

# Jobless Recovery: Is it Really Happening?

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October 30, 1995

SP-208-02-01E  
R-95-9E

## Abstract

This document has been translated from French. Although the English version was carefully prepared, in case of disagreement, the original document will be considered correct.

Concerns over the weak recovery in employment following the 1990-91 recession led many observers to describe this period as a "jobless recovery". This research paper uses econometric estimations and simulations of employment equations to determine if the weakness in employment growth over the 1991-95 period can be explained by weak output growth, the evolution of real wages, industrial restructuring or the evolution in the real cost of capital. Our results suggest that the growth of real wages has contributed to the weakness in employment growth during the recovery but was not the dominant factor. Rather, the results indicate that the historical relationship between output and employment does not appear to have changed. The weak recovery in employment was mostly due to the weak recovery in output rather than a fundamental change in the ability of the economy to generate jobs.

## Acknowledgements

The author wishes to thank Louis Grignon, Doug Hostland, Richard Roy and Richard Archambault for their comments and suggestions during preparation. Any error or omission, however, remains the author's responsibility.

## I. Introduction and Overview of the Study

In late 1993 and early 1994, concerns were raised over the weakness in employment growth marking the recovery following the 1990-91 recession. One particular concern was the fact that the growth in employment had been abnormally weak considering the growth in output. This recovery was accordingly described as a "jobless recovery". Although 1994 was a year where employment growth was strong, the stagnation of employment growth in the first half of 1995 again gave rise to these concerns.

Because unemployment has remained high, this matter has raised a great deal of interest. Nevertheless, little research has been conducted to determine whether the current recovery is truly abnormal with respect to job creation, or whether the weak growth in employment is simply the result of the slow, hesitant recovery.<sup>1</sup>

The study examines this aspect of the recovery in detail using econometric estimations and simulations of employment equations. Different employment equations are estimated over the 1966-89 period. Out-of-sample simulations are then conducted to verify whether the evolution of aggregate employment during the 1990-91 recession and the subsequent recovery can be explained by weak economic growth, the evolution of wage costs, industrial restructuring or the evolution of the real cost of capital.

The results suggest that the increase in real wages over the 1991-95 period may partially account for the weakness in employment growth. These estimations also suggest that the historical relationship between the GDP and employment did not appear to have changed in the last recession. The weak recovery in employment was mostly due to the weak recovery in output rather than a fundamental change in the ability of the economy to generate jobs.

- <sup>1</sup>The only exception of which we are aware is Cozier and Mang (1994), who also studied this matter using econometric estimations but a different methodology. However, other studies have also touched on this matter more indirectly. In particular see Prasad (1993), Sweeting (1994) and Parker (1995).

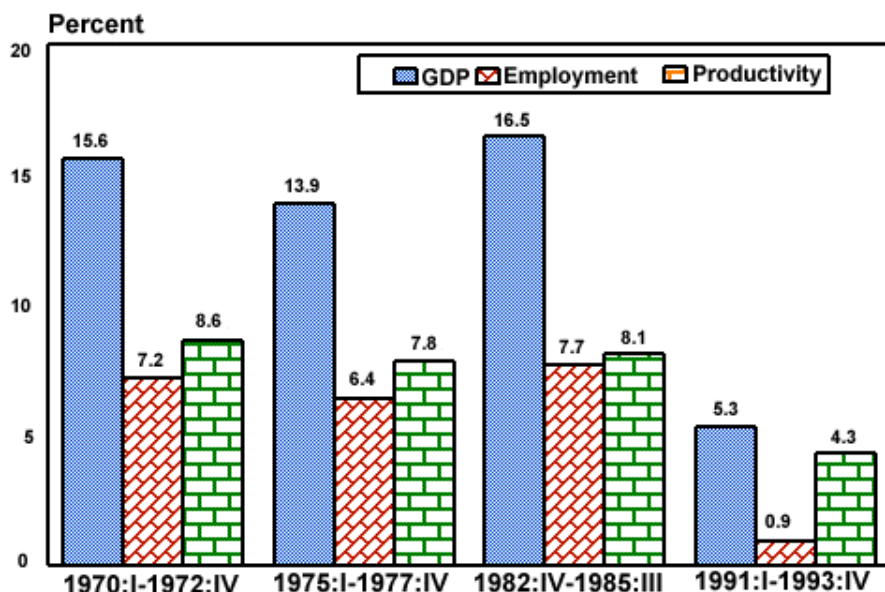
## II. What Do We Mean by "Jobless Recovery"?

The expression "jobless recovery" does not mean that no jobs were or will be created during the recovery. Rather it means that the growth in employment was abnormally weak during the recovery given the growth in output.

At the end of 1993, the extent of the jobless recovery seemed fairly striking when a comparison is made between the 1991-93 recovery and previous recoveries, as illustrated in Chart 1. This chart compares the growth in output, employment and productivity since the trough of the 1990-91 recession with that of previous recoveries.

The growth in GDP over the eleven quarters of the 1991-93 recovery was much weaker than over the first eleven quarters of previous recoveries. In addition, we note that the ratio between the growth in employment and the growth in GDP was also much lower than in previous recoveries when a 1 per cent increase in GDP led on average to an increase in employment of approximately 0.5 per cent. In contrast, during the 1991-93 recovery, employment increased only 0.17 per cent on average for a 1 per cent increase in GDP.

**Chart 1 : Growth in Employment, GDP and Productivity During the Recovery Growth, 11 quarters after the cyclical trough**

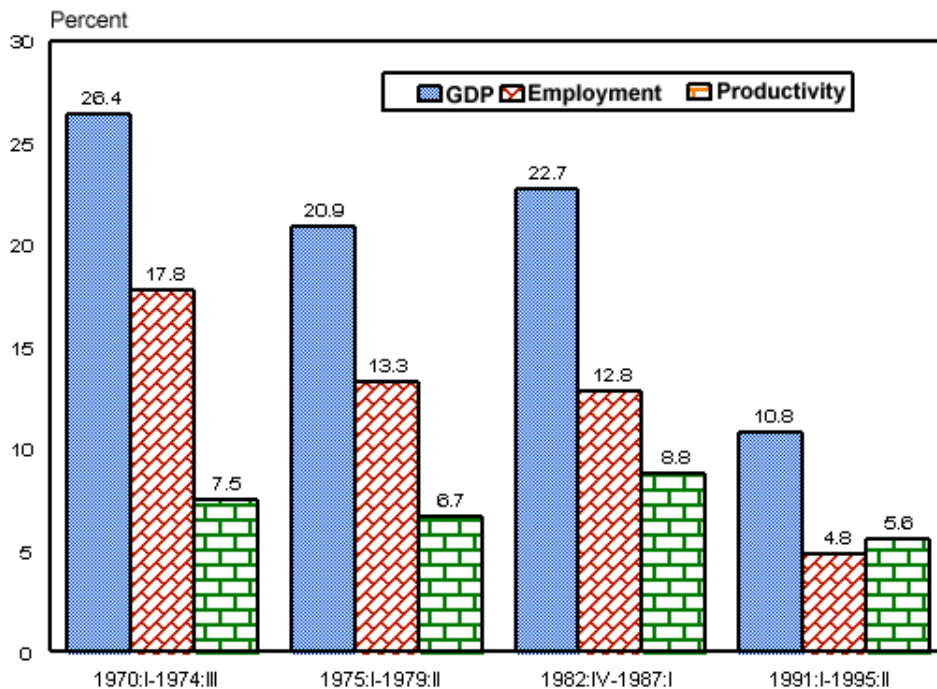


Developments in the relationship between growth in employment and output during 1994 seem to indicate that the phenomenon of jobless recovery no longer applies as readily to labour market developments. In fact, 1994 was a year where employment growth was strong. GDP and employment improved substantially, rising 5.4 per cent and 2.8 per cent respectively over the previous year. The growth in employment in 1994 was therefore stronger than the growth in output, which rose 2.5 per cent.

It should be noted, however, that the growth in employment was rather stagnant during the first quarter of 1995, rising only 0.1 per cent. <sup>2</sup> The data on national output for the first two quarters of 1995 indicate that the rate of growth of the Canadian economy slowed considerably in the first half, rising only 0.2 per cent in the first quarter and dropping 0.3 per cent in the second, compared with a growth in output of 1.1 per cent in the last quarter of 1994.

Chart 2 shows the growth in employment, GDP and productivity up to the second quarter of 1995. In the 17 quarters following throughout the recession, an increase of 1 per cent in the GDP led to an average increase in employment of 0.4 per cent during the period 1991:1-1995:2. This increase is still a little lower than the 0.6 per cent increase observed during previous recoveries.

**Chart 2 : Growth in Employment, GDP and Productivity During the Recovery Growth, 17 quarters after the cyclical trough**



Although recent developments on the labour market generally point to a resumption of the normal relationship between employment and GDP, it remains fragile. Moreover, stylized facts cannot explain why there appears to have been a breakdown of this relationship early in the recovery. In the section that follows we will attempt to analyse the evolution of employment during the 1991-95 recovery in further depth, using regression and simulation analyses.

- <sup>2</sup>Employment rose from 13,494,000 to 13,504,000 between January and June 1995.

### III. The 1991-95 Recovery: An Econometric Analysis

The analysis below examines the evolution of employment in detail using econometric estimations and simulations of employment equations. Different employment equations are estimated over the 1966-89 period. Out-of-sample simulations are then conducted to verify whether the evolution of aggregate employment during the 1990-91 recession and the subsequent recovery can be explained by weak economic growth, the evolution of wage costs, industrial restructuring or the evolution of the real cost of capital.

The results indicate that the weak growth in employment during the current recovery is due in part to the increase in labour costs for firms. As well, industrial restructuring efforts and the decrease in the real cost of capital appear not to have had a negative impact on employment growth. Finally, the results suggest that weak employment growth is mostly due to the weak recovery in output.

#### A. Possible Explanations for the Weak Recovery in Employment Over the 1991-95 Period

##### a) Industrial Restructuring

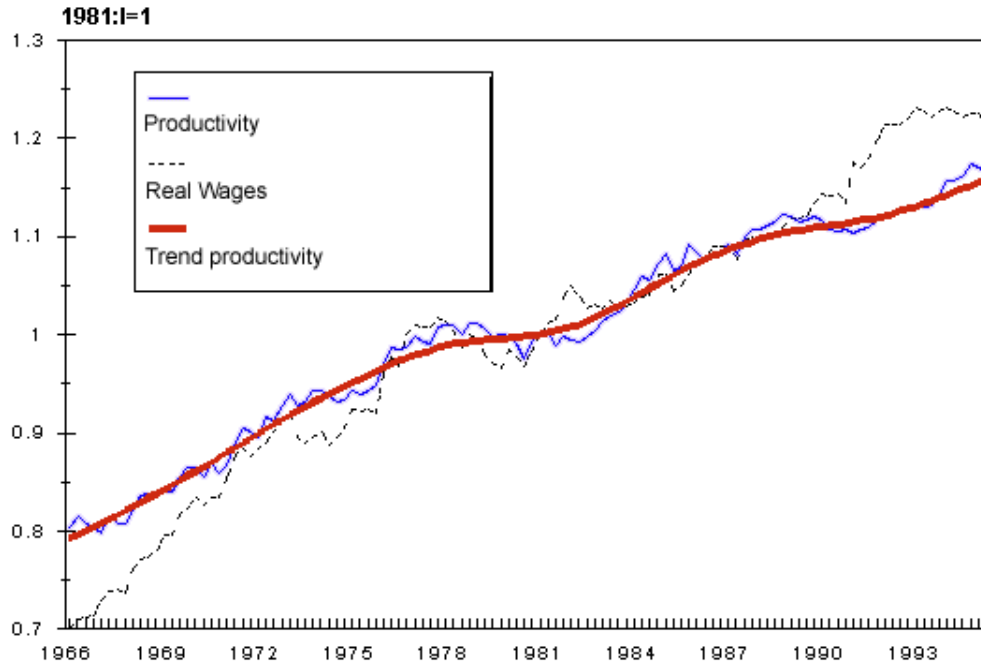
The restructuring of the Canadian economy is one possible cause of the weak recovery in employment. Structural changes in the economy due to the globalization of markets and technological change can lead to a sectoral redistribution of output resulting from the creation and destruction of firms and industries (Prasad, 1993).<sup>3</sup> This sectoral redistribution of output generally results in a substantial sectoral redistribution of employment to which workers must adjust. It is possible that the recent recession helped accelerate this redistribution and consequently increase the amount of adjustment required of workers, and that the weak growth in employment during the subsequent recovery is one result.

##### b) Excessive Real Wages

A second possible explanation for the weak recovery in employment is the increase in real wages relative to the increase in productivity. Between the first quarter of 1991 and the fourth quarter of 1993, wages rose 3.8 per cent in real terms,<sup>4</sup> an increase of approximately 1.5 percentage points above trend productivity growth over the same period (Chart 3).<sup>5</sup> One factor which contributed to the increase in real wages is the increase in payroll taxes levied on employers and particularly

the strong increases in employer contributions to unemployment insurance plans.<sup>6</sup>

**Chart 3 : Real Wages and Labour Productivity**



### c) Technological Change and Labour Substitution

Another possible explanation for the weak employment growth is technological change. It is possible that technological progress accelerated in recent years, reflecting rapid advances in computers, electronics and information technologies. It is also possible that the 1990-91 recession drove firms to make better use of new technologies, which enabled them to maintain or increase their output without necessarily using more human resources or by substituting new technologies for workers.

In a recent study, Parker (1995) examined the evolution of real business investment during the two most recent recessions. His analysis shows that business investment in machinery and equipment remained relatively strong during the most recent recession but dropped sharply during the recession in the early 1980s. The stability of purchases of machinery and equipment during the 1990-91 recovery is attributable to strong growth in purchases of computers and computer-based technology. While computers accounted for approximately 3 per cent of machinery and equipment expenditures by businesses in 1981, their share surged to 37 per cent in 1994 (Parker, 1995).

The increase in computer purchases between 1981 and 1994 reflects the decline in computer prices compared to the price of other investments. In fact, the decline in the relative price of computers appears to be the main source of the decrease in the real cost of capital in recent years (Parker, 1995). According to an estimate of the real cost of capital (for investments in equipment) made by the Department of Finance, the real cost of capital decreased by approximately 23.0 per cent from the beginning of the recovery in the first quarter of 1991 to the last quarter of 1993.

- <sup>3</sup> Another definition of restructuring concentrates on the behaviour of firms in certain industries which attempt to increase productivity by taking measures such as integrating vertically or horizontally or using new manufacturing processes or management techniques (Prasad, 1993). This paper does not use this definition because we are interested mainly in the evolution of employment and output at a more aggregate level.
- <sup>4</sup> Here, real wage means the producer's real wage and includes salaries and wages and employer contributions to social programs. The price index used to calculate real wages is the factor-cost GDP deflator.
- <sup>5</sup> Trend productivity was measured using a Hodrick-Prescott filter.
- <sup>6</sup> Employer contributions to social programs rose by approximately 22.0% between the first quarter of 1991 and the third quarter of 1993. This increase was due mainly to a 42.0% increase in employers' unemployment insurance premiums. Contributions to the Canada and Quebec Pension Plans and workers' compensation rose by 12.0% and 21.0% respectively (Cozier and Mang, 1994).

## B. Econometric Estimations and Dynamic Simulations

### a) An Employment Equation

In this section, we attempt to quantify the impact of industrial restructuring, the increase in real wages and the decrease in the real cost of capital on the evolution of employment during the 1991-93 recovery. To that end, we propose to estimate an employment equation where the level of employment depends on lagged employment, real GDP, real wages, restructuring and the real cost of capital over the period 1970:1-1989:2. We then conduct an out-of-sample dynamic simulation across the recession and subsequent recovery (i.e. 1990:1-1995:2) to determine the extent to which our equation can account for the weak recovery in employment. The employment equation is as follows:

$$E_t = F(E_{t-1}, Y_{t,i}, W_{t,j}, \sigma_t, r_{kt}) \quad [1]$$

where E and y are level of employment and real GDP respectively, w is the hourly rate of compensation in constant dollars and  $r_k$  is the real cost of capital in machinery and equipment. Finally, the restructuring variable  $\sigma$  is an index of the sectoral dispersion of employment.

The variable used for real wages (w) is an hourly rate which reflects the total cost of labour <sup>7</sup> including salaries, wages and supplementary labour income <sup>8</sup>. The real-cost-of-capital variable  $\sigma$  is based on estimates by the Department of Finance. It is expected a priori that, for a given level of output, a decrease in the real cost of capital will result in a decrease in labour demand and consequently a positive estimated coefficient. Finally, an index of the dispersion in sectoral employment demand is used to simulate the effect of economic restructuring in response to sectoral shifts in demand. According to Samson (1985), this index is calculated by taking a weighted sum of the difference between the rate of growth of sectoral employment and the rate of growth of aggregate employment:

$$\sigma_t = [\sum_i (e_{it}/E_t)(\Delta \log e_{it} - \Delta \log E_t)^2]^{1/2} \quad [2]$$

where  $e_{it}$ =employment in industry i;  $E_t$ =aggregate employment; and  $n$ =number of sectors. <sup>9</sup> The higher this index, the more sectoral restructuring of the economy there is and consequently the greater the negative impact on employment is expected to be. <sup>10</sup>

Stationarity tests were performed on each series. <sup>11</sup> In every case, the augmented Dickey-Fuller statistics indicate that the series are non-stationary. We then performed cointegration tests to determine whether there was a long-term relationship among these variables which would be stationary. The results of the Johansen cointegration tests indicate that there could be up to 3 cointegrating relationships. However, our ability to identify restrictions to impose on the parameters of the cointegration vector is severely limited by the fact that there is no theoretical framework to explain what long-term relationship among these variables should exist a priori. In addition, the reliability of the cointegration tests is weakened by the limited number of observations. We therefore estimate the equation in quarterly rates of growth so that all the series are stationary. <sup>12</sup>

$$\Delta \ln E_t = \alpha + \beta \Delta \ln E_{t-1} + \sum_{i=0}^m \gamma_i \Delta \ln Y_{t-i} + \sum_{j=0}^n \delta_j \Delta \ln W_{t-j} + \phi \Delta \ln \sigma_t + \xi \Delta \ln r_{kt} + \epsilon_t; m, n=12 \quad [3]$$

### b) Results of Estimations of the Employment Equation

The results of the estimation of the final version of the employment equation over the 1970-1989 period are presented below. The additional lagged variables in the original equation (equation [3]) were omitted because the coefficients are generally not significantly different from zero. The t-statistics are in parentheses.

$$\begin{aligned} \Delta \ln E_t = & 0.001 + 0.011 \Delta \ln E_{t-1} + 0.347 \Delta \ln Y_t + 0.295 \Delta \ln Y_{t-1} + 0.083 \Delta \ln Y_{t-2} \\ & (0.69) \quad (0.14) \quad (5.68) \quad (4.56) \quad (1.99) \\ & - 0.268 \Delta \ln W_t - 0.138 \Delta \ln W_{t-4} - 0.001 \Delta \ln \sigma_t - 0.005 \Delta \ln r_{kt} \\ & (5.63) \quad (3.09) \quad (0.83) \quad (0.47) \end{aligned} \quad [4]$$

R<sup>2</sup> aj. = .654                      D-H = -0.63

The estimation employment equation yields fairly robust results. This equation accounts for approximately 65 per cent of the variation in employment growth between 1970 and 1989, as measured by the adjusted R<sup>2</sup> statistic, which is respectable since the relationship is expressed in terms of quarterly rates of growth. According to the Durbin-H statistic, there is no problem of first-order autocorrelation in the equation. As well, all the estimated coefficients of the regression have the expected sign except the real cost of capital. Of the three explanatory variables we are studying (excluding lagged employment and GDP), only the coefficient of the real wages variable is statistically significantly different from zero at the usual 5 per cent confidence level.

According to this estimation, it appears that sectoral variations in employment did not have a significant effect on the evolution of aggregate employment during the estimation period. It is possible that our measure did not adequately capture these effects. Finally, our results indicate that the evolution of the real cost of capital did not have a significant negative impact on employment growth during the estimation period.

We therefore re-estimated the equation without including the restructuring and real-cost-of-capital variables. The results of this estimation over the period 1966:1-1989:4 are as follows:

$$\Delta \ln E_t = 0.001 + 0.037 \Delta \ln E_{t-1} + 0.329 \Delta \ln y_t + 0.296 \Delta \ln y_{t-1} - 0.102 \Delta \ln y_{t-2} \quad [5]$$

(0.71)
(0.51)
(6.59)
(5.68)
(2.06)

$$- 0.275 \Delta \ln w_t - 0.126 \Delta \ln w_{t-4}$$

(6.26)
(2.91)

$R^2$  aj. = .636
 $D-H = -0.27$

This equation accounts for approximately 64 per cent of the variation in employment between 1966 and 1989. All the estimated coefficients have the expected sign and are significantly different from zero at the 5 per cent confidence level. [13](#) The diagnostic tests of this regression are shown below:

**Table 1: Diagnostic tests of the regression**  
[confidence levels (p values) in parentheses]

<b>LM (1 to 4)</b>	0.05 (0.69)	0.19 (0.49)	0.89 (0.28)	1.64 (0.47)
<b>ARCH (1 to 4)</b>	0.15 (0.18)	0.13 (0.23)	0.06 (0.39)	0.01 (0.91)
<b>White</b>	13.05 (0.37)			
<b>Jarque-Bera</b>	1.21 (0.55)			
<b>skewness</b>	-0.07			
<b>kurtosis</b>	2.46			

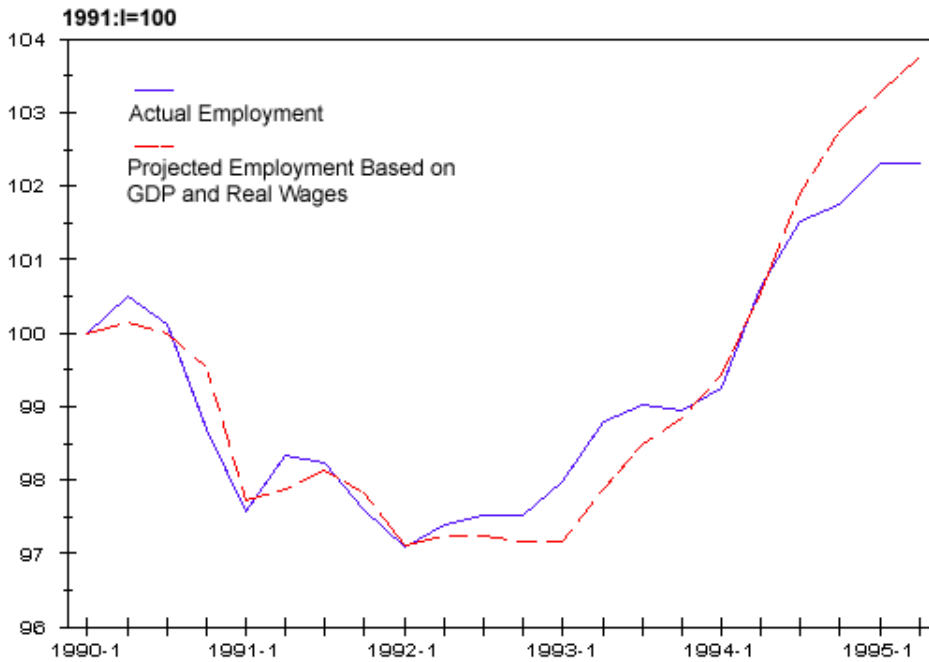
The LM statistics test for the presence of autocorrelation of order 1 to 4. These statistics indicate that autocorrelation is not a problem in our equation. In addition, based on the Jarque-Bera test, we can reject the hypothesis of nonnormality of errors. The ARCH statistics are used to detect effects of autoregressive conditional heteroskedasticity of the errors of order 1 to 4. According to this test, ARCH effects could be present. In addition, based on the White test, we cannot not reject the hypothesis of homoskedasticity of errors at a very high confidence level. The t-statistics shown above were therefore corrected to account for heteroskedasticity, which enabled us to obtain consistent standard deviations. [14](#)

It is important to note that including wages as an explanatory variable could introduce a simultaneity bias into the estimation as it is probable that real wages are not determined completely exogenously. However, it is not clear how this problem can be easily avoided. This could be the subject of future research. As well, the results could be sensitive to the formulation of the equation because Cozier and Mang (1994) obtain slightly different results with another equation.

### c) Dynamic Simulation of the Employment Equation

To determine the extent to which our equation can account for weak employment growth, we conducted a out-of-sample dynamic simulation of the employment equation over the period 1990:I-1995:II without including the effect of restructuring and the real cost of capital (we omitted the restructuring variable  $\square$  and the real-cost-of-capital variable because their estimated coefficients are not significantly different from zero). This simulation is presented in Chart 4.

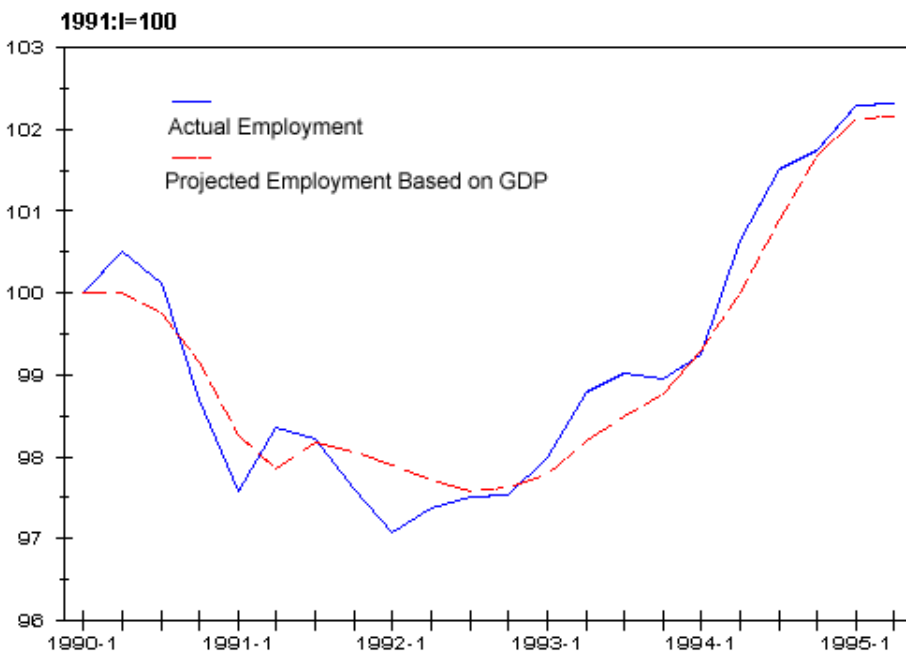
### Chart 4 : Actual and Projected Employment Based on GDP and Real Wages



Although the equation underestimates the employment level between 1992:3 and 1993:3 and overestimates the employment level after the third quarter of 1994, in general it accurately predicts the evolution of employment during the recovery. It accurately predicts the trough in employment in the second quarter of 1992, and the employment level predicted for the fourth quarter of 1993 is very close to the actual level. It therefore appears that the evolution of GDP and real costs of labour can account for the evolution of employment during the recent recession and the subsequent recovery.

We want to assess the relative impact of the evolution of real wages and GDP on the evolution of employment. We therefore estimated the relationship between employment and GDP, without including real wages, over the period 1966:1-1989:4 and then conducted a dynamic simulation of the regression across the recession and subsequent recovery. <sup>15</sup> The results of this simulation are shown in Chart 5.

**Chart 5 : Actual and Projected Employment Based on GDP**



Although the equation is not able to predict the trough in employment in the second quarter of 1992, it is a fairly good predictor of the evolution of employment after 1994. In particular, the equation accurately predicts the stagnation of employment since the beginning of 1995.

A comparison of the two dynamic simulations shown above suggests that the historical relationship between GDP and employment did not appear to change in the recent recession. <sup>16</sup> It seems that the evolution of GDP can alone account for nearly all the evolution of employment. In fact, according to forecasting performance tests, the equation based solely on





In 1994 there was a major increase in economic activity, accompanied by encouraging gains in employment. However, employment growth has been somewhat stagnant since then, but this is primarily because the Canadian economy has slowed considerably since early 1995 and not because of another phenomenon of jobless recovery.

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*First Internet Edition 1996*