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Labour Market Adjustment in Canada and the United States

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Cet article fournit une évaluation quantitative de l'importance relative des différents mécanismes d'ajustement du marché du travail au Canada et aux États-Unis. Les effets du système d'assurance-chômage sur l'ajustement du marché du travail sont examinés. Nous trouvons, qu'au niveau agrégé, des chocs sur le taux de croissance de l'emploi ont des impacts similaires sur le taux de chômage dans les deux pays, mais que l'impact sur les salaires est plus faible au Canada qu'aux États-Unis. Même si le système d'assurance-chômage a clairement contribué à la persistance accrue du chômage au Canada, il y a peu de preuves que la composante endogène de ce système a eu un effet significatif sur la persistance du chômage au niveau agrégé. Nous concluons aussi que la flexibilité plus faible du salaire réel au niveau agrégé au Canada n'a que des effets limités sur la persistance du chômage.

This paper provides a quantitative assessment of the relative importance of different labour market adjustment mechanisms in Canada and the United States. The effects of the unemployment insurance (UI) system on labour market adjustment are also examined. We find that, at the aggregate level, employment growth shocks result in roughly similar unemployment rate responses but smaller wage responses in Canada relative to the United States. Although the UI system has clearly contributed to increased unemployment persistence in Canada, there is little evidence that the endogenous component of the UI system has had a significant effect on aggregate unemployment persistence. We also conclude that the lower degree of aggregate real wage flexibility in Canada has had only a limited effect on unemployment persistence.

I Introduction

A number of explanations have been advanced for the unemployment gap between Canada and the United States that opened up in the early 1980s and has persisted since then. As the other papers in this conference volume show, few of these explanations are able to account for a substantial fraction of the unemployment gap by themselves although, taken together, they may well explain much of the gap.

In this paper, we take a different approach than in previous literature by providing a quantitative assessment of the

relative importance of various labour market adjustment mechanisms in Canada and the United States. This analysis is designed to shed some light on why similar shocks in the two countries could result in dissimilar labour market outcomes, both in the short run and the long run (also see Amano and Macklem, 1996). Although Canada is a more resource-based economy, both Canada and the United States are closely integrated and, over the last two decades, have been subject to fairly similar exogenous macroeconomic shocks. Thus, a comparative analysis of labour market adjustment in these two countries could help

to delineate institutional or other factors that might account for Canada's persistently higher unemployment rate since the beginning of the last decade. In addition, the relative importance of different labour market adjustment mechanisms could also have implications for designing effective policies to address the unemployment problem.

The principal mechanisms involved in equilibrating the labour market in response to exogenous shocks include real wage adjustment, changes in employment levels, and changes in unemployment and labour force participation rates. To study the relative importance of various adjustment mechanisms at different time horizons, we employ vector autoregression techniques to jointly estimate the effects of labour market shocks on employment, unemployment, real wages, and the participation rate.¹ The methodology developed in this paper is used to analyse the role of the unemployment insurance (UI) system in affecting the persistence of unemployment following shocks to employment growth. The structure of the UI system has often been cited as the proximate cause for the ratcheting up of Canada's unemployment rate during the last two decades (see, e.g., Milbourne, Purvis and Scoones, 1991; Card and Riddell, 1993; and Fortin, Keil and Symons, 1995). In particular, the regional extended benefits system is believed to have introduced a strong endogenous component to UI generosity in Canada. To facilitate a comparison of the effects of the UI systems across the two countries, we construct an index of UI generosity for the United States that is similar to Sargent's (1995) UI index for Canada.

We find some similarities as well as a few interesting differences across the two countries in the relative importance of different channels of labour market adjustment in response to employment growth shocks. The responses of unemployment rates are quite similar in the two countries, although there are some differences in the long-run responses of employment levels and the

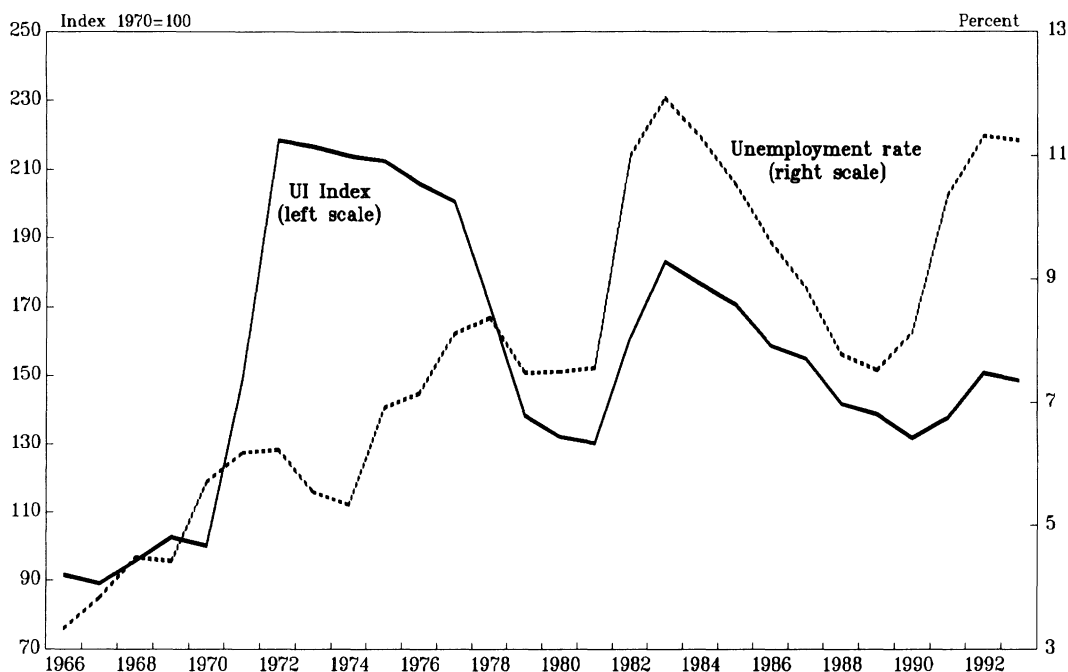
participation rate. The real wage response to an employment growth shock is more muted in Canada than in the United States, suggesting a lower degree of real wage flexibility in Canada. However, it does not appear that differences in real wage flexibility account for much of the discrepancy in unemployment persistence across the two countries in recent years. In addition, we do not find much evidence that the endogenous component of the UI system has had a significant influence on unemployment persistence in Canada.

The remainder of the paper is organized as follows. The next section describes the dataset and the following section describes the econometric methodology. Section IV presents the main results of the paper. Section V summarizes our main findings, discusses their implications, and suggests avenues for further research.

II Dataset

This section describes the dataset used in the analysis. Annual aggregate data were obtained covering the period 1966–93 for Canada and 1961–93 for the United States. For Canada, data on total employment, total hours worked, the unemployment rate, and the participation rate were obtained from the Labour Force Survey. The aggregate wages and salaries variable was obtained from Revenue Canada. For the United States, total employment, the unemployment rate, and the participation rate were obtained from the Current Population Survey and data on total hours worked were obtained from the Establishment Survey. Other macroeconomic data series for both countries, such as the CPI, were taken from the DRI databank.

For Canada, the real wage is derived by dividing aggregate wages and salaries by total hours worked and deflating this ratio by the CPI.² Labour productivity is derived by dividing real GDP by total hours worked. For the United States, the average real wage is defined as compensation per hour in the nonfarm business sector deflated by



SOURCES: Labour Force Survey (Canada) and Sargent (1995); the UI Index Mean = 153.2 and Std. Dev. = 38.9.

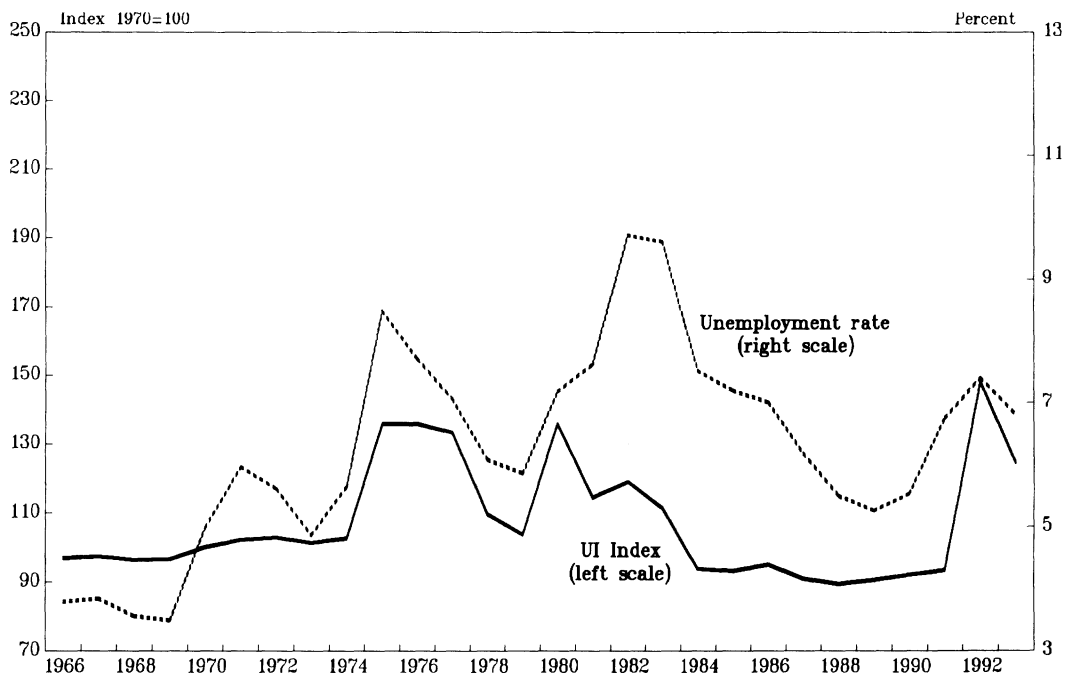
Figure 1 Unemployment insurance index and the unemployment rate in Canada

the aggregate CPI.³ Labour productivity is derived by dividing real GDP in the non-farm business sector by total hours worked.

One important issue for our empirical analysis is the choice of the appropriate measure of UI generosity in the two countries. Changes in the benefit replacement rate as well as other aspects of UI such as eligibility requirements and benefit periods could affect labour market dynamics. This is of particular importance in the case of Canada where the UI system has undergone substantial changes over the last two decades. For Canada, we use an index of UI generosity constructed by Sargent (1995), who calculates an efficient income-unemployment frontier and analyses individual behaviour at kink points. This index is a nonlinear function of the minimum number of weeks needed to qualify for unemployment benefits, the duration of benefits for individuals who have satisfied the minimum eligibility requirement, and the replacement rate.

Figure 1 plots the UI index and the aggregate unemployment rate for Canada. The two variables appear to have a positive but weak association. This figure vividly shows the sharp increase in UI generosity in 1971–72. One of the often cited explanations for the recent persistence of a high Canadian unemployment rate is the regional extended benefits component of UI, which is believed to have introduced a substantial endogenous component to the UI system. The decline in the UI index in the latter half of the 1970s followed by another increase during the recession in the early 1980s are suggestive of this cyclical element of UI generosity.⁴

To facilitate the comparison of UI effects across the two countries, we constructed a UI index for the United States that closely parallels Sargent's index for Canada. The procedure for constructing this index is described in detail in Appendix 1. Figure 2 plots this UI index and the aggregate unemployment rate for the United States.



SOURCES: Current Population Survey (US) and authors' calculations; the US Index Mean = 113.4 and Std. Dev. = 17.8.

Figure 2 Unemployment insurance index and the unemployment rate in the US

There appears to be a relatively strong positive association between the two variables although, relative to the base year of 1970, there has been much less of an increase in this index in the United States compared to Canada. As in Canada, there is an endogenous element to this index attributable to the system of regional extended benefits. The sharp rise in the index in 1992 reflects the introduction of the Emergency Unemployment Compensation program, a temporary benefits program that was enacted by Congress in November 1991 and remained in force until February 1994 (see McMurrer and Chasanov, 1995).

III Econometric Framework

In order to derive a reduced-form model for labour market adjustment, we make the identifying assumption that short-run labour market fluctuations are primarily attributable to labour demand shocks. In

this framework, innovations to labour demand are allowed to have permanent effects on the levels of both employment and real wages. However, the unemployment effects of labour demand shocks are constrained to be zero in the long run. In practical terms, however, the persistence of an increase in the unemployment rate could stretch out over many years. The speed with which the unemployment rate declines would depend on, among other things, the generosity of the UI system and on how quickly employment and real wages adjust. Thus, a sequence of negative labour demand shocks even at intervals of a few years could result in a ratcheting up of the unemployment rate.

An appropriate reduced-form specification would need to capture labour market adjustment in the different dimensions discussed above. However, making the reasonable assumption that the level of the aggregate working-age population is exo-

genous, a labour market identity ties down the participation rate, given the employment level and the unemployment rate.⁵ Thus, we can estimate only two independent equations for these three labour market quantities, in addition to a separate wage equation.

Our empirical strategy is to use vector autoregression techniques to perform a multivariate analysis of aggregate labour market adjustment separately for Canada and the United States. The methodology is similar to that employed by Blanchard and Katz (1992) who study state-level labour market dynamics in the United States. Since the econometric specifications in our analysis are contingent on the univariate time series properties of the variables, we conducted stationarity tests to identify the order of integration of the variables in our analysis. We ran standard Dickey-Fuller (DF) and Augmented Dickey-Fuller (ADF) regressions for each variable. To conserve space, we only summarize the main results here. Employment and real wages are found to be stationary in (logarithmic) first differences. The unemployment rate is borderline nonstationary in levels. Based on our priors, we choose to enter this variable in levels in our estimated equations for two reasons. First, as noted by many authors, it is difficult to accept that a variable such as the unemployment rate, which is by definition bounded between zero and unity, can truly be unit root nonstationary. Second, removing the low frequency component of unemployment by differencing would remove much of the relevance of this analysis for explaining long-term unemployment persistence.⁶

In order to make our empirical framework tractable, we employ an identifying assumption similar to that employed by Blanchard and Katz (1992). We assume that employment growth shocks represent exogenous shocks to labour demand. This implies that short-run variation in aggregate labour market quantities and prices is primarily determined by labour demand shocks. Under this assumption, employ-

ment growth shocks affect real wage growth and the unemployment rate contemporaneously but the feedback effects from any of these variables to employment growth can occur only with a lag. The interpretation of employment growth shocks as labour demand shocks is consistent with the concomitant unemployment and wage movements that we find in the data. It is also consistent with Abraham and Haltiwanger's (1995) conclusion that labour demand shocks have played the major role in accounting for the positive cyclical comovement in real wages and employment in the United States since the early 1970s.

We analyse the relationship between employment growth, wage growth and the unemployment rate using the following system of three equations:

$$\Delta e_t = \alpha_{10} + \alpha_{11}(L) \Delta e_{t-1} + \alpha_{12}(L) \Delta w_{t-1} + \epsilon_{1t} \quad (1)$$

$$\Delta w_t = \alpha_{20} + \alpha_{21}(L) \Delta e_t + \alpha_{22}(L) \Delta w_{t-1} + \alpha_{23}(L) ur_{t-1} + \alpha_{24}(L) \Delta prod_t + \epsilon_{2t} \quad (2)$$

$$ur_t = \alpha_{30} + \alpha_{31}(L) \Delta e_t + \alpha_{32}(L) \Delta w_{t-1} + \alpha_{33}(L) ur_{t-1} + \alpha_{34}(L) ui_{t-1} + \epsilon_{3t} \quad (3)$$

where Δe is the aggregate employment growth rate; Δw denotes average real wage growth; $\Delta prod$ is labour productivity growth; ur is the aggregate unemployment rate; ui is the unemployment insurance index; and t is the index for time. To control for supply effects, we include labour productivity growth as a determinant of wage growth in equation (2). In the employment equation, we net out the labour productivity component of wages by using the estimated wage growth net of labour productivity growth as an instrument for actual wage growth.

To capture the effects of the UI system on unemployment dynamics, the unemployment rate equation includes the UI index. Only lagged values of the index are included in the specification, thereby obviating potential endogeneity problems. It should be noted, however, that including the UI variable in the unemployment rate

Table 1
Multivariate analysis of aggregate labour market adjustment in Canada and the United States

Dep. Variable:	Canada			United States				
	Employment	Real wage	Unemp. rate	UI index	Employment	Real wage	Unemp. rate	UI index
DE		-0.052 (0.212)	-0.583** (0.027)			0.484* (0.289)	-0.632** (0.080)	
DE(-1)	0.337* (0.206)	0.155 (0.514)	0.296** (0.082)		0.515** (0.218)	0.199 (0.463)	0.246 (0.180)	
DE(-2)	0.139 (0.275)	-0.264 (0.248)	-0.005 (0.034)		-0.324* (0.201)	0.063 (0.209)	0.040 (0.074)	
DW(-1)	-0.469 (0.358)	0.253 (0.241)	0.090** (0.031)		-0.509 (0.374)	0.094 (0.235)	0.027 (0.078)	
DW(-2)	-0.282 (0.273)	-0.325 (0.247)	-0.114** (0.034)		0.305 (0.387)	-0.444* (0.248)	0.018 (0.082)	
UR				0.503 (0.347)				0.841** (0.312)
UR(-1)		-0.849 (1.031)	1.429** (0.134)	-0.627* (0.340)		-0.308 (0.557)	1.276** (0.239)	-0.613** (0.310)
UR(-2)		0.378 (0.754)	-0.608** (0.107)			-0.461 (0.589)	-0.464** (0.211)	
UI(-1)			0.059** (0.028)	1.258** (0.175)			-0.049 (0.065)	0.669** (0.257)
UI(-2)			0.009 (0.031)	-0.544** (0.158)			0.201** (0.076)	0.082 (0.318)
DPROD		0.785** (0.384)				0.737** (0.163)		
DPROD(-1)		-0.016 (0.350)				0.127 (0.276)		
DPROD(-2)		-0.094 (0.324)				0.304 (0.208)		
Adj. R ²	0.19	0.67	0.99	0.78	0.11	0.59	0.94	0.28
DW statistic	1.77	2.28	2.90	2.08	2.02	1.84	2.13	1.97

Notes: All regressions include a constant and were estimated using annual data from 1966 to 1993 for Canada and from 1961 to 1993 for the United States. Standard errors are reported in parentheses below the coefficient estimates. A double asterisk (**) indicates significance at the 5% level; a single asterisk (*) denotes the 10% level. The variable mnemonics are as follows: DE: employment growth; DW: real wage growth; UR: unemployment rate; UI: unemployment insurance index; and DPROD: labour productivity growth. The UI index was divided by 1,000 to facilitate the interpretation of the estimated coefficients. All equations were estimated by OLS except for the UI equations which were estimated by instrumental variables.

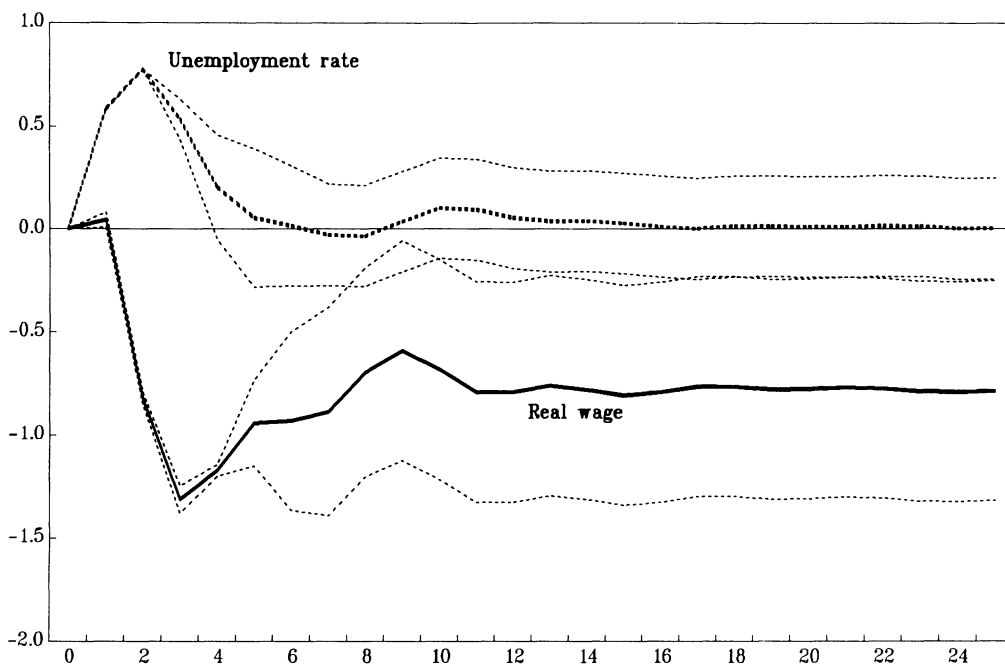


Figure 3a Impulse responses to Canadian aggregate employment growth shock¹

¹ The real wage impulse response represents percentage deviations from baseline. The unemployment rate response is expressed as percentage point deviations from baseline. The one standard deviation confidence intervals are constructed using Monte Carlo simulations with 1,000 replications.

equation could affect the coefficient on lagged unemployment as well as the constant term. In order to allow for the possibility of feedback effects between the unemployment rate and the UI index, we include in our system of estimated equations a separate equation for the UI index:

$$\begin{aligned}
 u_i_t &= \alpha_{40} + \alpha_{41}(L) u_{i,t-1} + \\
 &\alpha_{42}(L) ur_t + \epsilon_{4t}
 \end{aligned}
 \tag{4}$$

Thus, our framework lets us examine the effects of the UI system on unemployment persistence, while allowing for feedback effects between the level of the unemployment rate and the level of the index. Note that the contemporaneous unemployment rate is included in equation (4) in order to capture the regional extended benefits component of UI in both countries. This introduces a potential problem of endogeneity in the specification which we deal with by using instrumental variables rather than OLS (ordinary least squares) estima-

tion for this equation.⁷

IV Results

We use the econometric framework described above to separately analyse labour market adjustment in Canada and the United States. The system of reduced-form VARs was estimated with two lags.⁸ The aggregate results are reported in Table 1. In the employment regression, the coefficients on lagged employment growth indicate some persistence of this variable in both countries although in the United States much of the added impetus to employment growth after one period is reversed in the following period. In Canada, employment growth shocks are more persistent. In both countries, the effect of lagged changes in wages on employment growth is negative but statistically insignificant. Turning to the wage equation, it is apparent that real wage growth is not very

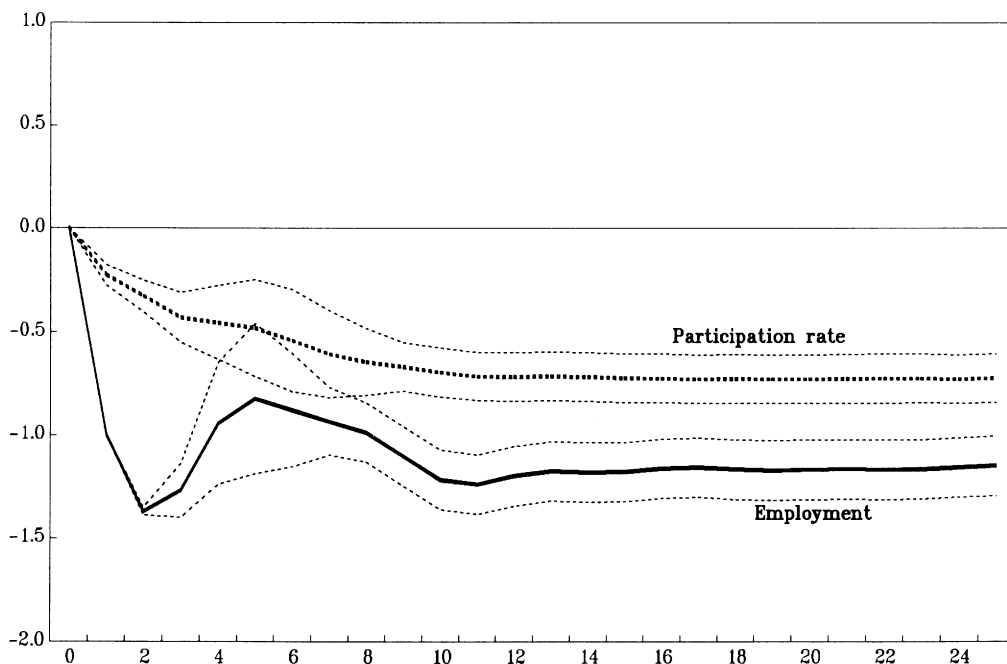


Figure 3b Impulse responses to Canadian aggregate employment growth shock¹

¹ The employment impulse response represents percentage deviations from baseline. The participation rate response is expressed as percentage point deviations from baseline. The one standard deviation confidence intervals are constructed using Monte Carlo simulations with 1,000 replications.

persistent in either country, as indicated by the coefficients on lagged wage growth. Increases in employment growth are positively associated with increases in real wage growth in the United States but not in Canada. As expected, there is a negative relationship between unemployment and wage growth in both countries, but this effect is not statistically significant.

Estimates of the unemployment rate equation are quite interesting. In both countries, an innovation in employment growth reduces unemployment but part of this effect is reversed in the subsequent period. The coefficients on the lagged dependent variable indicate that the unemployment rate is quite persistent in both countries. Of particular interest is the coefficient on the lagged UI index. The coefficient on the lagged UI index is significantly positive for Canada, indicating a positive relationship between the level of the UI index and the level of the unemployment rate. The point estimates indicate

that, for Canada, a one standard deviation increase in the index (38.9 points) would, *ceteris paribus*, result in an increase of 0.23 percentage points in the unemployment rate. Thus, the increase in the index of about 120 points from 1970 to 1972 would be expected to have eventually resulted in a 0.7 percentage point increase in the unemployment rate. For the United States, the coefficient on the second lag of the UI index is significantly positive and bigger than for Canada. However, it should be noted that this index for the United States has not risen as much since 1970 and has also been far less variable than the UI index for Canada.

Finally, estimates of the equation for the UI index show that in the United States there is an endogenous element to this index as indicated by the strong positive coefficient on the contemporaneous unemployment rate. Somewhat surprisingly, this coefficient is positive but insignificant for Canada. Over the full sample period, it ap-

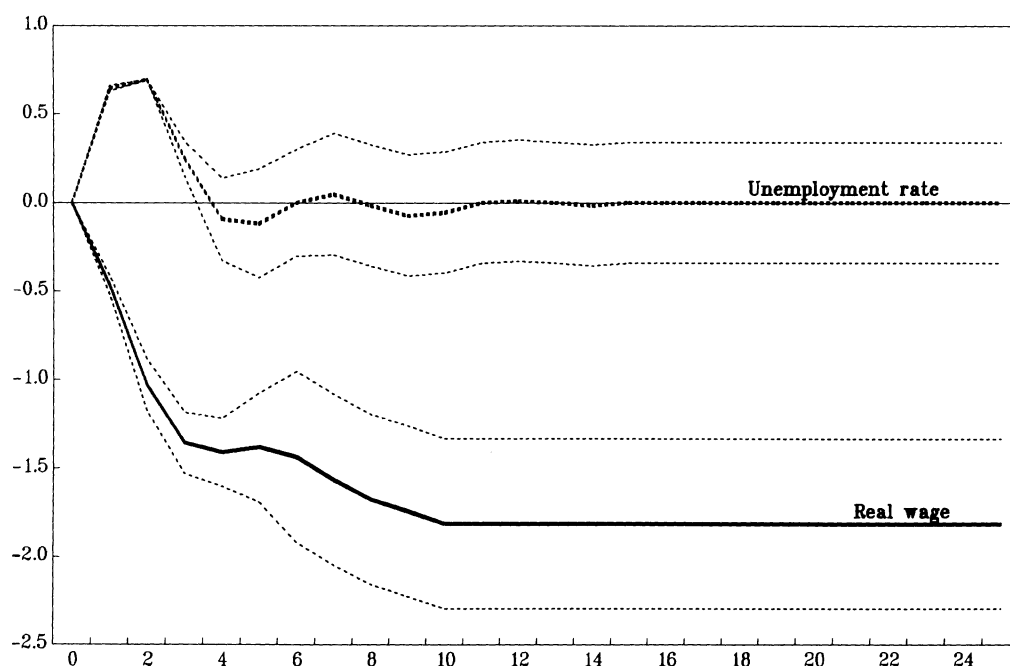


Figure 4a Impulse responses to US aggregate employment growth shock¹

¹ The real wage impulse response represents percentage deviations from baseline. The unemployment rate response is expressed as percentage point deviations from baseline. The one standard deviation confidence intervals are constructed using Monte Carlo simulations with 1,000 replications.

pears that there is a stronger cyclical element to the UI index in the United States than in Canada. When we re-estimated the UI equation for the 1978-95 subsample for Canada, the coefficient on the unemployment rate turned significantly positive, although the size of the coefficient did not change much. Thus, the regional extended benefits system did introduce an endogenous element to the UI system in Canada after 1978 but the quantitative effects of this relative to the full sample results are not large. The coefficient on the lagged UI index is strongly positive in both countries but much larger in absolute magnitude in Canada, indicating strong persistence of this index, although the second lag is negative and counteracts some of this persistence.

The coefficients in Table 1 suggest a roughly similar pattern of labour market dynamics in Canada and the United States,

although there are some important differences. To formally test for differences in the estimated equations across the two countries, we conducted likelihood ratio tests for each equation.⁹ The results are presented in Table 1A in the appendix. At the 5 per cent significance level, we reject the null hypothesis of equal coefficients for both countries for the employment growth, unemployment rate, and UI index equations. At the 10 per cent level, we marginally reject the restriction of the equality of coefficients for the wage equation. Thus, these tests indicate statistically significant differences in the dynamic equations that describe labour market adjustment in Canada and the United States.¹⁰ However, the quantitative significance of these differences remains to be examined. We now turn our attention to this issue.

To trace the dynamic path of the variables discussed above, it is useful to examine

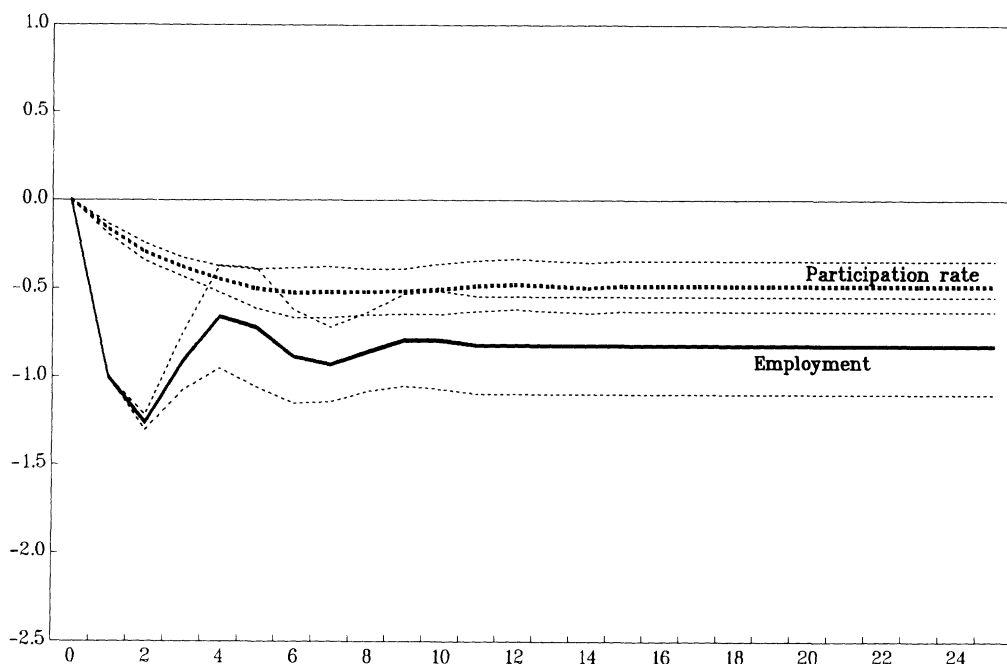


Figure 4b Impulse responses to US aggregate employment growth shock¹

¹ The employment impulse response represents percentage deviations from baseline. The participation rate response is expressed as percentage point deviations from baseline. The one standard deviation confidence intervals are constructed using Monte Carlo simulations with 1,000 replications.

impulse response functions computed using the coefficient estimates for both countries. Figures 3a and 3b show the impulse response functions and one standard error bands for Canada for the levels of employment, average real wages, and the unemployment and participation rates in response to a 1 per cent negative shock to aggregate employment growth. Figures 4a and 4b show the corresponding impulse response functions and one standard error bands for the United States.¹¹ Although the shock to employment growth is temporary, it has (by construction) a permanent effect on the level of aggregate employment. In Canada, unemployment rises sharply in the first year after the shock and shares the brunt of the adjustment with the participation rate since real wages remain essentially unchanged. The contemporaneous wage response is sharper in the United States, tempering the unemployment and participation rate responses. In the second

year after the shock, the real wage declines in Canada but the unemployment rate continues to rise because the continued fall in the employment level outweighs the decline in the participation rate. In the third year after the shock, the unemployment rate begins to decline in both countries. The rate of decline of the unemployment rate response towards zero is similar in the two countries. However, the long-run effects of a similar employment growth shock on both the level of employment and the participation rate are larger for Canada than for the United States.

Another important feature of these impulse responses is that, following a negative shock to employment growth, the magnitude of the short-run decline in real wages in Canada is much smaller than in the United States. The long-run real wage decline is also smaller than in the United States, suggesting that real wages are relatively less flexible in Canada than in the

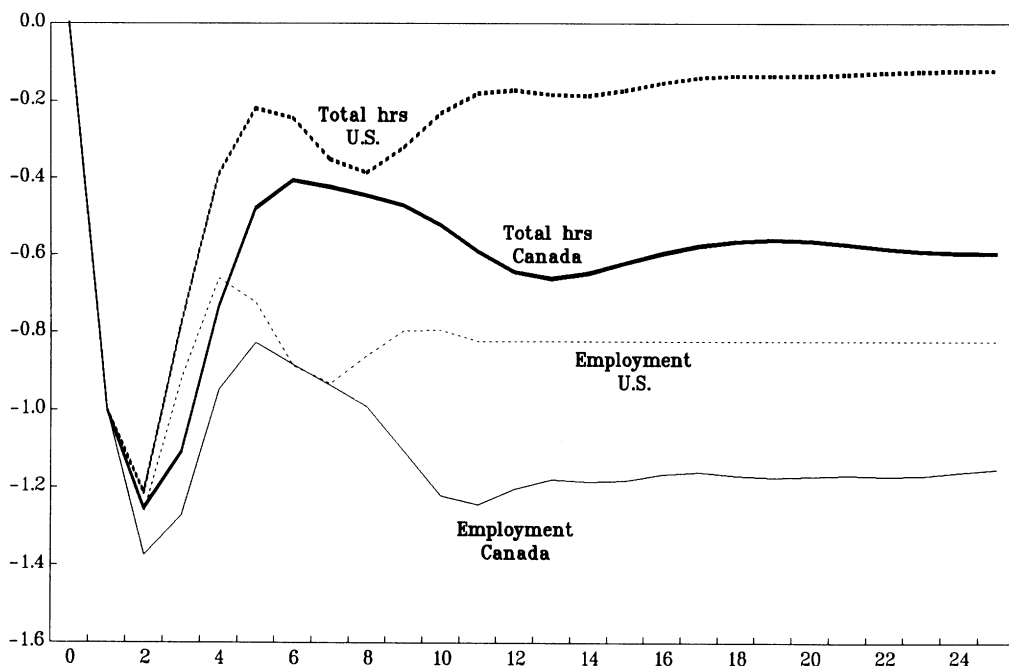


Figure 5 Impulse responses of Canadian and US employment and total hours¹

¹ The employment and total hours impulse responses represent percentage deviations from baseline.

United States. To investigate the effects of this apparent lower wage flexibility in Canada on labour market dynamics, we simulated an impulse response profile for Canada using coefficient estimates from the US wage equation but found only small differences in the resulting impulse responses for Canada. This implies that a significant portion of the higher persistence in Canada's employment level and, by extension, in the unemployment rate, cannot be explained by differences in wage flexibility across the two countries.¹²

As discussed earlier, one concern regarding our econometric specification may be that we include the unemployment rate in levels. To address this concern, we re-estimated equations (1)–(4) above using the detrended unemployment rate in place of the unemployment rate level.¹³ The impulse responses using this variable are shown as Figures A1 and A2 in the appendix. The main elements of the dynamics are essentially unchanged, although the unemployment rate and employment responses

in Canada are more muted than in Figure 3. Again, the major difference between the impulse responses across the two countries is the sharper real wage adjustment in the United States compared to Canada. Thus, we conclude that our main results are not driven by the use of unemployment levels in the baseline specification.

Another relevant issue is that the greater persistence of employment in Canada may reflect the preference of firms to adjust hours rather than employment. To examine this possibility, we substituted total hours worked for the total number of employees in the analysis. Impulse response profiles for Canada and the United States using the respective total hours variables are shown in Figure 5. For comparison, the employment impulse responses are also included in the figure. These impulse responses indicate that, in both countries, the long-run effect on total hours is less than for total employment. However, the long-run level difference between the total hours impulse responses for Canada and

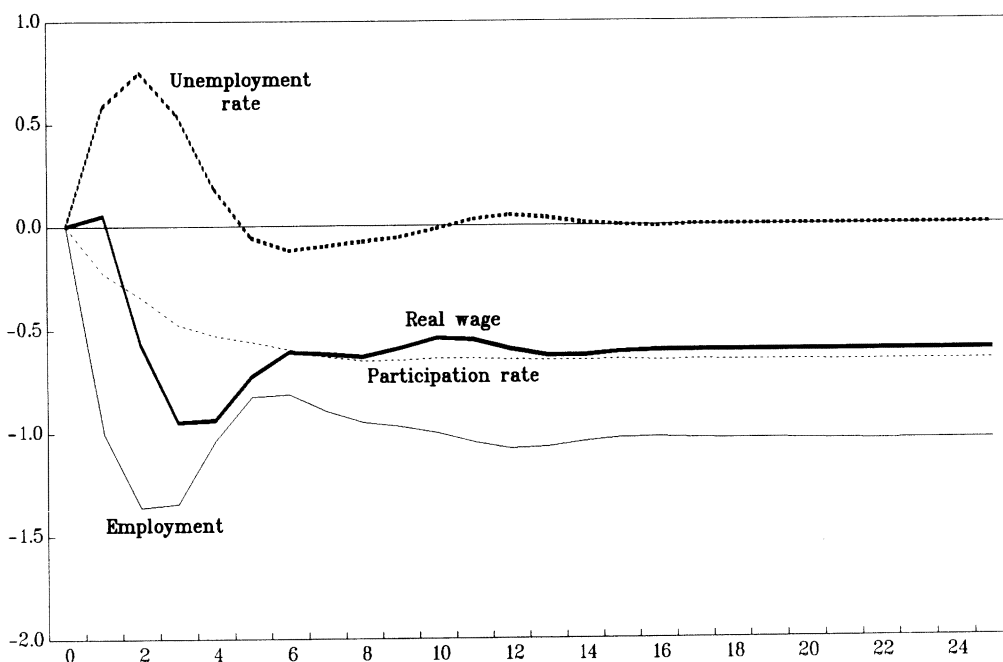


Figure 6 Impulse responses to Canadian aggregate employment growth shock¹ (excluding endogenous UI response)

¹ The employment and real wage impulse responses represent percentage deviations from baseline. The unemployment and participation rate responses are expressed as percentage point deviations from baseline.

the United States is very similar to the difference between their respective employment responses. Hence, we conclude that, although there is a significant degree of labour input variation at the intensive margin of weekly hours worked in both countries, the differences in hours variation are not sufficient to explain the differences between Canada and the United States in the persistence of the effects of employment growth shocks.

Having established various features of the baseline specification, we now take a closer look at the effects of the UI index on aggregate unemployment persistence. In particular, we are interested in examining whether the endogenous component of the UI system has had a significant impact on labour market dynamics in the two countries. To address this issue, we re-compute the impulse response figures using equations (1)–(3) and ignore the endogenous response of the UI as calculated in equation

(4). These impulse responses are presented in Figures 6 and 7.

The profiles of the unemployment rate responses in Canada and the United States are quite similar when comparing Figures 3 and 6 and Figures 4 and 7, respectively. This is in part because the endogenous response of the UI index to changes in the unemployment rate is largely reversed after one year in both countries (see Table 1). It appears, therefore, that the endogenous component of the UI system does not have a significant impact on the dynamics of labour market adjustment. In addition, as noted earlier, when the UI equation was re-estimated over the period 1978-95 for Canada, the coefficient on the contemporaneous unemployment rate was significant but not very different in magnitude from the full sample results. Hence, the impulse response functions for Canada using these subsample coefficients for the UI equation did not look very different. We in-

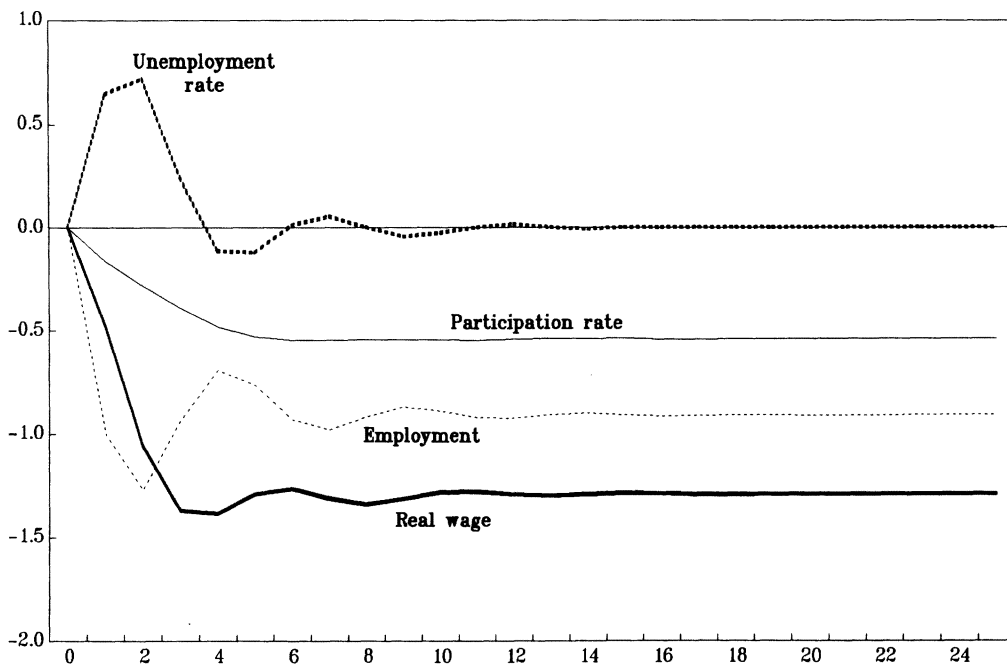


Figure 7 Impulse responses to US aggregate employment growth shock¹ (excluding endogenous UI response)

¹ The employment and real wage impulse responses represent percentage deviations from baseline. The unemployment and participation rate responses are expressed as percentage point deviations from baseline.

interpret these results as evidence that the effects of the endogenous component of the UI system are considerably weaker than the effects of the noncyclical component.¹⁴

However, the level of the UI variable, comprising both the cyclical and noncyclical components, is clearly a significant determinant of the unemployment rate and the persistence of unemployment in both countries. The UI indexes in both countries fell in 1978, rose briefly in the early 1980s, and then declined gradually through the end of the 1980s (see Figures 1 and 2). The recession in the early 1990s led to an increase in the UI indexes in both countries. Although the broad patterns of variation in the UI index are similar in Canada and the United States, there are some important differences. For instance, the UI index rose by about 31 per cent in the United States in 1980 (from 103.6 in 1979 to 135.8), but by 1984 had declined to a lower level than in 1980. In Canada, the increase was larger, about 39 per cent over the period 1981–83 (from 132.0 to 182.8), and the subsequent

decline was also much more gradual. However, the point estimates in the unemployment rate equations on the UI variables are larger for the United States than for Canada (the two lagged coefficients sum to 0.068 for Canada and 0.152 for the United States). Thus, the net effect of the UI variables on the respective unemployment rates is not large enough to explain the divergence between Canadian and US aggregate unemployment rates in the 1980s. We conclude that, although there is clear evidence that the UI system has contributed to increases in unemployment and in unemployment persistence in both countries, it is not evident that it is the proximate cause for the greater increase in the level and persistence of unemployment in Canada during the 1980s.

V Conclusions

In this paper, we have conducted a multivariate analysis of aggregate labour market adjustment in Canada and the United

States. Employment growth shocks were found to have a larger and more persistent effect on both employment levels and participation rates in Canada than in the United States. Further, the results show that the response of the average real wage to an aggregate employment growth shock is much smaller in Canada than in the United States, both in the short run and the long run. However, we conclude that a significant portion of the higher persistence in Canada's employment level in response to employment growth shocks and, by implication, differences in the persistence of the unemployment rate, cannot be explained simply by differences in wage flexibility across the two countries.

We constructed and implemented an econometric framework that accommodated the endogenous relationships between the unemployment rate and the UI index. However, even in the presence of a feedback relationship between these two variables, it appears that the quantitative impact of the endogenous component of the UI system in affecting aggregate unemployment persistence is not very large either in Canada or the United States. The noncyclical component of UI, on the other hand, has played an important role in increasing unemployment persistence in both countries although it does not appear to account for a significant fraction of the greater persistence of Canadian unemployment and the divergence between Canadian and US unemployment rates since the late 1970s. We are led to the conclusion that labour market adjustment mechanisms operate in a fairly similar fashion across the two countries. Explanations for the greater persistence of unemployment variation in Canada may, therefore, have to include other institutional features of the labour market and also more basic macroeconomic factors.¹⁵

The results presented in this paper have shed light on some aspects of the relationship between the UI system and labour market dynamics. However, the reduced-form econometric framework constructed in this paper represents only a preliminary

step towards a more fully specified structural model that incorporates other relevant relationships, such as the effect of changes in the UI system on labour supply decisions, in a more complete manner.¹⁶ Using more disaggregated data and examining labour market dynamics at the provincial level would also be a promising avenue for further research.

Notes

- * We are grateful to John Helliwell, Craig Riddell, Andrew Sharpe and two anonymous referees for helpful comments and to Tim Sargent for providing us with his UI index for Canada. The views expressed in this paper are those of the authors and do not necessarily reflect the views of the IMF.
- 1 Blanchard and Katz (1992) use similar techniques for analysing state-level labour market adjustment in the United States.
- 2 In January 1995, the Labour Force Survey estimates of total employment, the labour force, and the population were revised back to 1976. However, the wages and salaries series was not concomitantly revised by Revenue Canada. We assume that the change in the post-1976 estimates from the Labour Force Survey constitutes a level adjustment and control for this level change in our empirical work.
- 3 The Canadian and US aggregate wage variables used in this paper have been used quite widely in the literature. See, e.g., Huh and Trehan (1995).
- 4 Recent reforms to the UI system have resulted in a decline in this index since 1993.
- 5 Note that, although we motivate our reduced-form specification as being sufficient to model the effects of labour demand shocks, it can accommodate a broader set of shocks. For instance, the labour supply effects of an exogenous increase in the UI index would be accommodated through the endogenous response of the participation rate.
- 6 We recognize that this is a controversial issue. To address this concern, as described in the next section, we also estimate all our regressions using the detrended unemployment rate.
- 7 The set of instruments included two lags each of the UI index, the unemployment rate, and the employment growth rate.
- 8 The choice of lag length was based on the Schwarz-Bayes information criterion which indicated an optimal lag length of two for both countries.
- 9 In the wage equation we allow the coefficients on the productivity variables to differ across the two countries.
- 10 It would also be of interest to split the sample and test for structural change in the coefficients, par-

Table 1A

Tests for the equality of coefficient estimates between Canada and the US

Equation	Degrees of freedom	Test statistic	p value
Employment	4	10.55	0.03
Real wage	7	11.93	0.10
Unemployment rate	9	25.27	0.00
UI index	4	10.33	0.04

Note: The tests were conducted on the slope coefficient estimates for the baseline specification described in the text.

ticularly for Canada. Unfortunately, since we use annual data, splitting the sample left us with too few degrees of freedom for structural break tests to have any reasonable power.

- 11 For variables that enter the specification in first differences, the impulse responses of the corresponding (log) levels are obtained by cumulating the impulse responses for the (log) differences. Since all of the models that we estimate are linear, the responses to a 1% positive shock to employment growth would be of the opposite sign and symmetric. The impulse response for the participation rate was computed assuming fixed N and the labour market identity $e + p \cdot N \cdot ur = p \cdot N$, where e is the employment level, p is the labour force participation rate, N is the working-age population and ur is the unemployment rate.
- 12 These impulse response figures are not presented here in order to conserve space. They are available from the authors.
- 13 That is, we regressed the unemployment rate on a constant and a time trend and used the residuals from this regression. ADF tests showed that, over our sample period, the null hypothesis of unit root nonstationarity could be rejected against the alternative of stationarity around a deterministic linear time trend.
- 14 Using administrative data associated with the UI program, Corak and Jones (1995) reach a similar conclusion, that regional extended benefits were of relatively little importance in explaining the increased level and persistence of Canadian unemployment during the 1980s.
- 15 For instance, Keil (1996) argues that higher real interest rates in Canada relative to the United States since the late 1980s account for the persistently higher unemployment rate in Canada.
- 16 Recent work by Andolfatto, Gomme and Storer (1996) moves in this direction.

References

- Abraham, K. and J. Haltiwanger (1995) 'Real Wages and the Business Cycle,' *Journal of Economic Literature*, 33:1215-64.
- Amano, Robert A. and R. Tiff Macklem (1996) 'Unemployment Persistence and Costly Adjustment of Labour: A Canada-U.S. Comparison.' Manuscript (Ottawa: Bank of Canada, Research Department).
- Andolfatto, David, Paul Gomme and Paul Storer (1996) 'Unemployment Insurance and Labour Market Activity in Canada and the United States.' Manuscript, University of Waterloo.
- Blanchard, Olivier J. and Lawrence F. Katz (1992) 'Regional Evolutions,' *Brookings Papers on Economic Activity*, 1-61.
- Card, David and Craig Riddell (1993) 'A Comparative Analysis of Unemployment in Canada and the United States.' In David Card and Richard B. Freeman (eds.), *Small Differences that Matter: Labor Markets and Income Maintenance in Canada and the United States* (Chicago: University of Chicago Press).
- Corak, Miles and Stephen R.G. Jones (1995) 'The Persistence of Unemployment: How Important Were Regional Extended Benefits,' *Canadian Journal of Economics*, 28:555-67.
- Fortin, Pierre, Manfred Keil and James Symons (1995) 'The Sources of Unemployment in Canada, 1967-1991: Evidence from a Panel of Regions and Demographic Groups.' Working Paper No. 36, Research Center on Employment and Economic Fluctuations, Université du Québec à Montréal.
- Huh, C. and B. Trehan (1995) 'Modelling the Time-Series Behavior of the Aggregate Wage Rate,' *Federal Reserve Bank of San Francisco Economic Review*, Spring.
- Keil, Manfred (1996) 'Canadian and U.S. Unemployment Rates: A Comparison Based on Regional Data.' Manuscript (Claremont, CA: Claremont McKenna College).
- McMurrer, Daniel and Amy Chasanov (1995) 'Trends in Unemployment Insurance Benefits,' *Monthly Labor Review*, September 1995: 30-39.

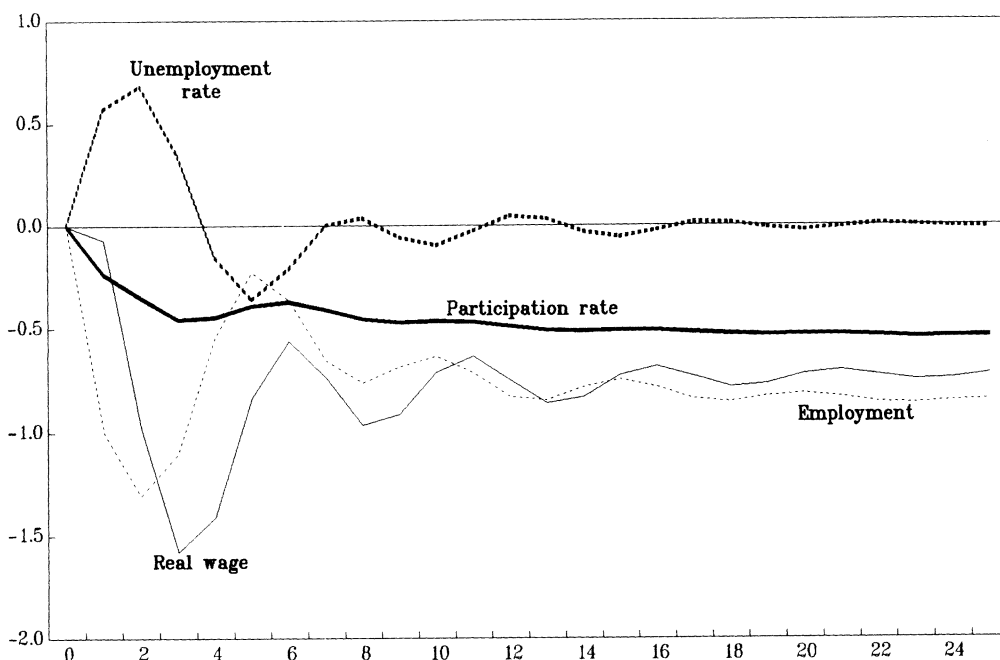


Figure A1 Impulse responses to Canadian aggregate employment growth shock¹ (detrended unemployment rate)

¹ The employment and real wage impulse responses represent percentage deviations from baseline. The unemployment and participation rate responses are expressed as percentage point deviations from baseline.

Milbourne, Ross, Doug Purvis and David Scoones (1991) 'Unemployment Insurance and Unemployment Dynamics,' *Canadian Journal of Economics*, 24:804-26.

Sargent, Timothy C. (1995) 'A New Index of UI Generosity.' Manuscript (Vancouver: University of British Columbia).

U.S. Department of Labor (1966-1993) *Significant Provisions of State Unemployment Insurance Laws*, various issues.

Appendix 1

This appendix describes the methodology for calculating the UI index for the United States. The methodology closely parallels that of Sargent (1995), who constructs the UI index for Canada using the following formula:

$$UI = \frac{D+A}{D+A+M} \left[1 - \left(\frac{1-\rho D/(D+A)}{1+\rho D/M} \right)^\theta \right]$$

where M is the minimum number of weeks needed to qualify for UI benefits, D is the amount of benefits for a claimant who has worked the

minimum number of weeks, A is the length of the waiting period (in weeks) before benefits are received, ρ is the estimated replacement ratio and θ is the scale parameter of the taste for leisure which is assumed to follow a Pareto distribution.

For the United States, the various components of the index were obtained from annual publications of *Significant Provisions of State Unemployment Insurance Laws* published by the U.S. Department of Labor (1966-1993). The publication includes for each state, the qualifying wage or number of weeks of work required to be eligible for unemployment insurance, the number of weeks needed to wait before receiving benefits, and the maximum number of weeks of benefits available to each claimant.

Eligibility requirements for a number of states are in terms of the number of weeks of work required. However, the eligibility requirement in some states is that annual wages need to be equal to at least 1 1/4 and 1 1/2 times the highest quarterly wage in the previous year. These requirements were converted into work weeks by multiplying 1.25 and 1.5 by 13 weeks to give 16 and 20 weeks of work respectively.

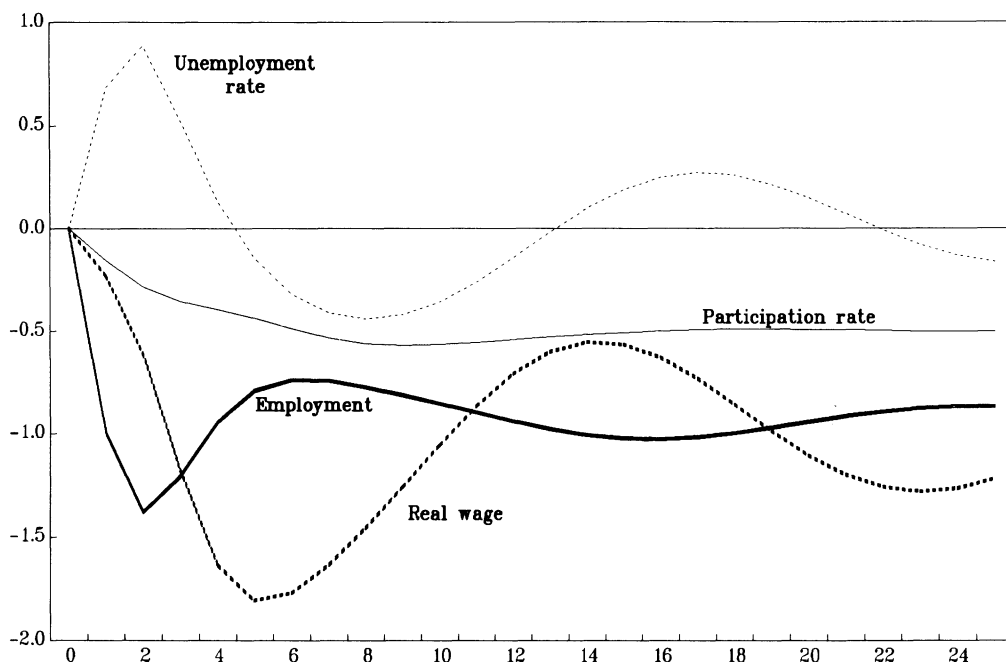


Figure A2 Impulse responses to US aggregate employment growth shock¹ (detrended unemployment rate)

¹ The employment and real wage impulse responses represent percentage deviations from baseline. The unemployment and participation rate responses are expressed as percentage point deviations from baseline.

Some state eligibility rules require multiples of the weekly base wage, defined approximately as half of the weekly wage in the quarter with the highest earnings. These eligibility requirements were converted into weeks of work by dividing the multiple by 2.

For most states, the maximum duration of benefits is 26 weeks. This duration was extended in 1972, 1975–1978 and 1980–1981 when national extended benefit triggers were in place. In 1992, a new extended benefit program called the Emergency Unemployment Compensation

(EUC) program was introduced. This was a temporary benefits program enacted by Congress in November 1991, which expired in February 1994. A number of states also had their own individual extended benefit programs over this period.

The replacement rate was also obtained from the Department of Labor and the scale parameter was assumed to equal 0.2 as in Sargent's work. National estimates for all the parameters were based on employment-weighted averages across states.