Unemployment in the Stock and Flow

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Abstract

A framework for the dynamic analysis of unemployment is presented, and applied to Canadian and U.S. data. The focus of the analysis is upon the distinction between being unemployed and becoming unemployed, that is, between the stock and the flow of unemployment. The share of a particular group in the stock of unemployed will differ from its share in the flow into unemployment to the extent that the average duration of unemployment for the group differs from the economy wide average. An analysis of Canadian and U.S. data leads to a series of stylized facts that permit a deeper understanding of unemployment in the two countries, and of the differences between them. Significant differences in the average duration of unemployment imply that stock shares are not good indicators of flow shares, changes in the stock share of some groups are due to changes in the flow share, while for others they are due to changes in the length of unemployment spells. Explanations of the Canada - U.S. unemployment rate gap should try to accommodate at least three facts uncovered by the analysis: (1) that employer initiated permanent separations are the primary means of entry into unemployment in Canada, while labour force entry plays a more important role in the US; (2) unemployment spells are significantly longer in Canada than in the U.S. because of longer spells for most groups regardless of reason for unemployment, not because of a compositional difference in the make up of the unemployed; and (3) that longer spell duration and a higher incidence of unemployment contribute about equally to the trend increase in the Canada - U.S. unemployment differential during the 1980s.

1. Introduction

It has long been recognized that labour markets are very dynamic markets, and more particularly that unemployment is a state through which many people pass. Feldstein's characterization of the "new unemployment" during the early 1970s as well as subsequent work by Clark and Summers ushered in this awareness for many observers. Further, many theoretical explanations of the level and changes in unemployment, as well as the rationale for policy intervention rests on the distinction between the incidence and duration of unemployment spells. To understand unemployment it is important to appreciate the distinction between being unemployed, and becoming unemployed, that is between the stock of unemployed and the flow into unemployment.

In this study we present a framework for the analysis of unemployment stocks and flows, and apply it to the level of unemployment in Canada, to changes in it, and to a comparison between Canadian and U.S. data. At the core of our analysis is the relationship between the share of a particular group in the stock of unemployed and its share in the flow of those becoming unemployed. The extent to which these shares differ depends upon the average length of unemployment spells relative to the economy wide average. Those groups spending a relatively longer time unemployed will form a greater proportion of the stock of unemployed than they will of the flow. Likewise those experiencing relatively shorter spells of unemployment will form a greater proportion of the flow into unemployment than they will of the stock.

We examine data from the Canadian *Labour Force Survey* (LFS) over the period 1977 to 1995 stratified by gender and reason for unemployment. The latter includes job loss (either a temporary or a permanent layoff), quits, and entry or re-entry into the labour market. We find significant differences in the average duration of unemployment spells across these groups that lead to corresponding differences in their stock and flow shares. For example, the stock share of temporary layoffs is typically one half to one third their entrance share because the average duration of an unemployment spell for those temporarily laid-off is about one half the economy wide average. Also, among men, the stock share of job losers is roughly 30% higher than the flow share. We also examine variations in these shares, and find first, that the share of unemployment due to temporary job loss falls during a recession. This is not as a result of any changes in the share of inflows, but rather because those temporarily laid off do not experience any change in the average duration of unemployment spells even though the economy-wide average duration increases significantly. Second, among men, the increase in the stock share of job losers in a downturn overstates their importance as a source of spells. Finally, for women, labour market re-entry is a more important source of unemployment spells during these periods than variation in its stock share suggests.

Our comparative analysis of Canadian and U.S. data covers the period 1980-1988. We find that temporary layoffs are a more important source of unemployment spells in the U.S., while permanent job loss is more important in Canada. While there is some question as to whether these concepts are comparable between the LFS and the *Current Population Survey* (CPS), it remains true that employer initiated separations are the source of over 50% of unemployment inflows in Canada versus closer to 40% in the U.S.

Finally, we also examine how the level of, and variation in, the Canada - U.S. unemployment rate differential is related to differences in unemployment duration and incidence over this period. We find that the cyclical increase in the unemployment rate gap during the recession of the early 1980s was primarily the result of much longer unemployment spells in Canada. However, the trend increase in the unemployment rate over the period is accounted for almost equally by the effects of incidence and duration. We also note that the duration differential is the result of differences in average duration within groups, rather than differences in the composition of the unemployed between the two countries.

We present these findings as a set of stylized facts that explanations of the Canada - U.S. unemployment rate gap must be able to accommodate, and go on to draw some possible inferences. Canada - U.S. differences in average duration by reason for unemployment suggest that Canada's relatively more generous UI program may play some part in the differential. On the other hand, the average spell durations of labour market new entrants and re-entrants are also longer in Canada than in the U.S., and these groups are less likely to be covered by UI in both countries. This result suggests there may be other forces at work. Our evidence also suggests that the employer initiated exit rate from employment into unemployment is higher in Canada. While this result is consistent with recent evidence that the Canadian UI system may induce "churning" in the labour market, we are unable to identify a definitive role to this program in our data. Future research on differences in the incidence of unemployment across the two countries may shed further light on this issue.

2. *Methodology*

Our analytical framework draws on the research of Chesher and Lancaster (1981, 1983) and Salant (1977). The key distinction is between what we refer to as the "entrance share" and "stock share" of a group of unemployed individuals. We divide the unemployed into mutually exclusive and collectively exhaustive groups. The entrance share of a particular group is defined as the fraction of the total number of individuals becoming unemployed accounted for by members of that group. For example, if the groups are indexed by i, let $N_i(x,t)$ represent the number of individuals belonging to that group who have been unemployed for x months at time t. Further, let the absence of a subscript indicate an economy wide total. Then the entrance share of group i at time t is

$$(1) \qquad s_i(t) = \frac{N_i(0,t)}{N(0,t)}.$$

The stock share of group i is defined as the share of the total number of unemployed at time t accounted for by members of the group. In this case, let $U_i(t)$ denote the number of individuals with group i characteristics unemployed at time t. The stock share is given as:

$$(2) \qquad \sigma_i = \frac{U_i(t)}{U(t)} \equiv \frac{N_i(0,t) \bullet D_i(t)}{N(0,t) \bullet D(t)} \quad.$$

The second part of this expression relies upon the familiar steady state identity that the number of unemployed is equal to the product of the number of individuals becoming unemployed and the average completed duration of an unemployment spell, which is denoted as $D(t)$.

The relationship between the stock share and the entrance share is derived by combining equations (1) and (2):

$$(3) \qquad \sigma_i = s_i \frac{D_i(t)}{D(t)} \ .$$

This equation shows that the stock share is the entrance share weighted by the relative average spell duration. If the members of group *i* experience unemployment spells that are on average the same length as the average economy wide spell then the stock share of that group will be the same as its entrance share. Otherwise it will differ, being larger for those groups with longer spell lengths, and lower for those with shorter spells.

Given an estimate of either the stock share or the entrance share the other can be derived if information on the average duration of unemployment for the group and the economy as a whole are also available. The average complete duration of unemployment can be calculated from information on reported spell lengths. The ratio *S(x,t)=N(x,t)/N(x-1,t-1)*, which we call the continuation rate, offers an estimate of the conditional probability that an individual will stay unemployed at least to the *x*th month given that he or she has been unemployed *x-1* months. In other words, this probability can be estimated as the ratio of the number of individuals reporting to be unemployed *x* months at time *t* divided by the number reporting to be unemployed *x-1* months at time *t-1*. These continuation rates are used to calculate the average complete duration of unemployment as:

$$(4) \qquad D(t) = \sum_{x=1}^{n} \prod_{j=1}^{x} S(j,t) \ .$$

This is the discrete time version of the result that in continuous time the average duration of unemployment is the integral of the survivor function. [1]

Equation (3) refers to the level of stocks and flows, but an analogous relationship between changes in them can be derived by taking the natural logarithm of (3) and differentiating with respect to a cyclical indicator. Referring to this indicator as *C*, and expressing the results as elasticities yields:

$$(5) \qquad \varepsilon_{\sigma_i C} = \varepsilon_{s_i C} + [\varepsilon_{D_i C} - \varepsilon_{DC}] \ .$$

In other words, the percentage change in the stock share is the result of two factors: how much the entrance share changes, and how much spell duration changes relative to the economy wide change in average spell duration. By approaching the problem in this way we are not suggesting that the labour market is actually in a steady state throughout the process of change. Rather, we are invoking a thought experiment involving a comparison of two steady states: one in which the economy is held in a

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[1] See Baker (1992a), Baker and Trivedi (1985), and Sider (1985) for more details.

steady state with the configuration of inflow and continuation rates that characterize the cyclical peak, and the other in which these rates are those of the cyclical trough. [2]

3.   *Results for Canada*

Canadian data on stocks, flows, and the duration of unemployment are used for the period from January 1977 through September 1995. To be considered as unemployed respondents to the LFS must be without paid employment during the reference week, and (unless they are temporarily laid-off and expect to be recalled) looking for work. If the job search requirement is not met the individual is classified as not in the labour force. Individuals who are searching for their first job are classified as new entrants, while those who have re-entered the labour force after a period out of it are classified as re-entrants. Those who are not temporarily laid-off, have held employment in the past, and have not left the labour force since their last job separation are asked if they quit their last job. Thus the unemployed are classified into one of the following groups: temporarily laid-off, other job losers (essentially those permanently laid off), quitters, new entrants, or re-entrants.[3]

The stock shares of unemployed are based on counts of the number of unemployed, appropriately weighted to represent country wide totals. The entrance shares are derived from the subset of individuals reporting less than five weeks of unemployment, that is those who would not have been unemployed during the previous month's survey.[4] The reported duration of unemployment is the number of weeks of continuous job search up to and including the reference week of the survey. This is used to derive estimates of the average complete duration, using equation (4), the details being described in Corak (1993).[5]

The data associated with equation (3), stock and entrance shares as well as group specific and the economy wide average duration of unemployment, are presented in Table 1. The stock of unemployed is dominated by those who have permanently lost their jobs. Their stock share is 49%. Males who experienced permanent layoffs are the most numerous, comprising 33% of the stock of unemployed. Female permanent job losers constitute the second largest group with a stock share of 16%. However, women who have re-entered the labour market also represent a significant fraction (14%) of the total stock share. The smallest stock shares are accounted for by new entrants and those temporarily laid-off. Together these groups make up about 10% of the unemployed.

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[2]   In other words we are answering the following question: "If the economy were in a steady state defined by the inflow and exit rates that prevailed at the cyclical peak and then in another steady state defined by the rates that prevailed at the cyclical trough, what are the differences in the stock shares, and are they the result of differences in entrance shares or in relative spell duration?"

[3]   The other job losers category includes, in addition to those permanently laid-off, those whose contracts expired and those who were fired. In what follows we refer to this category simply as the permanently laid-off. Statistics Canada (1992) offers more detail on the methodology of the LFS.

[4]   Some individuals may have become unemployed and either found a job or left the labour force after a very brief spell of unemployment during the month between consecutive surveys. As a result changes in entrance shares may be due in part to relative changes in the average duration of unemployment spells of less than one month in length. In addition, some minor adjustments to these numbers is made to account for a reporting bias inherent in the data.

[5]   In actual fact monthly transition probabilities are derived for the first three months of unemployment. Multi-month periods are used at longer durations because of sample size limitations. This is essentially the same method used by Baker (1992a).

A comparison of stock shares and entrance shares illustrates that neither statistic should be assumed to be a good indicator of the other. Permanently laid-off men have the largest entrance share, but at 26% it is 7 percentage points less than their stock share. For women permanent layoffs may be the largest reason for being unemployed, but labour force re-entry is the most significant reason for becoming unemployed. The entrance share of permanently laid off women is 14%, 2 percentage points less than their stock share. Female re-entrants, on the other hand, have an entrance share of 17%, 3 percentage points higher than their stock share. For both genders the entrance shares for temporary layoffs are more than double the stock shares, suggesting that they are a much more important source of unemployment spells than they are of unemployment.

The differences between entrance and stock shares are explained by the differences between the group specific and economy wide average duration of unemployment. The average duration of unemployment for men who have been permanently laid-off is more than 4 weeks longer than the economy wide average. As a result stock shares exceed entrance shares for this group by a significant margin. In contrast, female re-entrants experience unemployment spells that are about three weeks shorter than the economy wide average with the result that the stock share of this group is lower than its entrance share. In a similar fashion, the stock shares of those temporarily laid off are less than half of the entrance share because the duration of unemployment for these groups is so much shorter than the economy average.

Table 1
Stock Shares, Entrance Shares, and the Average
Duration of Unemployment: Canada, 1977:01-1995:09

	Stock Share (σ_i)	Entrance Share (s_i)	Average Duration (D_i) weeks
Economy Wide			16.5
Men			
Temporary Layoffs	0.04	0.09	9.0
Permanent Layoffs	0.33	0.26	20.7
Quits	0.09	0.07	21.3
New Entrants	0.02	0.02	20.0
Re-Entrants	0.10	0.11	15.2
Women			
Temporary Layoffs	0.02	0.06	7.2
Permanent Layoffs	0.16	0.14	19.8
Quits	0.08	0.06	20.8
New Entrants	0.02	0.03	16.7
Re-Entrants	0.14	0.17	13.7

Table 2
Elasticities of Stock Shares, Entrance Shares,
and Average Duration of Unemployment with Respect
to the Unemployment Rate: Canada, 1977:01-1995:09

	Elasticity of Entrance Share	Elasticity of Average Duration	Predicted Stock Share Elasticity
Economy Wide		0.660 (0.030)	
Men			
Temporary Layoffs	0.173 (0.098)	0.055* (0.118)	-0.432 (0.091)
Permanent Layoffs	0.465 (0.033)	0.769* (0.053)	0.574 (0.052)
Quits	-1.099 (0.059)	0.981* (0.094)	-0.778 (0.112)
New Entrants	0.401 (0.122)	0.844 (0.209)	0.585 (0.234)
Re-Entrants	-0.089 (0.051)	0.714 (0.089)	-0.035 (0.092)
Women			
Temporary Layoffs	-0.143 (0.080)	0.091* (0.074)	-0.712 (0.106)
Permanent Layoffs	0.377 (0.047)	0.583 (0.065)	0.300 (0.070)
Quits	-0.865 (0.073)	0.652 (0.104)	-0.873 (0.129)
New Entrants	0.059 (0.111)	0.746 (0.155)	0.145 (0.199)
Re-Entrants	-0.278 (0.036)	0.483* (0.061)	-0.455 (0.065)

( ) Indicates standard error.
* Indicates a significant difference from the economy wide elasticity.

The cyclical elasticities of the entrance shares, group specific duration, and economy wide duration of unemployment are derived by regressing the natural logarithms of group specific shares ($s_i(t)$), group specific duration ($D_i(t)$), and aggregate duration ($D(t)$) respectively upon the natural logarithm of the unemployment rate, monthly dummy variables to control for seasonal effects, and a time trend. These estimates are then used in conjunction with equation (5) to construct the "predicted" stock share elasticities. The results are presented in Table 2. Entrance share elasticities are positive for those (of either gender) permanently laid-off, for temporarily laid-off males, and male new entrants. They are negative for quitters of both genders, and females who are re-entrants or have been temporarily laid-off. The shares of quitters are the most cyclically sensitive (the elasticity for men being almost -1.1, while that for women being -0.9), followed by those of the permanently laid-off and male new entrants (which range from 0.38 to about 0.47). Thus, a steady state increase of the unemployment rate implies a decline in the share of quitters and female labour force re-entrants, and a rise in the share of those permanently laid-off and males seeking their first job.

As equation (5) makes clear the influence of these changes on changes in stock shares is mediated by the average duration of unemployment: stock share elasticities will differ from entrance share elasticities to the extent that the difference between the elasticities of group specific and economy wide average duration is significantly different from zero. This turns out to be so in five cases: for males who are temporarily laid-off, permanently laid-off, or quit; for females who are temporarily laid-off, and who are labour force re-entrants.[6] In all the other cases, variations in stock shares are essentially the result of changes in entrance shares.

In fact, the proportion of stock share variation due to entrance share variation may be considered to be equal to $\dfrac{|\varepsilon_{s_iC}|}{|\varepsilon_{s_iC}|+|\varepsilon_{D_iC} - \varepsilon_{DC}|}$.[7] In two of the five cases for which differences in the elasticities of average duration matter in determining stock share variations the entrance share is still dominant, accounting for 81% of the change in the stock share of permanently laid-off males, and 77% of the change in the stock share of males who have quit. For the former group variations in duration strengthen the effect of changes in entrance shares, while for the latter they attenuate it. In the remain-

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[6] This is determined by regressions of the difference between the logarithms of the group specific and the economy wide spell duration against the logarithm of the unemployment rate, monthly dummies, and a time trend. The unemployment coefficient estimates (followed by standard errors) are:

	Temporary Layoffs	Permanent Layoffs	Quits	New Entrants	Re-Entrants
Males	-0.605 (0.115)	0.109 (0.042)	0.320 (0.092)	0.184 (0.203)	0.054 (0.078)
Females	-0.569 (0.076)	-0.077 (0.056)	-0.008 (0.101)	0.085 (0.150)	-0.177 (0.055)

Those coefficients with a t-statistic ≥ 1.9 are considered statistically significant in Table 2.

[7] It should be noted, however, that $\varepsilon_{D_iC} - \varepsilon_{DC}$ is also affected by variations in entrance shares through their influence on the economy wide average duration of unemployment. The average complete duration of unemployment may be expressed as a weighted average of the group specific durations, $D(t) = \sum_i s_i(t) \cdot D_i(t)$. Thus changes in entrance shares have a direct and indirect channel to influence stock shares. To estimate the amount of stock share variation which is implied by entrance share variation we need to account for the direct effect of ε_{s_iC} as well as the indirect effect through variation in ε_{DC}. To measure the variation in the economy wide duration due the change in entrance shares we calculate $D*(t) = \sum_i s_i(t) \cdot \overline{D_i}$ where $\overline{D_i}$ is the group specific average duration for the entire period. That is, we hold group specific duration constant and let the entrance shares take their actual values so that any variation in the aggregate duration is due solely to the latter. A regression of $D^*(t)$ on the explanatory variables used in the text reveals an elasticity of $D^*(t)$ with respect to the unemployment rate of only 0.010 with a standard error of 0.008. On this basis we conclude that the variation in aggregate duration due to variation in entrance shares is negligible.

ing three cases differences in duration are an important if not dominant influence, accounting for most of the impact on stock variation for those temporarily laid-off (about 80%), and a substantial fraction (40%) in the case of female re-entrants.

In summary, changes in stock shares reflect, for the most part, changes in entrance shares. In some cases, however, changes in entrance shares are either a negligible influence on stock shares, or their influence is mediated through changes in relative spell duration. A steady state increase in the unemployment rate will, for example, imply a fall in the stock share of those temporarily laid off not because they form a smaller proportion of the inflow into unemployment, but because these individuals experience a negligible change in the average length of time they will be unemployed.

4. A Canada - U.S. Comparison

After following one another quite closely for most of the post-war period, a marked "gap" has arisen between the Canadian and U.S. unemployment rates. Between 1982 and 1994 the U.S. unemployment rate averaged 7%, but the Canadian rate averaged 10%. In spite of being the subject of numerous studies this gap remains to be satisfactorily explained.[8] The focus of this literature has been on the unemployment rate: there have been no comparative analyses of the incidence or duration of unemployment.[9] With this in mind a comparison using our framework may be informative.

The U.S. data needed to calculate the average complete duration of unemployment are available to us only from 1980 to 1988.[10] Consequently, our results offer a characterization of the unemployment rate gap during the 1980s. Card and Riddell (1995) have pointed out that this period should be distinguished from the 1990s.[11] In short, we are not in a position to make a comparison between pre- and post-gaps periods, only an assessment of the nature of unemployment in the two countries during the latter, and with the caveat that our analysis may not apply to developments since the onset of the 1990s.

Three differences are immediately apparent between the two countries when the data are presented using the relationship described in equation (3), (see Table 3). First, for all groups except temporary layoffs, the average length of a completed spell of unemployment is much longer in Canada than in the U.S. The difference is almost five weeks in the aggregate, but can be as long as 9.4 weeks for those who have quit. Second, the stock and entrance shares of the temporarily laid-off are higher in the U.S. than in Canada, the former particularly so. In the U.S., 18% of unemployment spells and 16% of unemployment are associated with temporary layoffs, compared to 14% and 6% in Canada. The flipside of this is that unemployment spells caused by permanent job loss, which are longer on average in both

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countries, are relatively more prevalent in Canada. Both the entrance and stock shares of permanent layoffs are 12 to 14 percentage points higher in Canada than in the U.S. The third major difference concerns new entrants, a group that forms a much larger share of U.S. unemployment than it does of Canadian. At 14% the entrance share of new entrants is almost three times as great in the U.S., while their stock share (at 11%) is more than double the Canadian figure.

These findings raise at least two issues concerning methodological differences between the LFS and the CPS. The first deals with the manner in which information on the temporarily laid-off is captured. It has long been suspected that the CPS overestimates the numbers involved, while the LFS underestimates them. The U.S. questionnaire refers to the state of being temporarily laid-off as simply "being on lay-off." Over time the popular usage of the term "layoff" has changed with the result that more and more respondents may have taken it to mean "permanent layoff." It has been suggested that the number temporarily laid-off has been overestimated by 30% to 50%. In fact, the introduction of a revised questionnaire in 1994 (which addresses this problem with a new series of questions) did not lead to significant changes in the number of temporarily laid off or to the composition of the unemployed.[12] The LFS, in contrast, is thought to underestimate the number of individuals laid off and expecting to be recalled. This bias could be in the order of 25%, raising the entrance share to about 17% or 18% and the stock share slightly to 7% or 8%.[13] All of this is to suggest that the differences between the entrance shares of the temporarily laid-off is likely even less than that depicted in Table 3. Indeed, the figure may even be slightly higher in Canada than in the U.S. At the same time, however, the U.S. stock share probably remains significantly higher than the Canadian.[14]

The second methodological issue concerns the definition of a new entrant. In the CPS those who have never held a full-time job longer than two consecutive weeks are considered to be new entrants, while in the LFS only those who have never held a job - of any sort - fall into this category.

Table 3
Stock Shares, Entrance Shares, and the Average
Duration of Unemployment: Canada and United States, 1980-88

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[12] See Bregger and Dippo (1993), and Polivka and Rothgeb (1993) for a discussion of the issue. We thank Thomas Nardone of the BLS for pointing out that the questionnaire revisions did not lead to significant changes in the composition of the unemployed, even though the quality of the estimate may have been improved. Cohany, Polivka, and Rothgreb (1994) document this fact.

[13] This expectation is based upon the results of a small pilot study conducted by Statistics Canada, the results of which have not been published. The bias originates with Question 30 of the LFS, which directs interviewers to a series of questions that determine if the respondent is temporarily laid-off. The wording of the question is thought to screen out many respondents who in fact have a recall expectation. It should also be noted that the LFS applied a search test to those who have been temporarily laid off longer than six months for part of our sample period. An individual who has been laid off longer than six months, and who has not reported actively searching for work in the four weeks before the survey is re-classified as out of the labour force. This edit, however, has not been applied after 1982, and we therefore expect that it does not play a role in determining our findings. We thank Deborah Sunter and Ian Macredie of Statistics Canada for bringing these issues to our attention.

[14] It should also be noted that recall expectations may vary over the course of an unemployment spell. For example, using administrative data on Canadian UI claimants, Corak and Pyper (1995, table 4-1) note that 77% to 87% of claimants are told by their employers at the time of layoff that they will be recalled, but ultimately only about 55% end up being recalled. In their analysis of UI claimants in two US states, Katz and Meyer (1990) find errors in recall expectations of a roughly similar magnitude: 20% to 30% of those expecting recall at the time of layoff were not re-called. It is possible that unaccounted differences in the way the two labour force surveys incorporate recall expectations, and differences in editing procedures that are implicitly or explicitly based on a likelihood of recall over the course of an unemployment spell (as discussed in the previous note) may influence our results.

	Stock Share		Entrance Share		Average Duration (weeks)	
	Canada	U.S.	Canada	U.S.	Canada	U.S.
Economy Wide					16.3	11.6
Temporary Layoffs	0.06	0.16	0.14	0.18	7.4	11.7
Permanent Layoffs	0.48	0.36	0.39	0.25	20.1	17.3
Quits	0.17	0.12	0.14	0.13	20.6	11.2
New Entrants	0.05	0.11	0.05	0.14	15.7	10.8
Re Entrants	0.24	0.25	0.28	0.30	13.8	9.5

Table 4
Elasticities of Stock Shares, Entrance Shares, and Average
Duration of Unemployment with Respect to the Unemployment Rate:
Canada and United States, 1980-88

	Elasticity of Entrance Share		Elasticity of Average Duration		Predicted Stock Share Elasticity	
	Canada	U.S.	Canada	U.S.	Canada	U.S.
Economy Wide			0.664 (0.037)	0.619 (0.065)		
Temporary layoffs	0.002 (0.104)	0.296 (0.097)	0.032* (0.066)	0.212 (0.224)	-0.629 (0.109)	-0.111 (0.234)
Permanent Layoffs	0.494 (0.032)	0.399 (0.062)	0.695 (0.053)	0.719 (0.156)	0.525 (0.045)	0.449 (0.135)
Quits	-0.959 (0.061)	-1.207 (0.092)	0.832* (0.079)	0.544 (0.193)	-0.792 (0.088)	-1.282 (0.205)
New Entrants	0.020 (0.095)	0.116 (0.090)	0.764 (0.156)	0.516 (0.223)	0.120 (0.178)	0.013 (0.229)
Re Entrants	-0.218 (0.039)	-0.130 (0.053)	0.566* (0.073)	0.397* (0.095)	-0.316 (0.067)	-0.352 (0.107)

( ) Indicates standard error.
 * Indicates a significant difference from the economy wide elasticity.

Very roughly, the number of new entrants in Canada is about the size of a one-year age cohort; in the U.S. it would be significantly greater. This is the likely explanation for the substantial differences in both the entrance and stock shares of new entrants presented in Table 3.[15]

Taking both of these factors into account it is still appropriate to suggest that job separation is a more important source of unemployment in Canada than in the U.S., while labour market entry (broadly defined to include new entrants and re-entrants) is more important in the U.S. In spite of some question as to the division of the unemployed between temporary and permanent lay-offs, the latter is likely a more important component of the entrance share in Canada, being at least 10 percentage points higher than in the U.S. On the other hand, labour force entry and re-entry together account for 33% of the entrance share in Canada, but 44% in the U.S. All of this also holds for the stock shares.

A comparison of cyclical variation in the stock and flow shares is presented in Table 4. The most notable difference in the entrance share elasticities is that the entrance share of temporary layoffs increases with an increase in the unemployment rate in the U.S., but remains unchanged in Canada. For the other groups there are differences in magnitude, but the pattern is very similar. The elasticity of aggregate duration is very similar in these countries over this period.[16] There are, however, some differences at the group level. For example, the elasticity of the average duration of quitters is larger in Canada than in the U.S. On the other hand, the elasticities for job losers are roughly similar, and the spells of the temporarily laid off appear acyclical in both countries. At the same time, however, the duration of unemployment for those temporarily laid-off changes significantly less than the economy wide average duration in Canada.[17] Consequently, the results for the predicted stock share elasticities reveal that the share of temporary layoffs falls as the unemployment rate rises in Canada, but displays little movement in the U.S. Also, the elasticity for quits is larger in the U.S. than in Canada.

In summary, over the sample period employer initiated separations are a relatively larger source of unemployment spells in Canada, while in the U.S. labour market entry plays the larger role. Further, variations in entrance shares are roughly similar in the two countries, except for the fact that the share of temporary layoffs increase with increases in the unemployment rate in the U.S., but does not change in Canada. Finally, unemployment spells appear to be significantly longer in Canada than in the U.S., by almost 5 weeks on average at the aggregate level.

This last finding, however, raises at least two further questions. Why does unemployment last longer in Canada? What are the relative roles of spell duration and spell incidence in the unemployment rate gap between the two countries? With respect to the first question, longer unemployment spells in Canada could be due to differences in the composition of those becoming unemployed (that is, Canadian inflows being more heavily weighted with groups that tend to spend a longer time unemployed), or to much longer spell durations for all groups in Canada relative to the U.S. The evidence in Table 3 suggests that the latter is the more likely scenario, but we formally test this hypothesis by decomposing the

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[15] In fact the revised CPS questionnaire, which was implemented in January 1994, employs a definition of a new entrant that corresponds to the LFS definition. During a parallel run of this version and the old version the BLS found that in 1993 the stock share of new entrants differed by 3.5 percentage points. It was 10.2% under the old questionnaire, but only 6.7% under the new. See Cohany, Polivka, and Rothgreb (1994, table 8).

[16] This result is unchanged if we include a quadratic trend in the specification: the cyclical elasticity is about 0.8 in both countries.

[17] This is also the case for re-entrants in both countries, but this result is difficult to interpret given the measurement issues alluded to earlier. The only other elasticity significantly different from the economy wide estimate is that for quitters in Canada, which is the only estimate to be significantly greater than the overall elasticity.

difference in the economy-wide average duration into "composition" (or between group) and "duration" (or within group) components.

As mentioned in note 7, the average unemployment spell duration in either country can be expressed as the weighted average of group specific duration, where the weights are just the entrance shares of each group. If we let j index countries, and i index groups, then the average duration is:

(6)	$$D^j(t) = \sum_i s_i^j(t) D_i^j(t).$$

Therefore, the difference in spell duration between the two countries (the unemployment duration gap) can be expressed as:

(7)	$$D^{CDN}(t) - D^{US}(t) = \sum_i (s_i^{CDN}(t) - s_i^{US}(t)) D_i^{CDN}(t) + \sum_i s_i^{US}(t)(D_i^{CDN}(t) - D_i^{US}(t)).$$

The first term on the right hand side of (7) captures the part of the differential related to differences in the composition of inflows to unemployment across the two countries, while the second term captures the part of the differential related to cross country differences in duration within groups.

In the first panel of Table 5 we present the average values of each of these components over the sample period. The difference in the average duration of unemployment spells measured in this way is 4.15 weeks.[18] The decomposition reveals that roughly three quarters of the differential can be accounted for by cross country differences in spell length within groups. Differences in composition play a much smaller role. Therefore, while a higher proportion of unemployment spells in Canada result from employment separation, as documented in Table 4, this difference in composition does not appear to be the basis for the significant difference in aggregate duration across the two countries.

The time series variation in these different components is presented in figure 1, along with the difference in average duration of unemployment. The component of the duration differential representing the difference in composition across the two countries is relatively constant over the period, while the component capturing the differences in group specific duration tracks the movement of the total differential. The composition component trends upward slightly during the 1981-82 recession and during its immediate aftermath, but the basic message of the figure is that the increase in spell duration for most groups in Canada drives most of the cyclical and trend increases in the duration gap.

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[18] This is smaller than the direct estimate provided in table 3 by just over one half week. The relationship described in equation (6) is exact if single month continuation probabilities are used to construct estimates of average duration. Given that multi-month continuation probabilities are actually employed at the longer end of the distribution, equation (6) holds only approximately in our data. This explains the apparent inconsistency between tables 3 and 5.

Table 5

Analysis of the Canada - U.S. Unemployment Duration and
Unemployment Rate Differentials: 1980:01-1988:12

Panel A: A Decomposition of the Canada/U.S. Duration Differential	
$D^{CDN}(t) - D^{U.S.}(t)$	4.15 Weeks
$\sum_i (s_i^{CDN}(t) - s_i^{U.S.}(t)) D_i^{CDN}(t)$	1.04 Weeks
$\sum_i s_i^{U.S.}(t)(D_i^{CDN}(t) - D_i^{U.S.}(t))$	3.10 Weeks
Panel B: The Role of the Duration Differential in Cyclical Variation in the Unemployment Rate Differential	
$\dfrac{\partial(\ln D^{CDN} - \ln D^{U.S.})}{\partial(\ln UR^{CDN} - \ln UR^{U.S.})}$	0.687 (0.111)
Panel C: Linear Trend Decomposition of the Unemployment Rate and Duration Differentials	
$\dfrac{\partial(\ln UR^{CDN} - \ln UR^{U.S.})}{\partial t}$	0.0038 (0.0003)
$\dfrac{\partial(\ln D^{CDN} - \ln D^{U.S.})}{\partial t}$	0.0018 (0.0004)

See the Appendix for data sources.

Panel A: the decomposition of the aggregate duration differential is outlined in equation (7).
Panel B: parameter estimate from a regression of the cross country difference in log duration on season dummy variables, a linear trend and the cross country difference in log unemployment rates.
Panel C: parameter estimates from regressions of the cross country differences in log unemployment rates and log duration on season dummy variables and a linear trend.

It remains to quantify the relative influence of spell duration and spell incidence on the unemployment rate gap. In fact, the duration gap and the unemployment rate gap move in tandem over much of our sample period, and both display an upward trend. This is clearly illustrated in figure 2.[19] To determine the proportion of the cyclical changes in the unemployment rate gap due to variations in the duration gap we regress the cross country difference in the natural logarithm of average spell duration on season dummy variables, a linear trend, and the cross-country difference in natural logarithms of the unemployment rates. The steady state identity that the unemployment rate is the product of the incidence rate and average spell duration implies that the estimated parameter on the difference in the logarithms of the unemployment rates indicates the proportionate role of changes in average duration.[20] The results are presented in the second panel of Table 5. The estimated elasticity suggests that close to 70% of the cyclical variation in the unemployment rate differential is due to relative variation in aggregate spell duration across the two countries, versus about 30% for differences in spell incidence.[21]

The real puzzle of the Canada - U.S. unemployment rate gap is its trend over time, not its cyclical behaviour. With only eight years of data we are limited in what we can say about this. We use a linear trend decomposition, which essentially involves drawing straight lines through the series plotted in figure 2. This will likely be sensitive to the choice of sample period, but we lack the data to provide a proper sensitivity analysis, or to examine longer term trends in the unemployment rate gap. A certain amount of caution is therefore needed in accepting this analysis. The results of regressing the difference in the natural logarithms of the unemployment rates on seasonal dummy variables and a linear time trend are presented in the first row, third panel of Table 5. Trend growth in the Canadian unemployment rate exceeded the growth of its U.S. counterpart by roughly 0.4% per month. Results from a similar regression of the difference in the natural logarithms of average unemployment duration are reported in the second row. Again using the steady state identity, the estimates imply that 47% (0.0018/0.0038) of the trend increase in the unemployment rate gap over this period is accounted for by the relatively greater growth of spell duration in Canada. This result is for a very short period of time, but it does suggest that the reason the unemployment rate gap remained large into the late the 1980s has about as much to do with the duration of unemployment as it does with incidence.

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[19]   The raw correlation coefficient between the two series is 0.859. Also note that the series for the difference in average duration differ slightly
       between figure 1 and 2 for the reasons outlined in the previous note. Figure 2 is based on the actual average duration data, while figure 1 is based on the estimate using a weighted average of the subgroups.

[20]   Our use of the steady state assumption, discussed in note 3 and the accompanying text, bears repeating. We are not suggesting that the economy was in a steady state over this period, rather we are undertaking a comparison of the steady states that would be implied by the underlying inflow and continuation rates.

[21]   This specification allows for different seasonal and trend effects across the two countries. Specifying common seasonal effects leads to very
       similar estimates: the elasticity is 0.693 with a standard error of 0.114. Restricting the trend to be same in the two countries leads to an estimated elasticity of 0.557 with a standard error of 0.069. This is somewhat smaller than the estimate reported in table 5, but still implies that over half of the cyclical variation in the unemployment rate gap is accounted for by variation in the duration gap.

Figure 1
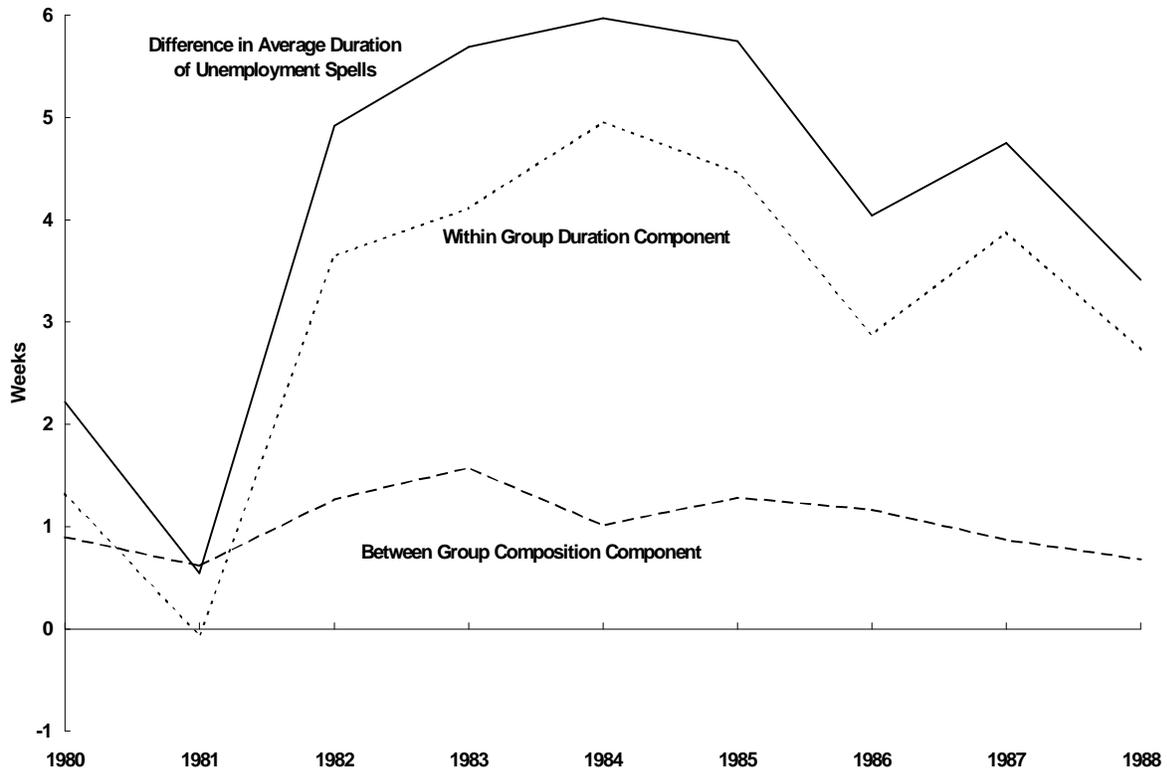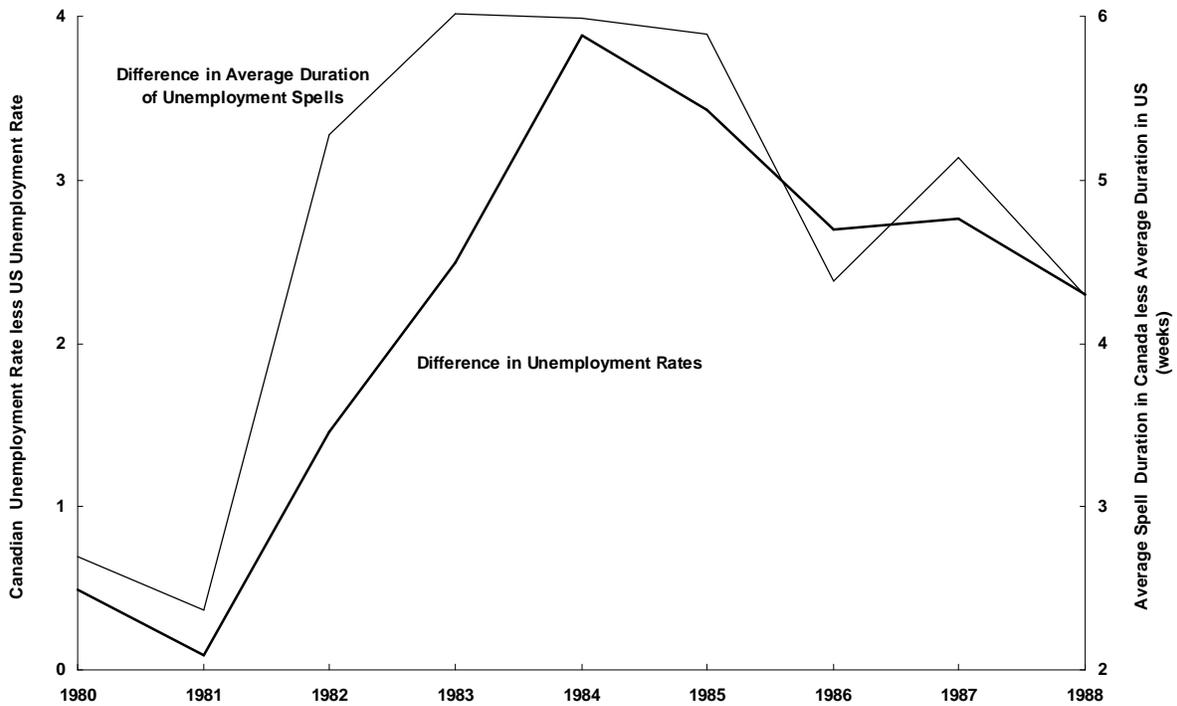**A DECOMPOSITION OF THE CANADA - US UNEMPLOYMENT DURATION DIFFERENTIAL**

Figure 2
CANADA - US UNEMPLOYMENT RATE AND UNEMPLOYMENT DURATION DIFFERENCES

5. Implications for Explanations of the Canada-U.S. Unemployment Rate Gap

Do these findings contribute to an explanation for the gap between the unemployment rates of the two countries? The strength of our data is the information it provides on unemployment duration, which as we have just pointed out may only be part of any explanation. Nevertheless, we offer a number of stylized facts that should be accommodated. First, spell incidence and duration appear to be equally important correlates of the trend increase in the unemployment rate differential over the 1980s. Second, unemployment spells tend to last much longer in Canada than in the U.S. This is characteristic of most groups regardless of the reason for unemployment, rather than being a result of differences in composition across the two countries. Third, labour force entry and re-entry are more important sources of unemployment spells in the U.S., while employer initiated separations are more important in Canada.

A complete explanation for the Canada-U.S. unemployment rate gap has yet to be offered, but the relatively more generous UI program in Canada is an often suggested cause.[22] Our data contain no specific information on UI receipt, but it may nonetheless be of interest to highlight those aspects of the results that inform this perspective.

Broadly speaking UI may influence the unemployment rate by changing inflows to unemployment, or by changing the duration of spells. Addressing the matter of duration first, it is often argued that a larger subsidy to job search in Canada, in the form of longer benefit entitlement, may lead to longer unemployment spells. Our results are consistent with this conjecture, as average spell duration is longer for most groups in Canada. On the other hand, there are likely other differences between the two countries that contribute to the duration differential, and for which we cannot control.

One way to try to isolate the contribution of the UI system in our data is to exploit the fact that UI in Canada covered a broader spectrum of workers over the sample period than it did in the U.S. All else equal, we might expect to find that the Canada - U.S. ratio in average duration is largest for groups who face larger cross country differences in coverage.[23] A comparison of quitters across the two countries provides a particularly clean view of this issue. During the 1980s quitters were eligible to receive UI in Canada, but not in the U.S.[24] As illustrated in Table 3, the average duration of unemployment spells among quitters is almost twice as long in Canada as it is in the U.S. In fact, the ratio of average spell durations, at 1.84, is the largest observed across all groups of the unemployed. Conversely, individuals experiencing employer initiated unemployment spells are most likely to be covered by UI in both countries. For permanent layoffs, the ratio of average spell duration in Canada to that of the U.S. is 1.16, one of the smallest observed, but the average duration of temporary layoffs is actually shorter in Canada than in the U.S. As noted in the previous section, there may be definitional differences that complicate the latter comparison. Ignoring the distinction between a temporary and a permanent layoff abstracts from these difficulties, and implies a ratio of 1.12 for the relative duration of

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[22] A consensus on the influence of UI does not, however, appear to have been reached. In particular, see Card and Riddell (1993,1995), Corak and Jones (1995), Milbourne, Purvis and Scoones (1991), Keil and Symons (1990).

[23] This sort of comparison is complicated by differences in UI take-up rates across the two countries. Blank and Card (1991), and Storer and Van Audenrode (1993) provide evidence of trends in take-up rates for the US and Canada respectively, while Card and Riddell (1993) provide a cross country comparison.

[24] Recently, however, changes have been introduced to limit eligibility in Canada.

employer initiated separations.[25] Taken together these comparisons would suggest that UI plays a role in determining the duration differential in the two countries, but that it is not the only factor at work. In fact, more support for this inference comes from the duration ratios for new entrants and re-entrants, which are both roughly 1.45. Given somewhat stricter requirements, it is possible that a smaller proportion of U.S. re-entrants are eligible for UI benefits. However, new entrants, using the definition in either country, are unlikely to be eligible for UI, and the fact that spell duration is also longer in Canada for this group suggests once again that something in addition to differences in the UI system is contributing to the duration differential.

Another possible effect of UI is that it induces labour force participation. During the 1980s relatively few weeks of insured employment were necessary for quite substantial benefit entitlement in some Canadian regions. This may encourage labour force participation among some individuals leading to relatively short periods of employment followed by unemployment.[26] In this way we might expect greater "churning" in the Canadian labour market.

It should be stressed that we have examined evidence on the *entrance shares* of various groups, not on the *incidence* of unemployment. But the former can be expressed in terms of the latter in the following way. The entrance share of group i in country j is equal to:

$$(8) \qquad s_i^j = \frac{N_i^{j(0)}}{N^{j(0)}} = \frac{N_i^{j(0)}}{LF^j} \bullet \frac{LF^j}{N^{j(0)}} = \frac{IR_i^j}{IR^j}$$

where LF represents the labour force, and IR represents the incidence rate. Therefore, the Canada - U.S. ratio of entrance shares for group i is equal to:

$$(9) \qquad \frac{s_i^{CDN}}{s_i^{US}} = \frac{IR_i^{CDN}}{IR_i^{US}} \bullet \frac{IR^{US}}{IR^{CDN}}$$

One of our major findings is that employer initiated separations are a larger source of unemployment in Canada (see Table 3). Equation (9) reveals that this could be due to a higher incidence of these sorts of spells in Canada, or to a higher overall incidence of unemployment in the U.S. Assuming that the nine year averages reported in Table 3 approximate a steady state we can make some "back of the envelope" calculations for our sample period. Estimates of IR^{CDN} and IR^{US} can be obtained by invoking the identity that the unemployment rate equals the product of the incidence rate and average spell duration. Between 1980 and 1988 the unemployment rate in Canada averaged 9.6% compared to 7.4% in the U.S. Therefore, the average weekly incidence rate in Canada is 0.59% (9.6/16.3), while the U.S. average is 0.64% (7.4/11.6). Thus, according to (9) the higher average overall incidence of unemployment in the U.S. during the 1980s does contribute to the difference in entrance shares. Nevertheless, the Canada - U.S. ratio of entrance shares of employer initiated (temporary and permanent layoff) spells is 1.23 [(0.14+0.39)/(0.18+0.25)], while the ratio of incidence rates is 1.08 (0.64/0.59), suggesting that

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[25] Using the average entrance shares as weights, the average duration of an employer initiated unemployment spells in Canada over the period is 16.7 weeks [{(14/53)7.4} + {(39/53)20.1}]. The corresponding statistic for the US is 14.9 weeks [{(18/43)11.7} + {(25/43)17.3}].

[26] Baker and Rea (1993), Christofides and McKenna (1995), and Green and Riddell (1993) examine the effects of UI parameters on the employment hazard; the evidence in Card and Riddell (1993, 1995) is also consistent with this conjecture.

there was a higher incidence rate of these sorts of spells in Canada over the period: the implied estimate of the ratio of incidence rates being 1.14 (1.23/1.08).[27]

It should also be noted, however, that this difference in incidence could represent higher Canadian exit rates out of employment and/or higher Canadian employment rates. To see this, note that:

$$(10) \qquad IR_i^j = \frac{N_i^j(0)}{LF^j} = \frac{N_i^j(0)}{EMP^j} \cdot \frac{EMP^j}{LF^j} = EXR_i^j \cdot ER_i^j$$

Therefore, the relative incidence rate in the two countries is:

$$(11) \qquad \frac{IR_i^{CDN}}{IR_i^{US}} = \frac{EXR_i^{CDN}}{EXR_i^{US}} \cdot \frac{ER^{CDN}}{ER^{US}}$$

where EXR is the exit rate out of employment by employer initiated separation, and ER the employment rate (the proportion of the labour force who are employed). The higher average unemployment rate in Canada over the sample period indicates that ER^{CDN} is less than ER^{US} by about 2.2 percentage points. Therefore, given the fact that the employment rate is just 1 minus the unemployment rate, the second term on the right had side of (11) is roughly 0.98, which given the estimate of the relative incidence rates of 1.14, implies that the average per period exit rate from employment by this means was higher in Canada than in the U.S.[28] While these calculations do suggest that employment was less "stable" in Canada over the period, they are very rough, and they do not account for the standard errors of the underlying statistics. Furthermore, while the higher exit rate in Canada suggests greater churning in the labour market, whether this is due to UI or some other factor can not be determined in these data. More research on this topic would appear warranted. For this reason we are somewhat hesitant about attributing a definite influence of UI on incidence rates, and feel that further confirmation and possible explanations, including any "churning" effects of UI, remain a topic for future research.[29]

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[27] Treating the monthly observations on entrance shares, unemployment rates and aggregate duration as data, the average Canada - US difference in log incidence rates of employer initiated separations calculated in this way is 0.129 with a standard error of 0.019.

[28] Again, treating the monthly observations on each of the component parts as data, the average Canada - US difference in log employment exit rates by employer initiated separation is 0.153 with a standard error of 0.020.

[29] Repeating this admittedly tentative analysis for quitters suggests that incidence rates are the same in the two countries in spite of the fact that this group was eligible to receive UI in Canada. Using equation (9), the information in table 3 on entrance shares, and the economy wide incidence rates of 0.64 for the US and 0.59 for Canada yields a ratio of incidence rates for quitters of 0.997 [(0.14/0.13)/(0.64/0.58)]. This estimate along with an employment rate ratio of 0.98 implies that relative exit rates from employment were 1.02. On the face of it this would suggest that in spite of being eligible to receive UI Canadian workers were essentially no more likely to quit their jobs than were their counterparts in the US. This is in marked contrast with the duration of unemployment for this group, and would at first glance suggest that UI has a more important role in
determining the length of unemployment spells conditional on being unemployed rather than the inflow into unemployment. It is difficult,
however, to draw a definitive conclusion in this regard without a stronger understanding of what other factors are at work determining the entrance shares of quitters in the two countries.

6.   *Conclusion*

We have presented a simple analytical framework for the dynamic analysis of unemployment that relies upon the fact that the stock and entrance shares of a particular group will differ depending upon the average duration of unemployment for the group relative to the economy wide average. This framework is applied to Canadian and U.S. data and leads to a series of stylized facts that may be helpful in understanding the nature of unemployment in the two countries.

We examine Canadian data by gender and reason for unemployment, and find that since there is a great deal of variation in the duration of unemployment spells, stock shares are not good indicators of entrance shares. In particular, the stock share of those permanently laid-off is much greater than the entrance share, while the opposite is the case for those temporarily laid-off. Furthermore, for women the most significant reason for being unemployed is permanent layoff, but the most significant reason for becoming unemployed is labour force re-entry. We also note that changes in stock shares between steady states are determined jointly by changes in entrance shares and average spell duration. In many cases changes in stock shares are determined almost entirely by changes in entrance shares, but there are important exceptions. In particular, the share of temporarily laid-off males in the stock of unemployed falls as the unemployment rate increases, not because of any change in their entrance share, but because there is little change in their average duration of unemployment. This is also the case for female re-entrants, but to a lesser degree.

We also apply our framework to U.S. data with the intention of developing a series of stylized facts that may be helpful in explaining the gap in the unemployment rates that has developed over the course of the 1980s. Over the period 1980-1988, unemployment spells are longer in Canada than in the U.S. Also, employer initiated permanent separations are the primary means of entry to unemployment in Canada, while labour force entry plays a more dominant role in the U.S. These differences in the composition of entrants, however, do not appear to play a large role accounting for the cross country difference in aggregate spell length. Over the sample period roughly 75% of the difference in the length of unemployment spells is the result of cross country differences in duration within groups (defined by reason for unemployment). Differences in the economy wide average duration of unemployment aggregate duration play a central role in the cyclical run up of the Canada - U.S. unemployment rate gap during the recession of the early 1980s. Longer spells in Canada also contributed to the trend increase in the unemployment rate gap over the (admittedly short) sample period. Cross country differences in unemployment incidence, however, account for slightly more than half the trend increase in the unemployment rate gap over the 1980s (but a much smaller part of its cyclical variation).

Any explanations for the unemployment gap should recognize these facts. But we also note that it is unlikely that there is one single explanation to this puzzle. In particular, we examine the influence of differences in UI regimes on the relative duration and incidence of unemployment in the two countries. Our very tentative results suggest that UI may have increased spell lengths in Canada relative to the U.S., but that other factors are also most certainly at work. At the same time it is difficult for us to uncover a definitive effect of UI on spell incidence. More research directed to factors that relate to the incidence of unemployment, particularly to the fact that there are more permanent layoffs in Canada, is called for.

Data Appendix

The Canadian duration and share statistics are constructed from monthly LFS data, Statistics Canada. Data tapes on all rotation groups are used for the period January 1976 to September 1995. The sample for each month is also restricted to respondents classified as unemployed, and LFS weights are used. Digit preference, the tendency of respondents to report "weeks of unemployment'" as whole months, is accommodated through re-allocation of 30 percent of respondents at 4, 8, 12, 16 and 26 weeks, 40 percent of those at 52 weeks and 50 percent of those at 78 and 99 weeks, in each month of the sample, to adjacent later weeks. The continuation probabilities as described in the text are estimated from the corrected data. Further details are offered in Corak (1993), and Corak and Heisz (1996).

The Canadian unemployment rate data are seasonally unadjusted, and are from Statistics Canada's CANSIM data base.

The U.S. duration and share statistics are constructed from unpublished CPS data, U.S. Department of Labor, Bureau of Labor Statistics. The data tapes contain the responses of members of the "outgoing rotation groups" in each month between 1979 and 1988. The sample for each month is restricted to respondents who are unemployed (Employment Status Recode = 3) and between the ages of 16 and 64 at the survey date. CPS weights are used to make the sample roughly representative of the U.S. population. Responses of 0 weeks unemployment in month are deleted from the <5 weeks interval. This exclusion is made to obtain consistent representation among the types of respondents at each duration. Re-allocations to correct for digit preference are performed in the same manner as used for the Canadian data. Baker (1992a, 1992b) offers further details.

The U.S. unemployment rate data are taken from 1) *Labor Force Statistics Derived from the CPS, 1948-87*, U.S. Department of Labor, BLS, August 1988, and 2) *Employment and Earnings*, U.S. Department of Labor, various issues 1988. Seasonally unadjusted data are used.

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