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THE CAUSES OF UNEMPLOYMENT IN CANADA:

A Review of the Evidence

by Stephen S. Poloz

Bank of Canada Banque du Canada

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Acknowledgments

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Abstract

This paper reviews various competing theories of structural unemployment and considers whether they may be used to explain any of the rise in unemployment experienced by Canada during the most recent economic cycle. The central message that emerges is that one should take into account multiple possible structural explanations when forming judgments about the non-accelerating-inflation rate of unemployment (the NAIRU). Furthermore, the degree of uncertainty associated with existing empirical work suggests that one should allow for a range of NAIRU estimates in reaching an understanding of economic developments. A balanced assessment of the available methodologies suggests that the NAIRU has risen somewhat during the 1990s, mainly because of a steep rise in the rate of payroll taxation. Nevertheless, the paper concludes that this rise in the NAIRU is likely to be temporary, both because the payroll tax effect ought to be digestible over time and because some reforms to the unemployment insurance system have already been implemented.

Résumé

L’auteur examine différentes théories du chômage structurel et la possibilité de s’en inspirer pour tenter d’expliquer les hausses du chômage que le Canada a connues au cours du dernier cycle économique. La principale conclusion de cette étude est qu’il faut tenir compte de plusieurs hypothèses de nature structurelle lorsqu’on forme des jugements au sujet du taux de chômage non accélérationniste (TCNA). En outre, les résultats des estimations effectués jusqu’ici sur cette variable étant incertains, il y aurait peut-être lieu de prendre en compte un éventail d’estimations du TCNA afin d’en arriver à une certaine compréhension de l’évolution de l’économie. Un examen équilibré des diverses méthodologies indique que le TCNA s’est accru un peu au cours des années 90, en raison principalement de la forte augmentation du taux des charges sociales. Néanmoins, l’auteur en vient à la conclusion que cette hausse du TCNA ne devrait être que temporaire, d’une part, parce que l’effet des charges sociales devrait finir par être absorbé au fil du temps et, d’autre part, parce que certaines réformes de l’assurance-chômage ont déjà commencé à entrer en vigueur.

1 Introduction

The unflagging upward march of unemployment in many developed countries over the past three decades has kept it at the forefront of macroeconomic research. Yet, there remains an impressive divergence of views across the economics profession as to the causes of and possible remedies for persistent unemployment. The purpose of this paper is to bring together a collection of plausible explanations for Canada's current level of unemployment and to discuss their relative worth and policy implications.

It is conventional to decompose movements in unemployment into a trend or structural component and a cyclical component, and to refer to the former as the "non-accelerating inflation rate of unemployment" (NAIRU). In many mainstream macroeconomic models, the NAIRU is presumed either to be constant or to evolve gradually over time, and differences between the actual rate of unemployment and the NAIRU are then seen as a key determinant of future inflation. The present paper takes as a point of departure the technical report by Rose (1988), which provided a comprehensive survey of concepts and determinants of the NAIRU in Canada. The report concluded that there was considerable uncertainty associated with measuring the NAIRU using available methods. Application of considerable judgment led to the suggestion that the NAIRU was on the order of 8 per cent in 1987 and that the evolution of some of the identified factors would likely lead to a decline in it over time.

The uncertainty associated with the NAIRU in Canada was also underscored in a paper by Setterfield, Gordon and Osberg (1992), which explored the issue along two dimensions. First, by changing the variables used in their estimated Phillips curves in reasonable ways, the authors generated NAIRU estimates for prime-age males that ranged from 4.42 per cent to 9.88 per cent. This range encompasses almost the entire unemployment experience for prime-age males over the 1956-87 period. Second, they chose a single estimated Phillips curve with strong statistical properties, calculated the implied confidence interval around the NAIRU, and concluded that the NAIRU for prime-age males was between 4.18 per cent and 10.33 per cent, with a mean of 6.65 per cent. While it would make little sense economically for the NAIRU to be at either extreme of historical experience, the exercise nevertheless provides an indication of the statistical reliability of NAIRU estimates based on single-equation models.

Given these findings, it would seem inadvisable to base policy decisions on a single explanation for movements in the NAIRU. Instead, the central message of this paper (as was also the case in Rose 1988) is that one should take account of multiple possible explanations and contributing factors in forming judgments about the NAIRU and the unemployment gap. Furthermore, one's emphasis should be not on a single estimate per se, but rather on an analysis of the risks associated with erring on one side or the other in measuring this crucial concept.

The remainder of the paper is organized as follows. Section 2 examines the various structural variables that have been put forward as possible determinants of the NAIRU in Canada and weighs the recent empirical evidence associated with each. Section 3 then discusses alternative methodologies that use systems of equations to develop NAIRU estimates. Section 4 attempts to reconcile this discussion with the actual evolution of unemployment in Canada in recent years. Section 5 offers some concluding remarks and sets out what seem to be the most promising areas for future research.

2 Structural determinants of the NAIRU

Given the importance attached to the unemployment issue, it is not surprising to find that the literature abounds with possible explanations of the NAIRU. The following selection may not be exhaustive, but it is surely indicative. Notice that, for the most part, the explanations that are offered are considered to be potential complements, rather than competing hypotheses.

2.1 Frictional unemployment, sectoral shifts and mismatching

This is the original set of explanations for a "natural" rate of unemployment. The economy is continually changing, with births and deaths of firms and jobs occurring. Freed-up labour and firms needing labour must find matches between skills supply and demand.

Casual observation would suggest that the Canadian labour market has been undergoing rapid change in the past decade, and certainly in the 1990s. Canadian firms have been investing extensively in new capital, automated processes, more efficient inventory methods and so on, in an effort to improve competitiveness and reduce their labour inputs. Widespread restructuring must surely have contributed to unemployment owing to skills mismatching over this period. One piece of evidence may be the large number of people that have dropped out of or delayed entry into the labour force during the past three to four years, in many instances to invest in additional training; this is on the order of 2 per cent of the current labour force. These people presumably will reenter the labour force as the economic expansion proceeds, thereby slowing the decline in the unemployment rate. However, to the extent that this temporary withdrawal from the labour force has been in order to train or retrain for a more technologically oriented workplace, labour market reentrants may match requirements more readily, in which case absorption could be quicker and the NAIRU could decline.

A related issue is the idea that unemployment is a result of intersectoral shifts in labour demand and the slow process of labour reallocation across sectors. Relative price shocks can be expected to prompt reallocation of labour between sectors of the Canadian economy, and such events are likely to have temporary effects on the NAIRU. This may be especially the case in Canada, where the patterns of economic activity have a regional dimension and such labour reallocations might involve large distances. Indeed, even small shocks might prove to be important in instances where the market in question is "thin"; for instance, an isolated one-industry town might face large and prolonged adjustment costs, were a relative price shock to force that industry to close its operation. Examples of the sort of relative price shocks that might temporarily raise the NAIRU include the energy price rises of the 1970s and structural changes such as trade liberalization and tax reform.

It is difficult to estimate the potential size of such effects on the NAIRU and even more difficult to estimate how long they might last. The idea of using intersectoral shifts in employment to estimate the importance of the phenomenon for aggregate unemployment was first tested for Canada by Samson (1985); in a more recent paper, Prasad (1993) finds little empirical evidence that recent rises in unemployment are due to intersectoral shifts in employment. However, it is important to draw a distinction between this *intersectoral* restructuring and *within-firm* restructuring involving modernization and perhaps a rise in the firm's equilibrium capital/labour ratio. The latter phenomenon appears to have been intensive and widespread in Canada during the past three or four years and would not be captured by the sorts of employment dispersion measures commonly used in this literature.

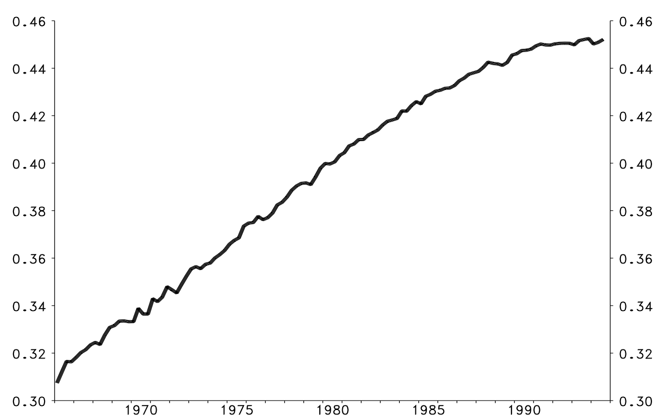
2.2 Demographics

As discussed in Rose (1988), there is evidence to suggest that the bulge in young labour market participants in the mid-1970s put some upward pressure on the NAIRU. Although that effect has been reversing with the aging of the work force since 1978, the baby boomer "echo" is just beginning now and will once again produce a positive trend in youth participation during the 1990s. Rose also concluded that the trend rise in female participation had probably contributed to the rise in NAIRU throughout the past 30 years, although he noted that in econometric work it was generally not possible to distinguish its effect from any other variable exhibiting a steady trend. However, the female share of the labour force has been quite stable for the past five years (see Figure 1). This means that the variable is now quite distinct from a steady time trend and cannot account for any further rise in the NAIRU that may have occurred in the 1990s. This may be the reason why Côté and Hostland (1994) reject the hypothesis that these shifts in age-sex composition of the labour force have contributed to the trend in unemployment. Fortin and Symons (1994) find a significant role for the labour force shares of both youths and women in explaining the trend in Canadian unemployment over the past 30 years, but their sample period ends in 1991, somewhat earlier than that of Côté and Hostland, which ends in 1993Q4. As with many issues connected to the NAIRU, the state of the debate is a little unclear.

A separate issue is the possible implications of the aging of the labour force. As the baby boomers get older, the aggregate characteristics of the labour market will follow them. For the United States, Darby, Haltiwanger and Plant (1985) have shown that an aging population can raise the NAIRU because older workers tend to have longer spells of unemployment than do younger workers. The effects in Canada might be at least qualitatively similar, with most of the effect to appear during the 1990s when the baby boomers begin to reach their 50s.

We conclude from this discussion that, although it is plausible to suggest that demographics have contributed to important movements in the NAIRU in the past, there is little in the data to suggest that they have continued to do so in recent years. However, it remains to be seen what effects an aging population might have on labour market behaviour in Canada.

Figure 1: Female share of the labour force



2.3 Unemployment Insurance

There is an abundant literature on the interaction between unemployment insurance (UI) and unemployment in Canada, and only the main conclusions of that literature will be touched upon here; a comprehensive survey and evaluation is offered by Corak (1994). Rose (1988), on the basis of his review of the evidence, concluded that the 1971 UI reforms had probably added up to 2 percentage points to the NAIRU. The 1977 reforms, however, had an uncertain effect; in broad terms, at the national level the system was tightened, but at the same time the regional dimension of the program was made more generous. Milbourne, Purvis and Scoones (1991) focussed on the latter reform, explaining that making the duration of benefits in each region more dependent on the actual unemployment in that region had imparted more persistence to the national unemployment rate. In short, the NAIRU was rendered path-dependent by the 1977 reforms to UI. They concluded that this development was largely responsible for the much slower decline in unemployment seen in Canada compared with the United States during the recovery from the 1981-82 recession.

More recently, Card and Riddell (1993) have conducted an extensive study of the impacts of the UI system on the Canadian labour market in order to help understand the emergence of what appears to be a permanent 2 percentage point gap between Canadian and U.S. unemployment rates during the 1980s. Since employment-population rates have been, and remain, similar in the two countries, Card and Riddell conclude that higher unemployment in Canada is simply due to the fact that individuals not working in Canada are more likely to describe themselves in labour force surveys as “unemployed” (that is, still in the work force and seeking work) rather than simply “not working.” This phenomenon appears to explain the entire relative rise in female unemployment in Canada during the 1980s. With regard to males, however, about half the relative increase in unemployment over the 1980s is found to be attributable to men captured as part of the labour force who have zero weeks of work during the previous year. The UI system cannot be blamed for encouraging people with zero weeks of work to remain attached to the labour force, but the authors do provide some evidence that Canadian workers have adapted their behaviour to the UI system: increases in the numbers of both men and women with 10 to 12 weeks of employment, and women with 20 weeks of employment, explain over 20 per cent of the relative rise in total unemployment. Nevertheless, strictly speaking, Card and Riddell’s analysis leaves unexplained about 1.5 of the 2 percentage points of extra unemployment in Canada compared with the United States.

Significant effects of UI on the NAIRU have been found in a number of other recent studies, including Ham and Rea (1987), Coe (1990) and van Rijckeghem (1993). However, there is considerable evidence on the other side of the debate, as summarized by Corak (1994). For example, Corak notes that a large proportion of UI claimants are repeat users and that many of these return to work for the same firm. This suggests that UI has effects on both the demand side and the supply side of the labour market. It is also noteworthy that there is significant involuntary unemployment at the time UI benefits are exhausted, which suggests that reducing benefit entitlements would not affect incentives much. In a similar vein, Phipps (1990, 1993) has suggested that the implied wage tax/subsidy created by UI can have only very minor effects on labour supply behaviour because empirical estimates of the wage elasticity of labour supply tend to be low. Also, many workers face work arrangement constraints that make it very difficult to adjust the number of hours or weeks worked at the margin. On the macro level, Côté and Hostland (1994) are unable to find evidence of cointegration between unemployment in Canada and typical time-series variables that are used to measure the effects of UI. However, this inference could reflect a failure to capture adequately the complexity of the UI system in a single variable. Such considerations suggest giving more weight to studies based on microeconomic data.

Out of this debate has emerged a decided lack of consensus on the effects of UI on the NAIRU. In any case, even if the UI system can account for a rise in the NAIRU of up to 2 percentage points in the 1970s and a further half percentage point or so in the 1980s, it certainly could not be used as support for the case that the NAIRU has risen in the 1990s. Indeed, if one accepts the premise that past generosity of the UI system has contributed to rises in the NAIRU, then one must also accept the implication that changes brought into the UI system over the past three years are likely to work to reduce the NAIRU over time.

2.4 Labour market hysteresis

Labour market hysteresis became a popular explanation for persistently high unemployment rates in a number of countries, particularly in Europe, during the mid-1980s. Economic explanations for hysteresis in unemployment were based on (a) human capital models, which argue that the unemployed tend to remain so because their skills deteriorate, (b) insider/outsider models, in which negative shocks reduce employment and the released workers are not reengaged because the insiders prevent the decline in real wages necessary to reabsorb them, and (c) institutional models, where restrictions on labour market behaviour may produce very slow adjustment to shocks. Giersch (1985), Blanchard and Summers (1986), and Lawrence and Schultze (1987) provide a good sampling of this literature.

While any of these models seem capable of accounting qualitatively for slow adjustment of labour markets to shocks, many analysts have remained sceptical of their ability to account for hysteresis in the pure sense. This scepticism rests on the general notion that one can expect certain market forces to act eventually to bring about adjustment of even very rigid labour markets (Blanchard, 1990). These forces would include (a) a “fear” channel, through which insiders fear the implications of a future negative shock that could cause even them to become unemployed, and (b) a “threat” channel, which acknowledges that a growing stock of unemployed may raise the bargaining power of firms.

Most previous studies using macroeconomic data have concluded that Canadian labour markets are not hysteretic in the pure sense. In particular, Fortin (1991) found no evidence of hysteresis in Canada, using data over 1956-84. Similarly, Cozier and Wilkinson (1991) rejected labour market hysteresis based on Phillips curve estimates over the 1964-88 period. In contrast, the hypothesis seemed to be supported by the estimates presented in Fortin (1991) for the 1973-90 period. However, this result proved to be fragile, as shown in Poloz and Wilkinson (1992) and Jones (1992).

However, the issue of whether the Canadian labour market is *exactly* hysteretic misses the point; if unemployment is path dependent to an important degree, exhibiting persistence or what some have called “partial hysteresis,” then it poses an important issue for macroeconomic policy. Most empirical studies find considerable persistence in the unemployment data. For example, Jaeger and Parkinson (1994) use an unobserved components approach to decompose unemployment into a trend and a cyclical component for several countries including Canada, and find the future trend rate to be significantly affected by the current actual unemployment rate. Their estimates imply that about one-fifth of a cyclical increase in unemployment becomes embedded in the underlying trend. Although such persistence might indeed be attributable to some of the arguments found in the hysteresis literature, it could also reflect the kind of mechanism outlined by Milbourne, Purvis and Scoones (1991), who ascribe the finding of increased unemployment persistence in the 1980s to the regional dimension that was added to the Canadian UI system in 1977. Fortin, Keil and Symons (1994) interpret their structural unemployment equations as implying strong persistence; they discount the hypothesis of Milbourne, Purvis and Scoones as the key underlying cause but do not offer an alternative explanation. A similarly sceptical view is expressed by Corak (1994), who looks at the data on individuals actually receiving regionally extended UI benefits and finds their numbers insufficient to explain the degree of persistence found in the aggregate unemployment rate.

2.5 Minimum wages

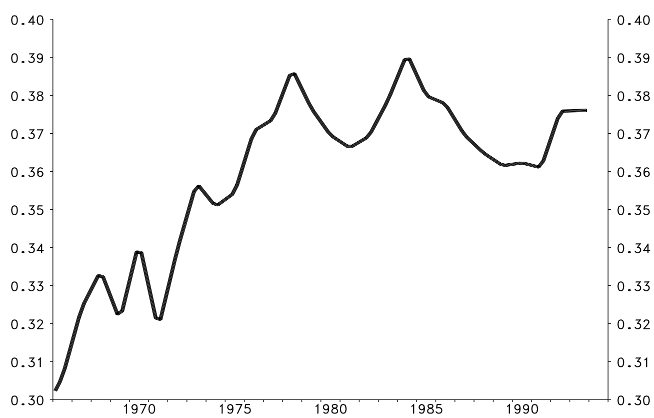
There is some evidence that increases in the minimum wage have contributed to rises in the NAIRU (for example, Coe, 1990; Fortin, Keil and Symons, 1994). However, relative to the average wage rate, the minimum wage tended to decline in Canada throughout most of 1975-85, and then moved sideways until 1990, making it an unlikely cause of rises in the NAIRU during that period. Nevertheless, the minimum wage has been raised in several provinces recently; for example, the minimum wage in Ontario went up in several steps from \$5.40 in 1990 to \$6.70 earlier this year. Some effects of these rises on the NAIRU may be felt down the road. However, as illustrated in Figure 2, even after these changes, the relative minimum wage remains at levels well below those seen in the early 1970s.

Figure 2: Relative minimum wage

2.6 Unionization

The proportion of the labour force that is unionized has been found to help explain the rise in the NAIRU, particularly during the 1970s, by Côté and Hostland (1994) and others. The theory behind this linkage is basically the insider/outsider model discussed above in respect of the hysteresis literature. The proportion of total Canadian employment that is unionized peaked in 1978 and, broadly speaking, has moved sideways since (Figure 3). However, it did decline steadily during 1985-90 and then began to recover in the 1990s. Thus, studies based on pre-1990 data might come to rather different conclusions on this issue than those that capture the more recent data. In any case, while it is plausible that the NAIRU has once again been positively affected by unionization during the 1990s, in terms of the broad historical experience, this effect seems very likely to be small.

Figure 3: Unionization rate

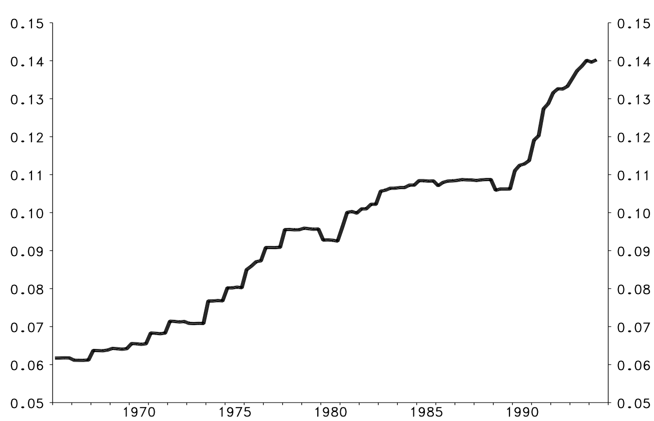


2.7 Payroll taxation

In recent years a number of payroll-type taxes have been increased by revenue-short governments. Indeed, wages and salaries grew by about 10 per cent over 1989-93, whereas supplementary labour income grew by over 40 per cent, thus raising the ratio of supplementary labour income to wages and salaries by about 3 percentage points, to around 14 per cent (Figure 4).

Evidence on the statistical connection between the NAIRU and payroll taxation is provided in Côté and Hostland (1994). Using cointegration tests on quarterly data from 1954-93 they find that the stochastic trend in unemployment can best be explained by two structural factors: the degree of unionization in the labour force and supplementary labour income as a share of the total wage bill (or the payroll tax rate). Other variables that are tested for cointegration with unemployment include demographics, the unemployment insurance replacement rate and the minimum wage. They are unable to isolate a unique cointegration vector using formal tests, however; in other words, the data cannot sort out with any precision the relative magnitudes of the effects of minimum wages and payroll taxes on the NAIRU. A possible reason for this is the potential for simultaneity between payroll taxes and the unemployment rate itself, as an important portion of the increases observed since 1990 has been due to UI premiums, which now rise with the unemployment rate in order to keep the UI program funded. In other work done at the Bank, Ron Parker suggests that for plausible labour market parameters, a rise in the payroll tax rate of 3 percentage points might lead to a reduction in employment of up to 1 percentage point, an estimate that would be consistent with the range of parameters found by Côté and Hostland. In a similar analysis, Scarth (1994) suggests an effect of about 0.5 percentage points.

Figure 4: Payroll tax rate



To what degree the effects of payroll taxes on the NAIRU might be permanent is another issue altogether, however. The long-run effect of a permanent payroll tax increase depends on who ultimately pays the tax; if real wages eventually adjust so that workers pay the entire tax, as would be the case were labour supplied inelastically, then there would be no long-run effect on the NAIRU. However, even if labour supply were inelastic, slow adjustment of real wages to such shocks might result in a higher NAIRU for an extended period, especially if important parts of the labour market behave according to some imperfectly competitive model. This issue will be difficult to pin down empirically because the share of payroll taxes in the total wage bill has basically always trended upwards, thus limiting the power of standard regression techniques. Nevertheless, it seems reasonable to expect that these payroll tax effects will be digestible over time and to the extent that future declines in unemployment prompt reductions in UI premiums (and these are not offset by other payroll tax increases) there will be an additional tendency for the payroll tax effect on the NAIRU to dissipate.

3 Systems methods of estimating the NAIRU

The apparent fragility of existing structural estimates of the NAIRU has prompted some researchers to focus on methods for deriving the NAIRU and its sister concept, potential output, which are based on models with more than one behavioural equation. By using more than one source of information, one can obtain estimates that are more robust statistically. For instance, rather than deriving the NAIRU from a single estimated Phillips curve, one could estimate a Phillips curve (containing the NAIRU) along with a production function (containing the output gap) and an Okun's law equation to link the output and labour market gaps and derive a system-consistent NAIRU series from the systems estimates (see Rose, 1988; Ford and Rose, 1989).

Recent work in this area has made extensive use of variants of the Hodrick-Prescott (HP) filter, which originally was intended to distinguish between supply and demand shocks in output. Given that the problem faced by the modeller wishing to measure the NAIRU is very similar, it is not surprising that some have built upon these filtering methodologies in NAIRU research. In particular, Laxton and Tetlow (1992) propose a method of conditioning the HP filter to derive what they refer to as a *multivariate filter* measure of potential output. In effect, they introduce additional information into the filter problem so that the values chosen by the filter are modified at the margin. For example, with a Phillips curve and an Okun's law relationship added to the system, the filter puts some weight on the series of residuals that will emerge from these two equations when the estimated path for potential output is chosen. The user can choose the weights attached to the additional information according to how reliable it is believed to be.

Côté and Hostland (1993) push the methodology further in order to determine both potential output and the NAIRU simultaneously. They set up a system of equations for inflation in the CPI, inflation in the GDP deflator, the rate of change in wages and the change in the unemployment rate. The latter equation contains some of the structural determinants of the NAIRU discussed in the previous section. The equations include potential output and the NAIRU, which are unobservable. The system is then estimated conditional on HP-filtered proxies for potential and the NAIRU, and the estimator iterates over various HP smoothness parameters for both output and unemployment to maximize the likelihood of the entire system.

What emerges from a procedure such as this one is an estimate of the NAIRU that puts some weight on structural determinants, such as those described in the previous section, while at the same time requiring that the measure contribute to other criteria, such as to be relatively smooth and to provide a reasonable explanation of the history of inflation. Accordingly, it represents something of a risk avoidance strategy for measuring the NAIRU and potential. One can alter the weights depending on the degree of confidence one has in the various components.

4 How large is the labour market gap in 1994?

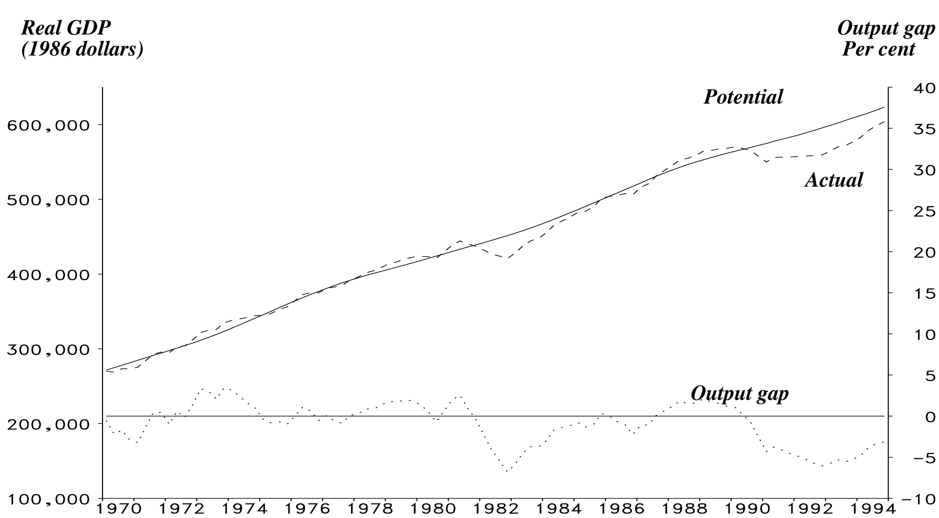
During the most recent cycle the unemployment rate rose by around 4 percentage points, trough to peak. The central questions that must be faced are: How much of this rise was due to a rise in the NAIRU? And how much represents the opening of a persistent labour market gap?

This survey, like that by Rose (1988), points to the possibility that a number of structural factors may have contributed to raising the NAIRU in recent years. This being said, another message that comes out of this review of the structural determinants of the NAIRU is the statistical fragility of the various estimates. As noted in the introduction, this fragility would cause anyone to pause before putting substantial weight on any of these structural estimates in policy formulation. This lends considerable appeal to systems methodologies of the sort described in Section 3 above, at least for the purposes of applied economic analysis and forecasting. Such methods take explicit account of uncertainty by tapping multiple sources of information and placing formal relative weights on each in choosing an estimate of the NAIRU and, at the same time, potential output.

At the Bank of Canada, the staff make use of all these methods in reaching judgments about the NAIRU and potential, which are then input into our macro model for purposes of developing medium-term projections. Given the wide range of estimates that are available, the outcome of this process is highly judgmental. However, the current judgment of the Bank's staff is that the NAIRU in Canada has risen somewhat since Rose (1988) reported that it was around 8 per cent at the end of 1987. The main contributing factor appears to have been the steep rise in payroll taxation since then, possibly with some additional temporary effects coming from relative price shocks due to trade liberalization and tax reform. Although it is very difficult to judge how long these effects might last, theory suggests that they should be digestible over time. Other structural variables appear to have been of much less importance recently, although the empirical evidence is far from conclusive. While the cumulative effect of UI on the NAIRU over the past 20 years may be quite important, recent changes will probably have the effect of lowering the NAIRU. The earlier upward pressure on the NAIRU coming from demographic effects has subsided and may even reverse, depending on how important the baby boom echo proves to be. Other factors that have been identified, such as the apparent recent recovery of unionization and new increases in minimum wages, may work to raise the NAIRU in the near term, but these effects seem likely to be small, on the basis of the evidence available. In large part, then, the factors that have caused the NAIRU to rise in the 1990s seem likely to be temporary, in which case the longer-term NAIRU estimates set out in Rose (1988) are likely to prevail over the medium term, absent additional structural changes.

Current unemployment is significantly above the NAIRU because the economy is not in equilibrium. One measure of the extent of disequilibrium is the output gap and, regardless of what methodology one uses, it is clear that the economy is still operating below its potential level of output. Estimates of potential output based on the multivariate Hodrick-Prescott filter methodology described above suggest an output gap that is on the order of 4 per cent in 1994; this is illustrated in Figure 5. One can build a case for higher or lower estimates than this, but balancing the evidence available makes this level seem reasonable. This methodology for estimating potential output implicitly ascribes some weight to both supply and demand disturbances in aggregate output fluctuations, and therefore it is slightly sensitive to economic cycles. This means, in particular, that as the expansion proceeds and the gap closes, estimated potential output growth will accelerate slightly, just as it is estimated to have slowed during the recession. This gives potential output a dynamic evolution, which means the implied estimated output gap is not strictly comparable to estimates based on alternative methodologies.

Figure 5: Multivariate filter estimates of potential and the output gap



A second, perhaps more telling, measure of the extent of macroeconomic disequilibrium is the gap between the producer real wage and labour productivity. As may be seen in Figure 6, this gap has opened up considerably during this economic cycle, with the real producer wage exceeding the level of productivity by nearly 6 per cent in 1993, which is very large by historical standards (see Cozier 1989, 1991). In 1994 this gap is showing early signs of closing. The rise in payroll taxation discussed earlier accounts for perhaps as much as one-half of this gap. This is illustrated in Figure 7, which compares the actual gap to that which would have prevailed had the share of supplementary labour income in the total wage bill remained constant from 1989Q1. The other factors that have contributed to a rise in the gap are cyclical in nature. First, as in most cyclical downturns, during 1990-91 wage growth responded to the weakening in aggregate demand somewhat later than did producer prices. Second, the current cyclical upturn differs from previous ones in a number of ways. An important difference has been the lack of synchronization of economic activity across the major world economies. This has contributed to keeping commodity prices, and therefore Canada's terms of trade, cyclically weak, and has kept producer prices down. As commodity prices recover, and as producer price rises outpace wage increases in coming quarters, this gap will narrow, and the demand for labour will rise commensurately. How directly this process of adjustment will be reflected in the unemployment rate itself is very difficult to judge for the various reasons discussed above, the most prominent being the rebound in labour force participation that seems likely to occur.

Figure 6: Real producer wages and productivity in Canada (1981=1.00)

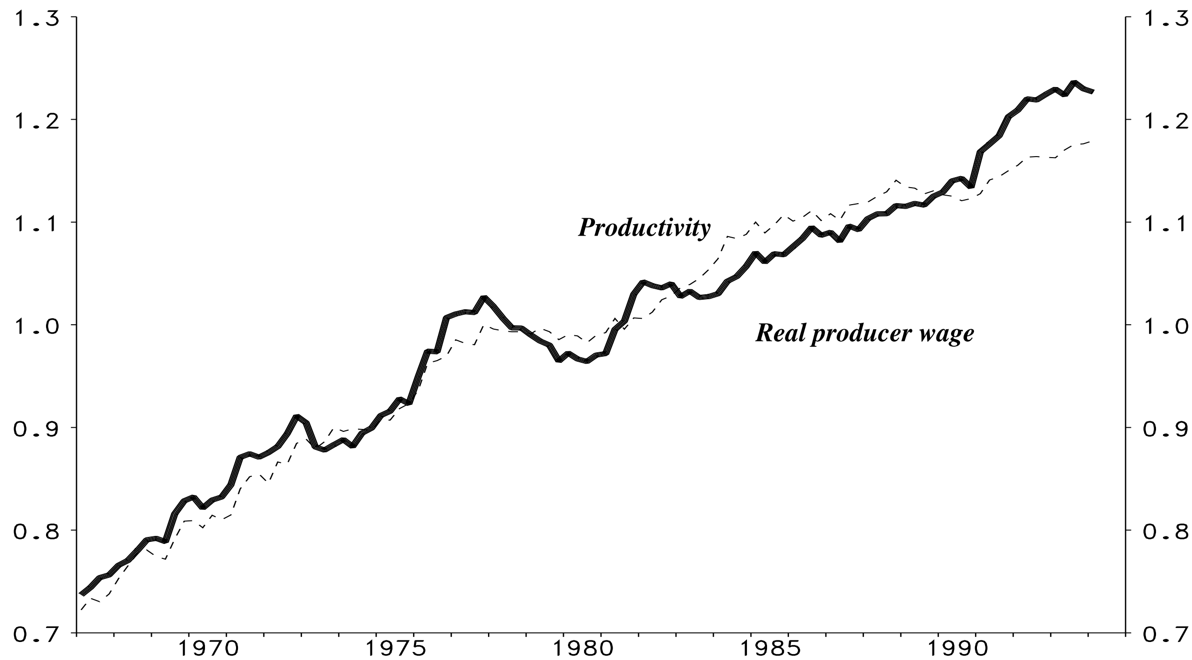
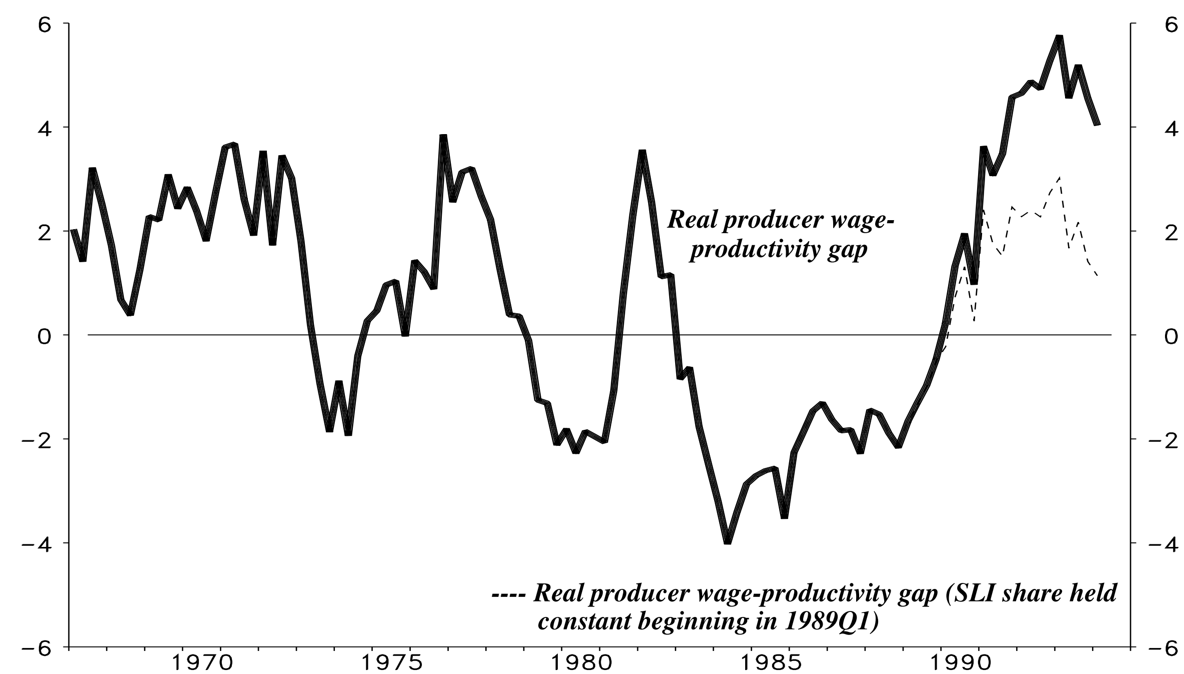


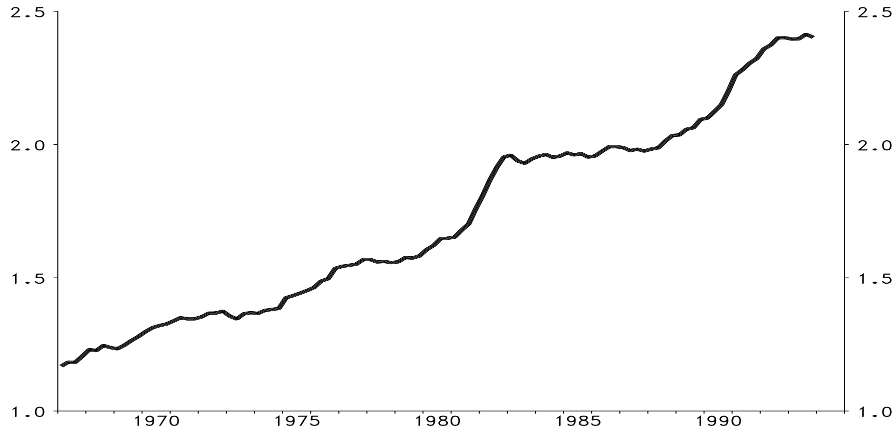
Figure 7: Real wage - productivity gap in Canada (1981=1.00)



The narrowing of the real wage/productivity gap would also be assisted by faster productivity growth. The complicated nature of our current cycle has made it very difficult to determine what is happening to productivity; see Sharpe (1994) for a discussion. However, the industrial restructuring that has been referred to in various contexts above has been substantial. It has shown up in the form of very high levels of imports of machinery and equipment throughout this cycle, the joint product of the relentless decline in the cost of capital led by computer prices, and the coincident rise in labour costs discussed above. Although the decline in computer prices is not a new phenomenon, it appears that the period 1984-89 saw little by way of restructuring, because Canadian firms found themselves to be very competitive internationally, in contrast to their U.S. counterparts, owing to a relatively undervalued exchange rate (the opposite of "Dutch disease"). It was not until 1989 that the need for extensive investment to restore competitiveness became obvious in Canada, and there has been substantial substitution of capital for labour since then. Canada's capital/labour ratio has more than doubled since 1960 (Figure 8), and the two periods of very rapid – and unreversed – rises were 1981-82 and 1990-91. These data support the view that the process of creative destruction accelerates during recessions, when opportunity costs are low and the survival of the firm seems under greatest threat (Howitt, 1994), an interpretation that is well supported by anecdotal evidence. All things considered, then, it seems reasonable to expect that in a cyclically adjusted sense, productivity will grow more quickly in the 1990s than it did during the 1980s, although the issue remains debatable.

This discussion suggests that the process of macroeconomic reequilibration in Canada will be complex, and possibly long-lived, especially in the labour market. To what extent the various factors that have been identified are influencing the NAIRU, as opposed to the unemployment gap itself, is very difficult to say. If one had more confidence in estimates of the output gap than of the unemployment gap, one could place more emphasis on the former in reaching judgments about the near-term evolution of the economy. However, the quantitative implications of the restructuring phenomenon for the level of potential output are also unclear, so one should be similarly reluctant to base policy on a single estimate of the output gap. The situation clearly argues for a risk-limiting strategy in both economic forecasting and policy-making.

Figure 8: Capital-labour ratio
(total person hours, 1960=1.0)



5 Concluding remarks

As in many countries, unemployment remains a serious and complex problem in Canada. The above discussion has identified a number of possible explanations, some of which are clearly structural, while others are less so. Although it is difficult to be precise about what has happened to the NAIRU since the late 1980s, the evidence suggests that it has risen above the 8 per cent level thought to prevail at that time, mainly because of a substantial rise in payroll taxation. It is also difficult to say how long these effects might endure, but the above analysis suggests that they are more likely to be temporary than those due to other structural determinants of the NAIRU. In addition, the changes to the UI system that have already been implemented can be expected to work to reduce the NAIRU over time. As for the unemployment rate itself, significant market forces are in place that should produce above-normal employment growth as the economic expansion proceeds. But this growth probably will have to deal also with a sizable rebound in participation, thus leaving the implications for unemployment highly uncertain.

Where should future research on this subject concentrate? At the Bank of Canada, the staff are pressing the issue in a number of directions. One area that is getting a good deal of attention is the implications for such concepts as the NAIRU and potential output of behavioural nonlinearities. To illustrate the problem briefly, suppose that the relationship between inflation and the output gap is non-linear, with excess demand eliciting faster and stronger effects on inflation than excess supply. In a stochastic setting where the monetary authority maintains a constant rate of inflation, the equilibrium level of output, hence potential output, will be lower than in a non-stochastic setting. This is because the upward creep in inflation that would result from the combination of the non-linearity and a symmetric shock history must be offset on through a lower average level of output. This problem is discussed in Laxton, Rose and Tetlow (1993a, 1993b). On a more empirical level, if Phillips curves are non-linear, then the inferences discussed above that relied on linear estimation are all potentially invalid. Indeed, one would expect precisely the sort of fragility of structural NAIRU estimates found in the course of previous research under conditions where a non-linearity in the underlying behaviour had been ignored in estimation. Evidence supporting the case for a non-linear Phillips curve in Canada is presented in Laxton, Rose and Tetlow (1993c). If this work holds up to further scrutiny, much of what we now think we know about potential output and the NAIRU may need to be rewritten.

Another issue that bears further scrutiny is the possibility that the NAIRU depends on long-term movements in the equilibrium real rate of interest. This hypothesis is explored in Fortin, Keil and Symons (1994), who find that the real interest rate has made an important contribution to unemployment in Canada during 1963-91. The idea is that a job can be viewed as delivering a stream of rents into the future and will continue to exist only so long as the present value of that stream remains positive; for a given sequence of stochastic shocks, the probability that this criterion will be violated and the job eliminated is greater the higher is the real rate of interest relevant to doing the present-value calculation. Similar empirical results for Canada are reported by Carruth, Hooker and Oswald (1994), who motivate the hypothesis with a model in which firms face a three-input production function and an imperfectly competitive labour market. The hypothesis clearly has some plausibility and is deserving of more attention. Among other things, future research will need to consider whether the real return on debt is more appropriate for testing this hypothesis than the real return on equity, for the behaviour of the two has differed importantly over time.

Research at the Bank of Canada is also examining a number of labour market issues more directly. One is to examine wage and employment adjustment at the more disaggregated, industry level to see how market structures or exposure to international shocks affects wage and employment behaviour. Another area of interest, in part prompted by apparent shifts in behaviour in this cycle compared with previous ones, is labour hoarding and its effect on productivity measurement. Another hypothesis worth exploring more thoroughly is that of “ranking” or “scarring” of workers, according to which previous bouts of unemployment make reemployment more difficult, thus contributing to sticky adjustment and longer unemployment duration. This list is far from exhaustive, but it illustrates a belief that further work based on micro labour market data appears to hold out the most promise at this time.

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