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Why Have Unemployment Rates in Canada and the United States Diverged?

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INTRODUCTION

At the same time that unemployment has disappeared from public policy discussions in the United States, it has become the major focus of discussion in Europe and elsewhere. It is not hard to explain the difference in public interest. European unemployment rates are at postwar highs and seem to be stuck at current levels. By contrast, the US unemployment rate is high by postwar standards, but it has declined considerably in the last four years to the point where there is now clear evidence of labour shortages in some parts of the country.

Even more remarkable than the comparison of recent US and European experiences is the comparison of recent US and Canadian experiences. Throughout the postwar period, US and Canadian unemployment rates moved in tandem. Figure 1 displays this relationship graphically by plotting the Canadian unemployment rate on the vertical axis against the US rate on the horizontal axis.¹ This historical link between unemployment rates in the two countries seems to have ended in 1982. During the past three years, Canadian unemployment rates have been some three percentage points higher than their US counterparts, and this gap shows no sign of diminishing.²

A variety of explanations has been offered for the disparity between US and European economic performance in the past decade.³ Many of these explanations revolve around rigidities in the labour market attributable to government intervention or other institutional features.⁴ It seems apparent that simple structural explanations for the divergence between US and European labour market performance ought to be equally useful in explaining the US and Canadian divergence, and indeed, we have heard many of the same explanations offered. Our purpose in this paper is to examine the relationship between US and Canadian unemployment for the light it sheds on any of these explanations.

From a practical viewpoint, a comparison of US and Canadian labour market indicators is relatively straightforward, since both countries use the same methods to measure these indicators.⁵ A direct comparison of US and European indicators, on the other hand, is complicated by differences in survey instruments and even in the underlying concept of unemployment.⁶

Our goal is to explore the data for the light they shed on a series of hypotheses that attribute the divergence in unemployment rates to structural rigidities in the labour market. Before examining these hypotheses in detail, however, we examine the extent to which the unemployment gap between Canada and the United States is either a secular phenomenon or a result of differential business cycle movements in the two countries. As Figure 1 suggests, we find no evidence of an unemployment gap prior to 1981. Furthermore, the

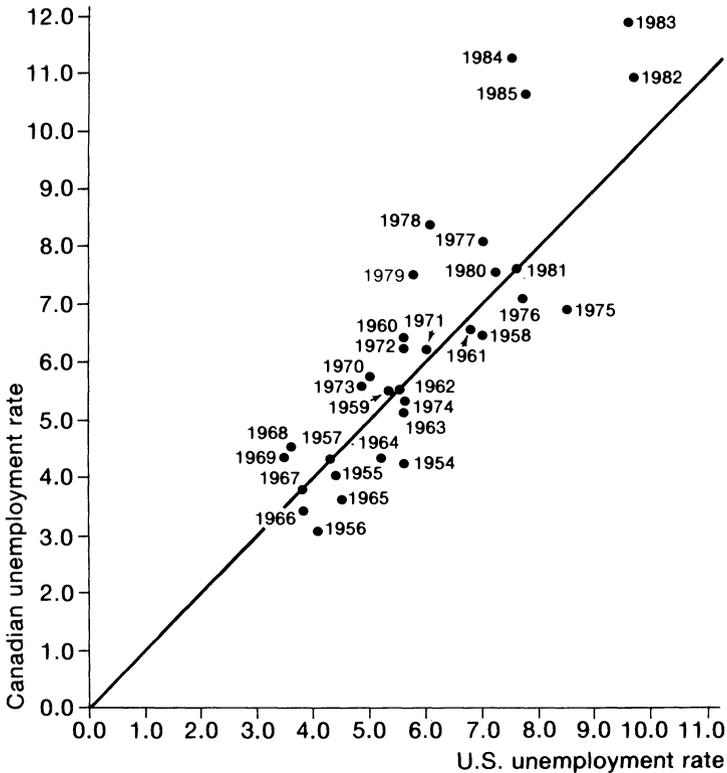


FIGURE 1. US and Canadian unemployment rates, 1954-1984.

unemployment gap in 1983 and 1984 is not easily explained by movements in relative output during the period. While Canadian output recovered from the 1982 recession at a rate consistent with historical patterns, Canadian employment lagged far behind, opening up an *employment* gap which in 1983 and 1984 explained most of the difference in unemployment rates between Canada and the United States.

This unprecedented increase in productivity is remarkably similar to employment and output changes observed in many European countries during the last decade. In Section II we explore primarily mechanical explanations for the shortfall of Canadian employment growth. We first explore the extent to which the divergence in unemployment rates between the United States and Canada may be attributed to changes in the demographic composition of employment. We then consider the possibility that differences in the industrial composition of the two nations, coupled with underlying differences in industrial growth rates, may explain differences in employment growth.

In Section III we turn to arguments about structural rigidity in the labour market. It is often argued that structural barriers discourage employment growth, either by preventing the flow of workers to new jobs, or by raising the costs of hiring new workers. Looking first at direct government intervention in the labour market, we compare the unemployment insurance and minimum wage laws in Canada and the United States and how they have changed over the past two decades. We then examine the extent of unionization in the two

countries and relative changes in union coverage since 1960. Our goal is to explore the possibility that the labour market may have become more or less encumbered by non-competitive barriers in either of these two countries.

In Section IV we examine the postwar history of real-wage movements in the United States and Canada, and the correlation between relative employment growth and relative wage rates. In some analyses unsustainable rates of real-wage growth force down the profitability of employment and lead to higher unemployment. Direct examination of profits data is difficult, but it is straightforward to analyse the course of labour costs between the United States and Canada and to test this candidate explanation for the divergence in employment rates.

The conclusions from our structural analysis of the US and Canadian labour markets are unenlightening. We find no evidence that minimum wage or unemployment insurance provisions have changed sharply in Canada relative to the United States. In both countries, minimum wages have declined recently relative to average hourly earnings. Both countries increased the generosity of their unemployment insurance plans in the early 1970s and both have recently taken steps to reduce unemployment benefits (broadly defined). The only structural aspect of the labour market that has changed substantially in Canada relative to the United States is the extent of unionization. This change has occurred gradually over the past 15 years, however, with relatively little change since 1980.

Our investigation of wage behaviour is similarly unenlightening. Historically, relative wage growth and relative employment growth between Canada and the United States have been *positively* correlated. The short-run relationship between wages and employment in each country is likewise inconsistent with the hypothesis that wage increases prevent employment growth. In any case, however, wages in Canada relative to their US counterparts have fallen dramatically since the mid-1970s with the depreciation of the Canadian exchange rate. We have been singularly unsuccessful in documenting structural differences in the US and Canadian labour markets that can explain the recent divergence in unemployment rates between the two countries.

I. AN ANALYSIS OF RECENT MOVEMENTS IN UNEMPLOYMENT

Table 1 presents some basic time-series data on the US and Canadian labour markets.⁷ At this broad level, the labour markets of the two countries are very similar, in terms of both labour force participation rates and unemployment rates. Labour force participation rates were lower in Canada in the 1950s but caught up to US rates by 1975. In the late 1970s Canadian unemployment rates were slightly higher than those in the United States. In 1980 and 1981, however, unemployment rates were about equal in the United States and Canada.

Our analysis is motivated by the sharply higher unemployment rates in Canada after 1982. Table 2 presents a simple regression analysis of the problem. In column (1) we present the least squares regression of the Canadian unemployment rate on the US rate, using data from 1955 to 1981. Over this period Canadian unemployment rates moved more or less point-for-point with US

TABLE 1

LABOUR FORCE, EMPLOYMENT AND UNEMPLOYMENT, CANADA AND THE UNITED STATES, 1954-1984

	Canada				United States			
	Labour force participation rate (%) (1)	Labour force (2)	Employment (3)	Unemployment rate (4)	Labour force participation rate (%) (1)	Labour force (2)	Employment (3)	Unemployment rate (4)
1954	54.5	5,567	5,334	4.2	58.8	63,692	60,119	5.6
1955	54.5	5,682	5,457	4.0	59.3	64,991	62,156	4.4
1956	55.1	5,863	5,682	3.1	60.0	66,542	63,799	4.1
1957	55.6	6,101	5,820	4.3	59.6	66,951	64,074	4.3
1958	55.5	6,205	5,804	6.5	59.5	67,674	63,044	6.8
1959	55.4	6,315	5,971	5.5	59.3	68,352	64,623	5.5
1960	55.8	6,485	6,068	6.4	59.4	69,643	65,767	5.5
1961	56.2	6,568	6,138	6.6	59.3	70,439	65,733	6.7
1962	55.9	6,663	6,301	5.5	58.8	70,611	66,695	5.5
1963	55.9	6,797	6,452	5.1	58.7	71,809	67,755	5.6
1964	56.2	6,989	6,688	4.3	58.7	73,077	69,299	5.2
1965	56.5	7,202	6,943	3.6	58.9	74,433	71,079	4.5
1966	57.3	7,493	7,242	3.4	59.2	75,749	72,884	3.8
1967	57.6	7,747	7,451	3.8	59.6	77,345	74,372	3.8
1968	57.6	7,951	7,593	4.5	59.6	78,707	75,908	3.6
1969	57.9	8,194	7,831	4.4	60.1	80,706	77,875	3.5
1970	57.8	8,395	7,919	5.7	60.4	82,800	78,672	4.9
1971	58.1	8,639	8,103	6.2	60.2	84,377	79,352	5.9
1972	58.6	8,897	8,344	6.2	60.4	87,019	82,139	5.6
1973	59.7	9,276	8,761	5.5	60.8	89,410	85,051	4.9
1974	60.5	9,639	9,125	5.3	61.3	91,967	86,789	5.6
1975	61.1	9,974	9,284	6.9	61.2	98,788	85,841	8.5
1976	61.1	10,203	9,477	7.1	61.6	96,152	88,751	7.7
1977	61.6	10,501	9,651	8.1	62.3	98,981	92,015	7.1
1978	62.7	10,895	9,987	8.3	63.2	102,234	96,048	6.1
1979	63.4	11,231	10,395	7.4	63.7	104,960	98,824	5.8
1980	64.1	11,573	10,708	7.5	63.8	106,974	99,303	7.1
1981	64.8	11,904	11,006	7.6	63.9	108,668	100,394	7.6
1982	64.1	11,958	10,644	11.0	64.0	110,238	99,525	9.7
1983	64.4	12,182	10,734	11.9	64.0	111,515	100,823	9.6
1984	64.8	12,400	11,000	11.3	64.4	113,521	104,999	7.5

Note: Labour force, employment and unemployment data pertain to the civilian non-institutional population, aged 15 and over in Canada; 16 and over in the United States. Canadian data for 1954-65 are adjusted for comparability with the revised Canadian Labor Force Survey. US data represent annual averages of seasonally adjusted monthly data from *Citibase*. Canadian data are taken from Statistics Canada, *Historical Labor Force Statistics*, 1974 and 1983 editions.

TABLE 2
RELATIONSHIP BETWEEN ANNUAL CANADIAN AND US
UNEMPLOYMENT RATES, 1955-1984^a

	Dependent variable: Canadian unemployment rate (%)					
	1955-1981			1955-1984		
	(1)	(2)	(3)	(4)	(5)	(6)
(1) Constant	0.52 (0.62)	0.00 —	-0.09 (0.53)	0.82 (0.71)	-1.17 (0.48)	-0.05 (0.53)
(2) US unemployment rate	0.93 (0.13)	0.51 (0.11)	0.52 (0.12)	0.87 (0.13)	0.66 (0.11)	0.55 (0.10)
(3) Linear trend	—	—	0.03 (0.02)	—	—	0.03 (0.02)
(4) Lagged Canadian unemployment rate	—	0.51 (0.11)	0.52 (0.12)	—	0.59 (0.09)	0.40 (0.10)
(5) Post-1981 intercept shift	—	—	—	2.76 (0.68)	—	1.57 (0.51)
(6) Standard error	0.86	0.63	0.62	0.88	0.70	0.58

^a OLS standard errors reported. Equations without lagged dependent variable exhibit strong residual serial correlation.

rates. An examination of the data in Figure 1 suggests that Canadian unemployment rates typically responded to changes in US rates with a lag. In column (2) of Table 2 we include lagged Canadian unemployment as an additional explanatory variable. The fit of this simple equation is remarkably good. Typically, a 1 point increase in US unemployment rates brings about a 0.5 point increase in Canadian rates within the year, and a 0.9 point increase within three years. Column (3) shows that, allowing for this partial adjustment mechanism, there is only a negligible upward trend in Canadian unemployment rates relative to US rates prior to 1982.

Column (4) of the table extends the regression in column (1) to the post-1982 period, with the addition of an intercept shift. The regression indicates a 2.8 per cent increase in Canadian unemployment rates after 1981 that is unexplained by contemporaneous US movements. Allowing for partial adjustment, the conclusion is very similar.⁸ While there is no indication of an emerging unemployment gap prior to 1981, Canadian unemployment rates after 1982 are some 2.5-3 per cent higher than expected.

This simple analysis suggests that the post-1982 unemployment gap is neither a secular phenomenon nor a result of the timing relationship between US and Canadian unemployment. In order to pursue the timing issue more formally, and also to explore the contribution of output demand to relative unemployment, we estimated a quarterly autoregressive forecasting model for the North American economy as a whole, taking as jointly dependent variables the levels of real GNP (output), employment and unemployment in the United States and Canada.⁹ In the data, this model has a simple recursive structure in which the level of US output is determined only by its own lagged values. This recursive structure makes it relatively easy to form forecasts of US employment and unemployment, and Canadian output, employment and

unemployment, conditional on starting values of each of these variables in 1981 and the sequence of realized US output from 1981 to 1984.¹⁰ We can then decompose movements in employment and unemployment in each country, and the unemployment gap between Canada and the United States, into components explained by the movement of US output during 1982-84, and unexplained components. Since the 'explained components' correspond to conditional expectations, the forecast errors should be close to zero if there has been no structural change in the link between US output and the other variables. Large and systematic forecast errors indicate a breakdown in this linkage.

The average annual prediction errors, or 'unexplained' components of US employment and unemployment, and Canadian output, employment and unemployment, are presented in Table 3. The unexplained components of US employment and unemployment are relatively small. In 1984 US unemployment was approximately one percentage point lower than expected, conditional on actual US output. About one-half of this unexpected reduction in US unemployment corresponded to extra employment: the remainder is attributable to labour force movements.¹¹

In Canada, on the other hand, the prediction errors are large and systematic. Canadian real GNP was about 3.5 per cent lower than expected in 1982, controlling for the simultaneous contraction in US output. Historically, output shocks in the United States translate into contemporaneous Canadian shocks with an elasticity of about one-half. In 1982 the large external shock to Canadian output was reinforced by a domestic shock of about the same order of magnitude.¹²

TABLE 3

PREDICTION ERRORS FOR CANADIAN GNP AND US AND CANADIAN EMPLOYMENT AND UNEMPLOYMENT, CONDITIONAL ON ACTUAL US GNP^A
(annual average of quarterly values)

	United States		Real GNP (%)	Canada	
	Employment (%)	Unemployment Rate ^b		Employment (%)	Unemployment Rate ^b
1982	0.1	-0.1	-3.4	-2.8	1.5
1983	0.0	-0.5	-2.2	-3.5	2.3
1984	0.5	-1.2	-1.9	-3.9	2.7

^a Predictions based on a fourth-order vector-autoregressive representation of seasonally adjusted quarterly data. The model is estimated with data from 1956 to 1981, and is used to predict US employment and unemployment, and Canadian GNP, employment and unemployment for 1982-84, conditional on 1981 starting values and realized US real GNP.

^b Expressed as percentage points of unemployment. The unemployment rate is defined as the difference between the logarithms of the labour force and employment.

During 1983 and 1984 Canadian GNP continued to be lower than predicted on the basis of US output, but the gap was shrinking. Based on historical evidence, domestic shocks to Canadian output decay at a rate of about 70 per cent per year, holding constant US output.¹³ The post-1982 pattern of prediction errors for Canadian GNP is consistent with a large domestic shock to GNP

in 1982 and relatively small domestic shocks after that. There is no evidence of an increasing gap in aggregate demand during 1983 and 1984.

In the Canadian labour market, however, prediction errors based on realized US GNP actually increased in magnitude during 1983 and 1984. Employment was 2.8 per cent less than predicted in 1982, 3.5 per cent less in 1983, and 3.9 per cent less in 1984. Unemployment was higher than predicted in all three years, although the loss in employment was larger than the gain in unemployment in each case, reflecting an unpredicted contraction of the Canadian labour force.

Table 4 summarizes the decomposition of the Canadian-US unemployment gap into components attributable to movements in US output, and unexplained components. The table makes clear that the unemployment gap is not a result of predictable lags in the response of the Canadian labour market to the US business cycle.

TABLE 4
ACTUAL AND PREDICTED UNEMPLOYMENT
IN CANADA AND THE UNITED STATES^a
(annual averages of quarterly values)

	Canadian unemployment minus US unemployment ^a		
	Actual (%)	Predicted (%)	Residual (%)
1982	1.5	-1.0	1.6
1983	2.5	-0.3	2.8
1984	4.2	0.3	3.9

^a See notes to Table 3.

The increasing magnitude of the Canadian employment and unemployment prediction errors in Table 3, together with the declining output prediction errors, suggest that an output-based explanation of the unemployment gap is incomplete. To investigate the possibility of a breakdown of the labour market-output relationship in Canada after 1982, we performed a second simulation of Canadian employment and unemployment, conditional on 1981 starting conditions and realized *Canadian* GNP. Again, the predictions have the interpretation of conditional expectations, given 1981 conditions and the entire sequence of Canadian GNP.¹⁴ The results of the simulations are summarized in Table 5. Conditional on output, Canadian employment was 1.8 per cent less than expected in 1982, 2.4 per cent less than expected in 1983, and 3.3 per cent less than expected in 1984. At the same time, unemployment was 1 per cent higher than predicted in 1982, 2.2 per cent higher in 1983, and 3.4 per cent higher in 1984. The gap between employment growth and output growth in Canada, and the corresponding increases in unemployment, explain most of the unpredicted unemployment in Canada in Table 3 and most of the unemployment gap between Canada and the United States in 1983 and 1984.

On the basis of this evidence, we conclude that traditional demand-side determinants of output and employment are not a major source of the unemployment gap between Canada and the United States. Output was relatively

TABLE 5
 PREDICTION ERRORS FOR
 CANADIAN EMPLOYMENT AND
 UNEMPLOYMENT, CONDITIONAL ON
 ACTUAL CANADIAN GNP^a
 (annual averages of quarterly values)

	Canadian employment (%)	Canadian unemployment rate ^b
1982	-1.8	1.0
1983	-2.4	2.2
1984	-3.3	3.4

^a Predictions based on a fourth-order vector-autoregressive representation of seasonally adjusted quarterly data. The model is estimated with data from 1956 to 1981, and is used to predict employment and unemployment conditional on 1981 starting values and realized Canadian real GNP.

^b Expressed as percentage points of unemployment. The unemployment rate is defined as the difference between the logarithms of the labour force and unemployment.

depressed in Canada in 1982, but has recovered predictably since then. The unemployment gap, by comparison, widened in 1983 and 1984, and continued in 1985. In the remainder of the paper, we examine conditions within the US and Canadian labour markets that may potentially explain the relative lack of employment growth in Canada.¹⁵

II. DEMOGRAPHIC AND INDUSTRIAL COMPOSITION OF LABOUR MARKETS IN CANADA AND THE UNITED STATES

In this section we briefly summarize the demographic and industry structures of the US and Canadian labour markets. Table 6 presents the shares of various age and sex groups in employment, unemployment and the labour force in Canada and the United States. The table also summarizes trends in these shares during the last two decades, and the shares as of 1983.

The table illustrates several points. First, the demographic structure of these two countries' labour forces is very similar. There is no evidence that Canadian unemployment rates are higher because of a greater concentration of high-unemployment groups. Second, a disproportionate share of unemployment is concentrated among young workers in both countries. Third, the pool of employed workers has become relatively older in Canada. The employment shares of 15 to 24-year-olds were below their long-run averages in both countries in 1983, but by a wider margin in Canada. While this may account for an upward trend in relative productivity in Canada, the changes are too small and too gradual to explain the rapid increase in Canadian productivity after 1982.

TABLE 6
DEMOGRAPHIC COMPONENTS OF EMPLOYMENT AND UNEMPLOYMENT, CANADA AND UNITED STATES

	Canada									United States								
	% of labour force			% of employment			% of unemployment			% of labour force			% of employment			% of unemployment		
	Mean	Trend	1983	Mean	Trend	1983	Mean	Trend	1983	Mean	Trend	1983	Mean	Trend	1983	Mean	Trend	1983
(1) Men 15-24	14.2	0.0	12.6	13.3	-0.1	11.1	26.5	-0.1	23.8	12.4	0.1	11.6	11.5	0.0	10.4	25.2	0.0	22.1
(2) Men 25-54	40.4	-0.4	38.2	41.3	-0.3	39.2	26.9	-0.2	30.8	37.9	-0.3	36.9	38.7	-0.3	37.5	22.9	0.5	31.4
(3) Men 55 and older	8.9	-0.2	7.4	9.1	-0.2	7.8	6.4	-0.4	4.5	9.9	-0.2	8.0	10.1	-0.2	8.4	5.5	-0.2	4.7
(4) Women 15-24	11.7	0.1	11.3	11.1	0.0	10.6	18.6	0.2	16.2	10.3	0.1	10.1	9.6	0.1	9.5	21.8	-0.3	16.7
(5) Women 25-54	21.3	0.6	26.7	21.4	0.6	27.3	19.3	0.6	22.4	23.7	0.4	27.9	23.9	0.4	28.5	21.2	0.1	22.3
(6) Women 55 and older	3.7	0.0	3.7	3.8	0.0	3.9	2.3	0.0	2.2	5.9	-0.1	5.4	6.0	0.0	5.7	3.4	-0.1	2.7

Note:

Based on quarterly unadjusted data, 1966-83. Trends are expressed as percentage points per year, and are estimated from a linear regression on constant, trend and seasonal factors. Values shown for 1983 represent annual averages.

TABLE 7
RELATIVE GROWTH RATES OF EMPLOYMENT IN CANADA AND THE UNITED STATES BY INDUSTRY, 1964-1984^a

	Mining		Manufacturing		Construction		Transportation, Public utilities			
	Can.	USA	Can.	USA	Can.	USA	Can.	USA		
(1) % of total employment (average), 1961-84	1.9	1.0	23.9	26.0	5.7	5.0	10.2	6.2		
(2) % change in employment, 1964-69	10.0	-2.3	12.9	16.7	14.0	15.5	9.4	12.4		
(3) % change in employment, 1969-74	11.0	12.5	9.5	-0.4	17.7	12.7	15.7	6.4		
(4) % change in employment, 1974-79	14.4	37.5	2.0	4.8	4.5	10.7	7.2	8.7		
(5) % change in employment, 1979-84	-2.7	4.2	-12.5	-6.9	-4.3	-3.3	0.8	0.6		
			Finance, insurance, Real estate							
			Trade		Services ^b		Government ^b		Total ^c	
	Can.	USA	Can.	USA	Can.	USA	Can.	USA	Can.	USA
(1) % of total employment (average), 1961-84	16.9	21.7	5.1	5.3	28.4	17.3	7.1	17.5	100.0	100.0
(2) % change in employment, 1964-69	23.8	20.9	29.2	20.6	39.3	29.0	19.4	27.2	21.5	20.8
(3) % change in employment, 1969-74	27.4	15.6	35.3	18.1	22.5	20.4	31.9	16.2	19.7	11.2
(4) % change in employment, 1974-79	12.5	18.8	23.9	19.9	20.5	27.3	11.9	12.6	11.8	14.9
(5) % change in employment, 1979-84	7.2	7.9	10.2	13.9	15.5	20.7	7.1	0.1	4.1	4.8

^a Data are based on annual averages of seasonally adjusted data. US data are taken from *Citibase*. Canadian data are taken from *Cansim* (1961-83) and the *Bank of Canada Review* (1983-84). Canadian employment series are spliced at March 1983 to reflect the revision of the Establishment Survey. Growth rates represent actual percentage changes (rather than changes in logarithms).

^b In Canada, service employment includes education and health service workers employed by provincial and local governments. These workers are classified as government workers in the United States.

^c Total non-agricultural employment. Canadian non-agricultural employment includes forestry workers (who made up less than 1 per cent of non-agricultural employment in 1984). In the United States forestry workers are classified as agricultural workers.

Table 7 presents the industry composition of employment in Canada and the United States and compares five-year employment growth rates in the two countries by industry. Employment shares and growth rates by industry are fairly similar. At this level of aggregation, there is no indication that Canadian employment is more heavily concentrated in slow-growth industries. The last two columns of the table give the aggregate employment growth rates for both countries by five-year intervals. According to these data, Canadian growth rates were about the same as US rates for 1964–69 and 1979–84, and were significantly higher than US rates over the 10-year period 1969–79. By an absolute comparison, then, Canadian employment growth performed as well as or better than US growth during the past two decades. An absolute comparison is misleading, however, because of the higher labour force growth rate in Canada. Equal employment growth rates in the United States and Canada from 1979 to 1984 actually lead to an increase in relative unemployment of 2.3 per cent. The lack of employment growth in Canada in the 1980s is better interpreted as a *relative* shortfall than an absolute one.

Our comparison of the demographic and industry structure of the United States and Canada leads us to an important conclusion: these structures are remarkably similar. Consequently, the recent divergence between the aggregate unemployment rates in the two countries cannot be attributed in any simple way to differences in demographic or industrial structure. It follows that alternative, less mechanical, explanations for the divergence in unemployment rates are worth examining, and we turn to those next.

III. LABOUR MARKET RIGIDITIES IN CANADA AND THE UNITED STATES

The similarity of the industrial and demographic structures of the Canadian and US labour markets deepens the puzzle of the recent unemployment divergence between the two countries. One explanation for the European-US divergence is the widely discussed 'Eurosclerosis' hypothesis. According to this hypothesis, employment costs have increased rapidly in Europe relative to the United States as a result of government intervention in the labour market, social welfare policies and trade union policies. Government and union regulations on hiring and firing decisions, and social policies that discourage worker mobility, are said to lead to unemployment, resulting mainly from failure to absorb new labour market entrants.

This 'regulatory rigidity' hypothesis is rarely spelled out in a way that encourages empirical examination, and we are unaware of any serious analysis of it. A simple hypothesis, however, is to associate some level of structural or 'regulatory' unemployment with the extent of regulation in each country. If the 'regulatory rigidity' hypothesis is to explain the recent divergence of US and Canadian unemployment rates, two conditions must be met. First, measures of labour market rigidity must be roughly similar in the United States and Canada throughout the 1960s and 1970s, in order to explain the similarity of unemployment in the two countries during this period. Second, there must be a sharp increase in 'rigidity' in 1981 or 1982.

In what follows we select three straightforward measures of labour market regulation for examination. The first is an index of the minimum wage rate, which is often alleged to operate as a barrier to the employment of younger

workers. The second is an indication of the generosity of the unemployment insurance benefit system, which is often alleged to cause workers to prolong their unemployment spells and to cause employers to initiate too many temporary layoffs. The third is the extent of unionization of the labour force. We are aware that there are many other rigidities in the labour market, including government- and non-government-induced rigidities. Most of these are difficult to quantify, however, and we leave our attempts to do so to further research.

Minimum wage regulation

Table 8 indicates our measures of the statutory minimum wage rate in the United States and Canada and their levels since 1966. It is conventional to use the ratio of the minimum wage to some aggregate wage rate as an index of the effective minimum wage. We have selected average hourly earnings in manufacturing as a benchmark in each country. Minimum wages vary by province in Canada, and we have used a labour force weighted average of provincial relative minimum wage rates to form a national index. In the United States there is a uniform federal minimum wage, but coverage of employment by minimum wage statutes is not universal. Traditionally, the ratio of the minimum wage to average wages is multiplied by the fraction of covered employment to obtain an effective minimum. It is clear from the table that, as conventionally measured, the minimum wage is typically higher in Canada than in the United States. Without the coverage adjustment, however, the relative minimums in the two countries are very similar. Since 1980 the effective minimum has apparently declined in both countries by about the same percentage amount. There is no evidence of an increase in minimum wage regulation in Canada, either in absolute terms or relative to the United States.

Unemployment benefits

Tables 9a and 9b provide a history of information on unemployment benefits in the United States and Canada since 1966. We present three measures of the generosity of unemployment insurance benefits. The first of these is the aggregate replacement rate, which measures the ratio of average unemployment benefits to average earnings.¹⁶ We have calculated both a gross replacement rate and a net replacement rate, which adjusts for the differing tax treatment of benefits in the United States and Canada. There have been some changes in relative replacement rates in the past two decades. In 1972, for example, revisions in the Unemployment Insurance Act in Canada increased benefits dramatically in that country relative to the United States. Since the late 1970s gross and net replacement rates have remained more or less constant in the United States and Canada, although net rates are apparently lower in Canada.

A second measure of the generosity of the unemployment insurance system is the average duration of benefit spells. During the 1970s, benefit spells in both Canada and the United States averaged about 15 weeks. The duration of benefits is highly sensitive to economic conditions, and durations were longer in the United States in 1975 and 1976, and longer in Canada in 1978 and 1979, reflecting the relative strengths of cyclical downturns in the two countries. In 1980 and 1981, benefit spells were about of equal length in the two countries.

TABLE 8
MINIMUM WAGE RATES, COVERAGE, AND COVERAGE-WEIGHTED MINIMUM WAGES, CANADA AND UNITED STATES,
1966-1984

	Canada ^a				United States ^b			
	Actual minimum (male workers)				Weighted relative minimum	Actual minimum	Proportion of Non-supervisory workers covered	Coverage-weighted relative minimum
	Nova Scotia	Ontario	Quebec					
1966	1.08	1.00	0.75	0.41	1.25	0.63	0.30	
1967	1.10	1.00	1.04	0.43	1.25	0.75	0.35	
1968	1.14	1.00	1.08	0.43	1.40	0.73	0.35	
1969	1.19	1.30	1.25	0.46	1.60	0.78	0.41	
1970	1.25	1.35	1.32	0.45	1.60	0.78	0.39	
1971	1.33	1.61	1.44	0.46	1.60	0.78	0.36	
1972	1.45	1.65	1.58	0.46	1.60	0.78	0.34	
1973	1.60	1.79	1.73	0.46	1.60	0.78	0.32	
1974	1.72	2.06	2.00	0.47	1.87	0.81	0.36	
1975	2.24	2.35	2.49	0.48	2.10	0.83	0.37	
1976	2.50	2.60	2.84	0.47	2.30	0.85	0.39	
1977	2.75	2.65	3.08	0.45	2.30	0.87	0.37	
1978	2.75	2.65	3.27	0.43	2.65	0.78	0.35	
1979	2.81	3.00	3.42	0.42	2.90	0.78	0.35	
1980	2.81	3.00	3.61	0.40	3.10	0.78	0.34	
1981	3.08	3.28	3.84	0.38	3.35	0.79	0.34	
1982	3.41	3.50	4.00	0.36	3.35	0.80	0.32	
1983	3.75	3.50	4.00	0.35	3.35	0.80	0.31	
1984	3.75	3.83	4.00	0.35	3.35	0.80	0.30	

^a Minimum wage rates are taken from *Labour Standards in Canada*. The weighted relative minimum wage represents a labour-force-weighted average of relative minimum wage rates by province and sex. For each province, the minimum wage is expressed as a fraction of average hourly earnings in manufacturing. Minimum wages cover essentially all workers in all provinces for the years in this table. Data for 1966-70 were provided by R. Swidinsky. Data for 1971-84 represent the author's calculations.

^b Actual minimum wage data are taken from the *Social Security Bulletin Annual Statistical Supplement* (1983). Coverage data are taken from *Minimum Wage and Maximum Hours Standards Under the Fair Labor Standards Act* (various issues). Coverage data for 1982, 1983 and 1984 represent extrapolations. The coverage-weighted minimum wage is the product of the coverage ratio and the actual minimum, divided by average hourly earnings of production workers in manufacturing, excluding overtime.

TABLE 9a
 COVERAGE, BENEFITS, AND DURATION OF UNEMPLOYMENT INSURANCE, CANADA, 1966-1984^a

	Proportion of labour force covered	Ave. weekly benefit	Ave. weekly earnings	Gross replacement rate	Tax adjustment ^b	Net replacement rate	Ave. duration of benefit claims ^c	Ave. no. of UI recipients per unemployed worker ^d
1966	0.61	24	96	0.25	1.25	0.31	—	0.92
1967	0.62	25	103	0.24	1.25	0.30	—	0.90
1968	0.64	27	110	0.24	1.25	0.30	—	0.89
1969	0.66	32	118	0.27	1.25	0.34	—	0.84
1970	0.67	35	127	0.28	1.25	0.35	—	0.80
1971	0.67	39	138	0.28	1.25	0.35	—	0.81
1972	0.89	62	149	0.42	1.00	0.42	13.5	1.06
1973	0.90	68	160	0.43	1.00	0.43	14.4	1.10
1974	0.90	75	178	0.42	1.00	0.42	13.1	1.06
1975	0.90	85	203	0.42	1.00	0.42	14.2	1.04
1976	0.91	93	228	0.41	1.00	0.41	14.6	0.96
1977	0.90	101	250	0.40	1.00	0.40	15.0	0.88
1978	0.89	110	265	0.42	1.00	0.42	15.9	0.88
1979	0.89	109	288	0.38	1.00	0.38	16.0	0.85
1980	0.89	121	317	0.38	1.00	0.38	15.2	0.81
1981	0.89	130	355	0.37	1.00	0.37	14.8	0.79
1982	0.89	145	391	0.37	1.00	0.37	17.0	0.88
1983	0.89	155	420	0.37	1.00	0.37	21.2	0.88
1984	0.89	162	444	0.36	1.00	0.36	19.2	0.85

^a The proportion of the labour force covered represents the sum of insured employment and unemployment, divided by the labour force. Data on insured employment and unemployment are taken from Statistics Canada, *Statistical Report on the Operation of the Unemployment Insurance Act* (various issues). Data on average benefits and average duration of benefits are taken from Statistics Canada, *Social Security National Programs*, Vol. 2 (1984), and Riddell (1980). Average weekly earnings are for production workers on private payrolls, from *Employment, Earnings and Hours*.

^b Calculated on the assumption that the marginal tax rate for a typical UI recipient is 20 per cent on earned income. UI benefits were untaxed prior to 1972. From 1972 to 1979 they were taxed as ordinary income. After 1979, UI recipients with annual net income in excess of \$20,670 (1.5 times maximum insurable earnings) were forced to reimburse 30 per cent of the benefits that made up the excess.

^c Measured by dividing total benefit weeks paid by the number of initial claims.

^d Measured by dividing total benefit weeks paid by 52 times the average number of unemployed workers.

TABLE 9b
 COVERAGE, BENEFITS, AND DURATION OF UNEMPLOYMENT INSURANCE, UNITED STATES, 1966-1984^a

	Proportion of labour force covered	Ave. weekly benefit	Ave. weekly earnings	Gross replacement rate	Tax adjustment	Net replacement rate	Ave. duration of benefit claims ^c	Ave. no. of UI recipients per unemployed worker ^d
1966	0.65	40	99	0.40	1.25	0.50	11.2	0.31
1967	0.66	41	102	0.40	1.25	0.50	11.4	0.34
1968	0.66	43	108	0.40	1.25	0.50	11.6	0.33
1969	0.67	46	115	0.40	1.25	0.50	11.4	0.33
1970	0.66	50	120	0.42	1.25	0.50	12.3	0.37
1971	0.67	54	127	0.43	1.25	0.53	14.4	0.36
1972	0.75	56	137	0.41	1.25	0.54	14.0	0.32
1973	0.76	59	145	0.41	1.25	0.51	13.4	0.31
1974	0.77	64	155	0.41	1.25	0.51	12.7	0.36
1975	0.76	70	164	0.43	1.25	0.51	15.7	0.43
1976	0.77	75	175	0.43	1.25	0.54	14.9	0.33
1977	0.80	79	189	0.42	1.25	0.54	14.2	0.31
1978	0.88	83	204	0.41	1.25	0.53	13.3	0.31
1979	0.89	90	220	0.41	1.25	0.51	13.1	0.33
1980	0.90	99	235	0.42	1.25	0.53	14.9	0.38
1981	0.90	106	255	0.42	1.25	0.53	14.5	0.32
1982	0.89	119	267	0.45	1.25	0.56	15.9	0.33
1983	0.88	123	281	0.44	1.25	0.55	17.5	0.31
1984	0.88	123	294	0.42	1.25	0.53	14.8	0.25

^a The proportion of employees covered represents insured employment divided by total employment. Insured employment and average duration are from the *Handbook of Unemployment Insurance Financial Data 1938-76*, and *Monthly Labor Review* (various issues). Data on average weekly benefits and average duration are from the same source. Average weekly earnings are for all production workers on private payrolls.

^b Calculated on the assumption that the marginal tax rate for a typical UI recipient is 20 per cent on earned income and 0 on UI benefits. In 1979 UI benefits became taxable at one-half the recipient's normal tax rate, for recipients whose adjusted gross income exceeded \$20,000 (\$30,000 for married taxpayers filing jointly).

^c Measured by dividing total benefit weeks paid by the number of initial claims. Benefit weeks pertain to state unemployment insurance system only.

^d Measured by dividing total benefit weeks paid by 52 times the average number of unemployed workers. Benefit weeks pertain to state unemployment insurance system only.

In 1982 and 1983 benefit spells increased in both countries in response to the downturn in economic activity. The increase was greater in Canada, although the relative increase is roughly consistent with historical patterns and the relative increase in unemployment rates in Canada. Evidence on the duration of benefits does not suggest that the Canadian unemployment insurance system is significantly more generous than the US system, or that there was a radical change in either system in the 1980s.

A third measure of the generosity of the unemployment insurance system is the ratio of benefit recipients to the number of unemployed workers. In contrast to the previous two measures, which characterize unemployment benefits for those workers who actually receive benefits, the ratio of recipients to unemployed workers summarizes the probability of obtaining benefits, conditional on becoming unemployed. For both Canada and the United States, we calculated the probability of receiving benefits by dividing the average weekly number of benefit recipients by the average weekly total of unemployed workers.

The last columns in Tables 9a and 9b present this number for Canada and the United States respectively. The comparison is quite remarkable. In spite of the fact that coverage of employed workers by the unemployment insurance system is approximately the same in the two countries, a given level of unemployment generates about three times as many beneficiaries in Canada as in the United States. Some caution is required in interpreting these numbers, since the US beneficiary count only includes recipients of state unemployment insurance benefits, and the United States also operates unemployment insurance schemes for veterans, federal workers and railroad workers outside of the state system. In the 1970s, only 80 per cent of average weekly insured unemployment was covered by state programmes; this number increased to 90 per cent in 1978 with revisions in US law. Nevertheless, eligibility criteria for unemployment insurance are apparently stricter in the United States, with the result that the average ratio of benefit recipients to unemployed workers is only about 0.3 in the United States, compared with about 0.9 in Canada.

The time series variation in US benefits per unemployed worker is procyclical, reflecting cyclical movements in the fraction of unemployed workers who are eligible for benefits.¹⁷ As noted by Burtless (1983), the fraction of unemployed workers in the United States receiving benefits has fallen in the last five years (controlling for business cycle conditions). A similar decline in the ratio of beneficiaries to unemployed workers is apparent in Canada after the 1979 revision to the unemployment insurance system there. The ratio increased in Canada in 1982, however, so that in 1984 the relative fraction of benefit recipients to unemployed workers in Canada as against the United States was as high as its level in 1973.

The fact that unemployed workers are more likely to receive benefits in Canada than in the United States is an important difference between the countries, and the only major difference in their unemployment systems that we have found. This difference has existed for at least the past 20 years, however, and seems incapable of explaining a *recent* divergence in unemployment rates. It may none the less account for the relatively slower adjustment to cyclical shocks in Canada. The evidence in Section I above, however, suggests that the recent unemployment divergence is not purely an adjustment phenomenon.

Union coverage

Table 10 presents time-series information on the extent of union coverage in the United States and Canada. The entries for 1950, 1960, 1964 and 1970 indicate relative stability in union coverage over that period, with a small decline in US coverage during the 1960s. During the 1970s, however, union coverage ratios diverged rapidly, with union coverage increasing some 4 or 5 percentage points in Canada and decreasing by about the same amount in the United States. After 1980, information on US union coverage is irregular. Coverage measures from the Current Population Survey, which became available in 1973, stopped in 1981 and then resumed in 1984, are roughly in agreement with coverage ratios estimated indirectly from union membership. By 1984 these data suggest that union coverage was twice as high in Canada as in the United States.¹⁸ While this is an important difference between the two economies, the gap in union coverage emerged in the early 1970s, and remained relatively constant during the 1980s. Union membership rates by themselves, therefore, cannot explain divergent unemployment rates *after* 1981.

TABLE 10
UNION MEMBERSHIP AS A PERCENTAGE OF NON-AGRICULTURAL
EMPLOYMENT, CANADA AND THE UNITED STATES, 1950-1984

	Union membership as a percentage of non-agricultural payroll measured from union records ^a		Union membership as a percentage of wage and salary workers measured from household survey ^b
	Canada	USA	USA
1950	30.1	31.5	—
1960	32.3	31.4	—
1964	29.4	28.9	—
1970	33.6	27.3	—
1971	33.6	27.0	—
1972	34.6	26.4	—
1973	36.1	25.8	23.6
1974	35.8	25.8	23.2
1975	36.9	25.3	22.3
1976	37.3	24.7	23.4
1977	38.2	24.8	23.4
1978	39.0	23.6	22.7
1979	—	—	23.8
1980	37.6	24.8 ^c	22.7
1981	37.4	—	21.2
1982	39.0	22.1 ^c	—
1983	40.0	—	—
1984	39.6	—	19.1 ^d

^a Calculated as the ratio of estimated union membership to employment of non-agricultural payrolls. The BLS discontinued its estimates of union membership in 1980. No Canadian estimate is available for 1979.

^b Estimated from Current Population Survey. Data for 1973-81 are from Kokkelenberg and Sockell (1985). CPS discontinued its union membership questions during 1982 and 1983. The CPS survey includes employee associations after 1976.

^c The 1982 figure for union membership in the United States was estimated by the Bureau of National Affairs. The 1980 and 1982 membership figures include membership in employee associations. The 1978 estimate of union membership as a percentage of non-agricultural employment including association membership is 26.2 per cent.

^d Estimate from September 1984 CPS.

Our conclusion from this analysis of minimum wage laws, unemployment insurance provisions and union coverage rates is straightforward. There is no direct evidence that changes in any of these institutional features can explain the unemployment gap in Canada after 1981. Each of these features doubtless contributes to the level of structural unemployment in each country. However, it is difficult to isolate a dramatic change in any of these features that corresponds to the timing of the unemployment gap.

IV. WAGE RIGIDITY AND EMPLOYMENT

An alternative interpretation of the hypothesis linking the regulation of labour markets to unemployment attributes the causation to wage rigidity. In this view, economic shocks that require wage decreases to restore labour market equilibrium are prohibited from working their way through the economic system by labour market regulations. According to these notions, wage rigidity is the cause of unemployment, and unemployment has increased recently because of a sequence of economy-wide shocks.

It is, of course, difficult to test this hypothesis directly when the economic shocks in question are not empirically identified, but two different aspects of this hypothesis are testable by using the comparison of wage behaviour in the United States and Canada. If it is relative wage rigidity that has caused Canadian employment to grow more slowly than the Canadian labour force relative to that of the United States, then it seems that a comparison of the time-series path of wage behaviour in the two countries is called for. Alternatively, the relative wage rigidity explanation for the divergence in unemployment presumes a causal relationship between an exogenously determined real wage and the employment level. We also subject this hypothesis to test in the two countries.

The path of real wage rates

Figure 2 portrays the history of the real wage rate in Canada relative to that of the United States since 1964. The wage series is the ratio of real average hourly earnings in manufacturing in the two countries adjusted for the real exchange rate.¹⁹ This series provides an indication of what it costs in US dollars to buy an hour of Canadian labour relative to the cost of buying an hour of US labour, and is perhaps a useful measure of movements in relative labour costs to producers. As the figure indicates, the cost of Canadian labour increased relative to the cost of US labor continuously until the mid-1970s. After a sharp fall in the relative cost of Canadian labour in the 1977-80 period, this index remained relatively stable at around the value of 1.0 in subsequent periods.

These data certainly do not provide any evidence that relative wage rigidity is a major source of the divergence in Canadian and US unemployment rates. First, there has been no substantial increase in the cost of Canadian labour relative to the cost of US labour in the post-1981 period. Second, the period 1964-74, which coincided with higher rates of growth of employment in Canada than in the United States, also coincided with continued greater growth in Canadian real wage rates. Thus, treating exogenous real-wage growth as a causal source of employment changes is entirely contradictory with the facts.

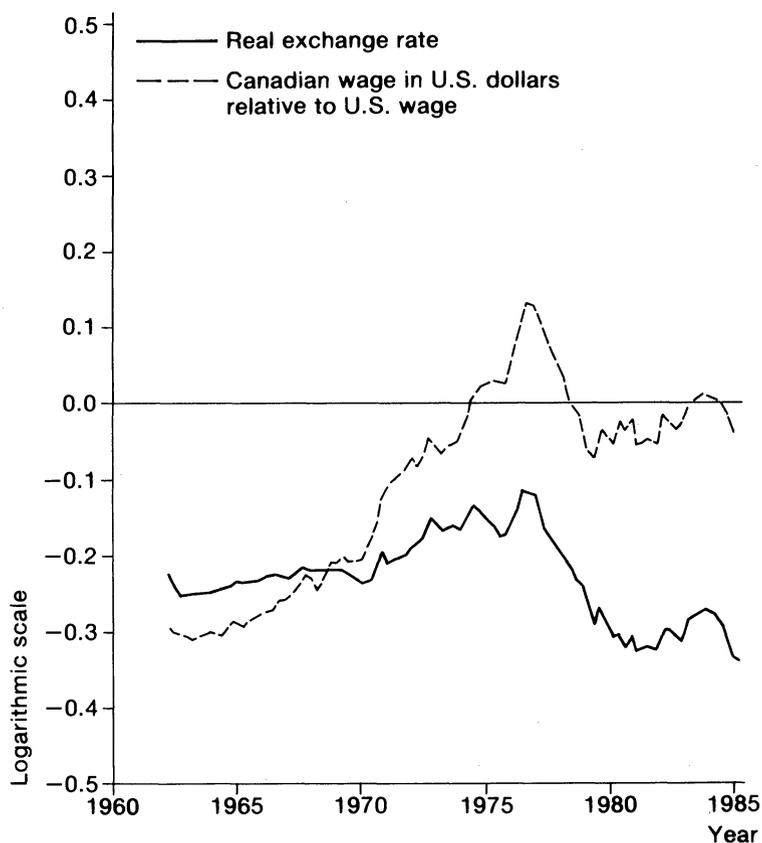


FIGURE 2. Relative wages and the exchange rate, 1965-1983.

Although the current equality in US and Canadian employment growth is consistent with the current stability in the US-Canadian wage ratio, the history of relative wage growth in the two countries in earlier periods implies a positive rather than negative relation between employment growth and wage growth.

Effects of the real wage on employment

More direct tests of the role of real wages in determining employment are contained in Table 11. Columns (1) and (4) of the table indicate that employment may be well described as a (weakly) damped second-order autoregressive process in both countries. Innovations in Canadian employment display somewhat greater variability than in the United States, but the rate of change of employment is less persistent in Canada.

Causality tests of employment by the real wage are reported in row (10) of the table. There is marginal evidence of causality from real-wage rates to employment in both the United States and Canada. The sums of the coefficients on the real-wage variables in the regressions reported in Table 11, however, indicate a positive, but effectively negligible, long-run relationship between real wage rates and employment in both the United States and Canada.²⁰ In

TABLE 11

AUTOREGRESSIVE REPRESENTATIONS OF MANUFACTURING EMPLOYMENT:
 QUARTERLY DATA, CANADA AND THE UNITED STATES, 1962-1984
 (standard errors in parentheses)

	Canadian employment			US employment			Canada -USA
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) Employment (<i>t</i> -1)	1.34 (0.10)	1.50 (0.11)	1.40 (0.10)	1.63 (0.08)	1.70 (0.11)	1.56 (0.11)	1.36 (0.11)
(2) Employment (<i>t</i> -2)	-0.38 (0.10)	-0.93 (0.19)	-0.89 (0.17)	-0.70 (0.08)	-0.87 (0.22)	-0.80 (0.21)	-0.91 (0.18)
(3) Employment (<i>t</i> -3)	—	0.52 (0.20)	0.55 (0.18)	—	0.12 (0.22)	0.18 (0.21)	0.69 (0.18)
(4) Employment (<i>t</i> -4)	—	-0.13 (0.12)	-0.12 (0.11)	—	-0.02 (0.11)	-0.04 (0.10)	-0.26 (0.12)
(5) Real wage (<i>t</i> -1)	—	—	-0.12 (0.19)	—	—	0.09 (0.16)	0.11 (0.17)
(6) Real wage (<i>t</i> -2)	—	—	0.19 (0.28)	—	—	-0.07 (0.25)	0.20 (0.25)
(7) Real wage (<i>t</i> -3)	—	—	-0.31 (0.28)	—	—	0.30 (0.24)	-0.14 (0.25)
(8) Real wage (<i>t</i> -4)	—	—	0.34 (0.19)	—	—	-0.42 (0.16)	-0.09 (0.16)
(9) Standard error	0.014	0.014	0.013	0.010	0.010	0.010	0.023
(10) Probability value of exclusion test for 4 lagged values of real wages	—	—	0.04	—	—	0.15	0.12

^a Seasonally adjusted data (all variables in logarithms). The wage rate represents average hourly earnings of hourly-rated workers in Canada; production workers in the United States. Regressions include a linear trend and quarterly dummy variables.

^b Canadian and US employment regressions are estimated jointly in a two-step procedure. Correlation of the first-stage residuals from Canadian and US equations is 0.40. The probability value of an *F*-test for equality of the US and Canadian coefficients is 0.02.

^c All variables in difference form. The probability value for an *F*-test that all US and Canadian variables enter with equal and opposite coefficients is 0.11.

sum, we find no evidence that real wage rates have been a factor in employment determination in either country.

The last column of Table 11 provides a more direct test of whether movements in the relative wage of Canadian *v.* US workers have been a causal factor determining relative employment movements in the two countries. Here we simply difference the dynamic employment equations in the two countries and compute the regression of relative employment on relative real wage rates directly. This specification has the attractive feature that it differences out unobservable error components in employment demand that are common to both countries. To the extent that input prices and productivity shocks are similar between the two countries, mis-specification in the demand equation of one country or the other is eliminated.

A test for coefficient equality between lagged US and Canadian variables shows that these restrictions are not easily rejected. Consequently, the differenced employment regression provides a powerful test of the role of relative wages in the determination of relative employment. The results are the same as when the test are performed for each country separately: there is no evidence that relative employment and relative wage rates are negatively related.

V. CONCLUSIONS

We began our investigation with the puzzle set out in Figure 1: Why has the unemployment rate in Canada increased so substantially relative to the unemployment rate in the United States? This question is all the more interesting because, as we have shown, the demographic and industrial composition of the two economies are remarkably similar. It seems that simple mechanical hypotheses cannot explain the basic puzzle.

It is also evident, however, that the increase in Canadian unemployment relative to US unemployment cannot be fully attributed to output movements. We find that the gap between actual and predicted Canadian output, based on US output, has fallen dramatically since 1982 while the unemployment gap has widened. We also find that unemployment in Canada was 2 to 3 percentage points higher in 1983 and 1984 than predicted by Canadian output. Some caution is nevertheless required in interpreting post-1980 movements in employment and output in Canada, since the magnitude of the 1982 contraction was unprecedented in Canadian post-war history.²¹

We have investigated a variety of hypothesis to explain the slow growth of employment in Canada after 1982. These hypotheses refer to rigidities in the labour market, which raise employers' costs and restrict the flow of workers between sectors. The evidence does not support the notion that the growth in relative unemployment in Canada is due to differences in the regulation of the labour market in the two countries. Minimum wage laws and unemployment benefits are fairly similar in Canada and the United States, and neither has changed relative to the other in the last decade. Unionization rates have increased in Canada relative to the United States since 1970; most of this divergence occurred before 1980, however, and does not seem to have created an unemployment gap prior to 1980.

Finally, the hypothesis that differential real wage rates are a major determinant of relative employment in the United States and Canada is soundly rejected by the data. In the time-series data, real wage rates have been essentially uncorrelated with employment movements within each country and between the two countries.

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APPENDIX

TABLE A1

MACROECONOMIC INDICATORS FOR CANADA

	Monetary statistics ^a			Real expenditure statistics (1972 \$ billions)				
	Change in nominal M1	Change in nominal M2	90-day T-bill rate	Government expenditure	Private fixed investment	Consumption	Net exports	GNP
1973	14.5	14.7	5.4	23.5	20.6	63.9	-1.7	107.8
1974	9.3	20.5	7.8	24.5	21.7	67.2	-4.9	111.7
1975	14.0	15.2	7.4	25.5	22.5	70.6	-5.7	113.0
1976	8.0	13.0	8.9	25.5	23.8	75.2	-6.0	119.6
1977	8.5	14.3	7.4	26.2	23.7	77.0	-4.6	122.0
1978	10.1	11.1	8.6	26.5	23.7	79.0	-3.1	126.3
1979	6.9	15.7	11.6	26.4	25.8	80.6	-4.5	130.4
1980	6.4	18.9	12.8	26.5	26.8	81.4	-3.0	131.8
1981	3.6	15.2	17.8	27.2	28.6	82.8	-3.6	136.1
1982	0.7	9.3	13.8	27.5	25.3	81.1	0.0	130.1
1983	10.2	5.7	9.3	27.5	23.8	83.7	-0.5	134.4
1984	3.2	4.4	11.1	28.5	23.7	86.8	1.2	141.1

^a Based on annual averages of weekly money supply statistics.

TABLE A2
MACROECONOMIC INDICATORS FOR THE UNITED STATES

	Monetary statistics ^a			Real expenditure statistics (1972 \$ billions)					GNP
	Change in nominal M1	Change in nominal M2	90-day T-bill rate	Government expenditure	Private fixed investment	Consumption	Net exports		
1973	7.3	9.9	7.0	253.3	200.4	767.9	15.5	1254.3	
1974	5.0	6.1	7.9	260.3	183.9	762.8	27.8	1246.3	
1975	4.6	9.3	5.8	265.2	161.5	779.4	32.2	1231.6	
1976	5.7	13.0	5.0	265.2	176.7	823.1	25.4	1298.2	
1977	13.7	12.7	5.3	269.2	200.9	864.3	22.0	1369.7	
1978	2.5	8.5	7.2	274.6	220.7	903.2	24.0	1438.6	
1979	7.7	8.2	10.0	278.3	229.1	927.6	37.2	1479.4	
1980	6.3	8.1	11.5	284.3	212.9	931.8	50.3	1475.0	
1981	7.1	9.5	14.0	287.0	219.6	950.5	43.8	1512.2	
1982	6.5	9.4	10.7	292.7	204.7	963.3	29.7	1480.0	
1983	11.3	12.3	8.6	291.9	224.6	1009.2	12.6	1534.7	
1984	6.9	7.9	9.6	302.2	265.5	1062.6	-15.5	1639.0	

^a Based on annual averages of weekly money supply statistics.

NOTES

1. For display purposes, we have superimposed the 45° line on Figure 1. The slope of a regression line (fit to pre-1982 data) is 0.93.
2. 1985 unemployment rates in the United States and Canada were 7.2 and 10.5 per cent respectively.
3. For an academic analysis of these disparities, see Bruno, this volume.
4. The current situation stands in dramatic contrast to the 1950s and 1960s. In those years unemployment rates were significantly higher in the United States than in Europe, and many economists apparently concluded that the happy state of affairs in Europe was to be attributed to the *more* interventionist government policies towards the labour market in Europe.
5. Both countries use a rotating monthly household survey to measure unemployment and employment, and use the same definition of unemployment. The establishment surveys in each country, which measure industry employment and average hourly earnings, are also very similar.
6. Some of these differences are discussed in Bureau of Labor Statistics (1978).
7. Consistent historical labour force statistics are not available for Canada prior to 1966. We have adjusted 1954-65 data for comparability with the revised labour force survey used after 1975.
8. The steady-state impact of the intercept shift in column (6) is 2.6 percentage points.
9. The model was estimated on seasonally adjusted data from 1956 to 1981 with four lags of each dependent variable, quarterly dummy variables, a linear trend, and a trend shift variable taking effect in first quarter 1974.
10. As an illustration, consider the problem of forming conditional forecasts of a variable y , given the actual values of a variable x from t to $t+j$, and a recursive forecasting model:

$$x_s = ax_{s-1} + u_s$$

$$y_s = by_{s-1} + cx_{s-1} + v_s.$$

Let P denote the least-squares projection operator, given the above information. Then

$$P(y_s) = bP(y_{s-1}) + cx_{s-1} + P(v_s).$$

Since v_s is a forecast error, it is uncorrelated with x_{s-j} . Since y does not Granger-cause x , v_s is also uncorrelated with x_{s+j} . Therefore $P(v_s) = ru_s$ where r is a population regression coefficient. Using the forecast equation for x_s ,

$$P(y_s) = bP(y_{s-1}) + rx_s + (c - ar)x_{s-1}.$$

The coefficients of this equation correspond to the coefficients of a regression of y_s on x_s and x_{s-1} . Given a starting value for y , this equation can be iterated forward in time to obtain the required conditional forecasts.

11. For convenience, we have defined the unemployment rate as the difference in logarithms of the labour force and employment. By definition, then, the difference in employment and unemployment represents movements in the labour force.
12. There is reasonable evidence that the 1982 monetary contraction in Canada was larger than the US contraction. Historical data on money supplies, interest rates and the components of GNP are recorded in appendix Tables A1 and A2.
13. In annual data, the logarithm of Canadian real GNP (Y_t^c) has approximately the following time-series representation:

$$Y_t^c = 0.91 Y_{t-1}^c - 0.22 Y_{t-2}^c + 0.56 \xi_t^a + \xi_t^c,$$

where ξ_t^a is the current innovation (forecast error) in US GNP, and ξ_t^c represents an orthogonal domestic output shock.

14. This interpretation follows from the fact that Canadian employment and unemployment do not appear to Granger-cause Canadian output.
15. It is worth reiterating that productivity per employed worker (as measured by GNP and aggregate employment) actually increased sharply in Canada relative to the United States after 1982. Thus, 'low productivity' is not an explanation for relatively low employment growth in Canada. Hours per worker in Canada have not changed substantially since 1981.
16. The ratio of average benefits to average earnings may differ from the average ratio of benefits to earnings if, for example, low-wage workers are more likely to receive benefits. Presumably, this bias is about equal in the two countries.
17. One factor affecting the ratio of recipients to unemployed workers is the duration of unemployment spells. Unemployment benefits are denied for the first two weeks of an unemployment spell in Canada, and for an average of about the first week of unemployment in the United States. If average duration increases, the fraction of potentially eligible unemployed workers

increases. This phenomenon cannot explain higher beneficiary ratios in Canada as compared with the United States over the past decade since unemployment duration (as measured by the mean length of interrupted spells) is about equal in the two countries, controlling for cyclical conditions.

18. An examination of unionization rates by industry in the early 1980s suggests that union coverage rates are higher in Canada in most industries, including manufacturing (46 per cent in Canada *v.* 36 per cent in the United States) and services and public administration (36 per cent *v.* 22 per cent).
19. The real exchange rate is the ratio of consumer price indexes, multiplied by the nominal exchange rate.
20. For the United States, the sum of four lagged real-wage coefficients is 0.08 (with a standard error of 0.07). For Canada, the sum of four lagged real-wage coefficients is 0.09 (with a standard error of 0.04). The sums of coefficients are essentially the same when four lagged values of consumer prices are also included in the regressions. The finding that short-run wage movements are only weakly correlated with employment movements in the United States is well known: see Geary and Kennan (1982), Ashenfelter and Card (1982), and Symons and Layard (1984).
21. Annual employment and real GNP both fell in 1982 for the first time in Canadian post-war history. By comparison, the 1982 recession in the United States was the same order of magnitude as the 1974-75 recession.

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