons cycliques fondé sur la distribution totale des périodes de chômage. Ceci permet de mieux interpréter l'impact de la récession de 1981-82 sur la concentration ou le poids relatif du chômage. Le cadre choisi est celui des courbes de Lorenz et des phases de chômage relatif.

Les résultats des tableaux 2 et 3 de l'article indiquent un degré marqué de concentration de la période de chômage pour chacune des années 1978, 1980 et 1982 dans la section supérieure de la distribution du chômage. Tant pour les hommes que pour les femmes, les trois déciles supérieurs incluent plus que 60 pour cent des semaines de chômage subi. Les trois déciles inférieurs ne comptent jamais plus que 7.5% du chômage total. Les résultats indiquent aussi que le degré de concentration dans la section supérieure de la distribution varie d'une façon cyclique et on se rend compte qu'il est plus faible durant les années caractérisées par des taux de chômage élevés. Ces deux résultats sont valables pour les groupes d'âge et de sexe pris séparément ainsi que pour les régions (comme on peut le voir dans les tableaux 4 et 5) et, en général, ils sont très significatifs.

Cependant, ces résultats ne signifient pas que, dans l'ensemble, la distribution du chômage était plus équilibrée dans les périodes de fort chômage. On a aussi découvert que l'intensité du chômage dans la section inférieure de la distribution décroît dans les périodes de récession. Ainsi, les années où le chômage était plus élevé présentaient des plus petites fractions de chômage au sommet et à la base des segments de la distribution. La courbe Lorenz des temps de chômage pivote autour de sa partie inférieure de telle sorte que la section inférieure de la courbe s'affaisse alors que les autres parties s'élèvent en périodes de récession. Cela diffère d'une façon marquée du cas des périodes de chômage où la courbe Lorenz des durées de chômage court s'abaisse uniformément en périodes de récession.

Ces constatations relatives au chômage, cependant, servent à clarifier l'interprétation classique, telle celles de Clark et Summers (1979) et de Bowers (1980) selon lesquelles la proportion des périodes de chômage de longue durée augmente en temps de récession. Les sans-travail sont en général en chômage plus longtemps durant une récession alors que la distribution totale du chômage a tendance à être plus étirée et l'incidence du chômage plus marquée. Les personnes qui se trouvent dans la section supérieure de la distribution subissent davantage de chômage, même s'il ne s'agit pas d'une portion plus grande du chômage dans son ensemble. Ainsi, pendant une récession, ceux qui d'une façon normale sont sans emploi durant une année donnée sont en chômage plus longtemps, mais un nombre supplémentaire de travailleurs deviennent sans travail pendant des périodes d'une durée modérée ou courte.