

Output Fluctuations, Monetary Policy and Fiscal Policy in Canada: 1961-2000

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1. Introduction:

Fluctuations in economic activity continue to raise questions. One set of questions relates to the historical patterns of fluctuations and changes in the magnitude and duration of fluctuations over time. A second set of questions relates to the sources of fluctuations and changes in those sources as a result of changes in the structure of economic activity. A third set of questions involves the roles played by policy, either as a force contributing to the changing characteristics of fluctuations, or as a cause of fluctuations. The experience of the Canadian economy over the past forty years, from the first quarter of 1961 to the third quarter of 2000, provides a set of observations which can be considered in terms of these questions about the sources and magnitudes of fluctuations and the role of macroeconomic policy. This paper examines Canadian experience in broad terms to provide a background for that more intensive examination of the specifics of the questions identified here.

There is a wide range of studies and considerable controversy over the historical patterns of fluctuations in economic activity in the United States. The debate arose in response to Christina Romer's (1986a, 1986b, 1989, 1991) studies of stability and instability in the United States economy before and after the Second World War. Romer's argument is that the apparently smaller fluctuations in economic activity in the postwar period were largely and result of differences in the measurement of economic activity provided by prewar and postwar data. The implication that postwar stabilization policy had not produced meaningful improvements in the stability of economic activity resulted in a number of further studies examining the methodology and data used for the measurement and analysis of fluctuations, and a search for explanations of the sources and durations of fluctuations (Basu and Taylor 1999, Watson 1994, Zarnowitz 1999). A continuing point of interest in these studies is the role of stabilization policy, either as a source of greater stability or as the source of disturbances and fluctuations in the post-war U.S. economy (Romer, 1999). A second issue in studies of the U.S. economy is the decline in the volatility of GDP growth rates which occurred in the early 1980's and has persisted to 2000 at least (Taylor, 1998; McConnell and Perez-Quiros, 2000). The point at issue in the U.S. economy is whether recent stability represents a significant recent improvement in the implementation and effectiveness of policy, or a shift in the structure of the economy, or some other more obscure change.

This paper considers GDP growth, fluctuations and monetary and fiscal policy in the Canadian economy over the past forty years, 1960- 2000. It uses several methods used in studies of the U.S. economy to define trends and fluctuations in aggregate economic activity. The observed patterns of variation are then examined in several ways. First, variations in Canadian output growth are examined to identify any obvious changes in growth rates and volatility over the forty year period. Second, a dis-aggregation of expenditure variation is used to consider possible sources of observed changes in the volatility of output growth. Third, Canadian output growth, unemployment and inflation are compared with those in the U.S. economy. And fourth, the relationship between macroeconomic policy regimes and the variance in output growth rates is examined. The main question with respect to Canadian experience is the same as that raised in the U.S. context: to what extent do changes in the volatility of output growth reflect changes in structure or changes in policy? Answering that question in depth will require more detailed

studies of the observations made in this paper. As a result this paper sets an agenda for further work.

2. Growth and Fluctuations in Canada 1961-2000:

Recent studies of growth and fluctuations in the economy use different methods for measuring the volatility of growth rates, or fluctuations in economic activity. Several of those methods are used here to examine recent Canadian experience. The starting point is Figure 1 which plots quarterly growth rates in real GDP over the period 1962:1 to 2000:3. Three observations on this plot are of particular interest. The first is the apparent decline in the average growth rate of real GDP over the period from about 1962 to 1979. The second is the lower average growth rate from 1980 to 2000, as compared to the earlier period. The third is the remarkable increase in the amplitude and duration of fluctuations in real GDP growth rates in the later period, 1980 - 2000, as compared to the earlier period 1962 -1979. There is an apparent break in the nature of fluctuations in economic activity in the late 1970's to early 1980's. Dating of this structural break in the growth rates is confirmed by both strong significant Chow tests and a significant dummy variable from 1980:1. Using this date for the break and the methods used in other studies, for example Romer (1999), Watson (1994) and McConnell and Perez-Quiros (2000), an aggregate numerical analysis of the growth rate data from Figure 1 is presented in Table 1.

Table 1: Growth and Volatility in Canadian Real GDP: 1962 - 2000

	Period Mean %	Volatility Std dev	Persistence
1962-2000	3.7	2.4	0.86
1962-1979	4.8	1.7	0.69
1980-2000	2.7	2.5	0.89

Source: Statistics Canada: CANSIM Data Base

In this table, growth is measured by the four quarter change in the natural log of quarterly real GDP, seasonally adjusted at annual rates. The standard deviation of these growth rates is used as a measure of volatility and the persistence of fluctuations is measured as the autocorrelation of the growth rate on its first lag, following Basu and Taylor (1999). These descriptive statistics provide clear confirmation of the patterns noted from the graphic in Figure 1. GDP growth was significantly higher and more stable over the first half of the period, namely 1962-1979, than in the later 1980-2000 period. Furthermore, fluctuations in growth rates, or departures from the mean, were more persistent in the later period than in the earlier period. It is of particular note that there is no evidence of greater stability in the economy in the later period, even though it is sometimes argued that policy objectives have been clarified and implementation has been improved in that period, and that the structure of the economy has evolved toward a larger and

more stable service sector. Indeed the observations suggest just the opposite, that the economy has been more volatile in the last 20 years than it was during the 1961-1979 period.

Table 2 presents some additional measures of growth and fluctuations based on a broader set of indicators that have been used in other studies. Watson (1994) and McConnell and Perez-Quiros(2000) have examined volatility in different sectors of the economy, at different levels of dis-aggregation to see if changes in structure can explain changes in the volatility of growth rates. Romer (1999) and Basu and Taylor (1999) extend the measurement of growth and volatility to include components of aggregate expenditure, unemployment rates and inflation rates. An examination of the growth process on these terms confirms the earlier observations on growth and stability.

In terms of expenditure, investment and exports were the two prime sources of growth and variations in growth rates. Average growth rates in these expenditures exceeded average growth rates in real GDP by a substantial margin and were two to three times as volatile. The difference between the sub periods 1961-1979 and 1980-2000 observed on the basis of GDP growth and volatility is confirmed by the observations on expenditure components. It is of note , however that lower growth rates and higher volatility in the later period were much more evident in investment expenditures than in exports. The period average growth rate in investment expenditures dropped from 5.4 percent to 3.8 percent while the volatility, as measured by the standard deviation, increased from 4.8 percent to 8.3 percent. By contrast, export growth in the 1980-2000 period was only slightly lower and was in fact more stable than in the earlier period. It appears that the decline in GDP growth rates and particularly the increase in their volatility reflects the change in the growth and volatility of investment expenditures. These observations on the role played by investment are consistent with those of other studies. Basu and Taylor (1999), for example find high volatility in investment expenditures in the United States across a broad time horizon, and Zarnowitz (1999) emphasizes patterns in investment as the key factors driving patterns in GDP growth.

Looking at growth and volatility from the output side rather than the expenditure side reveals the same patterns from a different perspective. In terms of broad sectors the goods producing sector of the economy grew more slowly than the services producing sector in the entire period 1961-2000 and in the sub periods defined above. These sector growth rate differentials produce the pattern of goods sector - service sector restructuring that has been a part of, and an important contributor to, economic growth in industrial countries in this broad time period (Curtis and Murthy, 1999). Consistent with conventional wisdom, goods sector output was much more volatile than services sector output in both sub periods, and thus the growth in the services sector did have the potential to contribute to economic stability. However, this potential was not realized as the volatility of service sector output increased significantly in the 1980-2000 sub period and deviations of service sector growth from the average became more persistent, thereby adding to the greater volatility observed in GDP growth in this later period. Within the goods sector itself, the growth of manufacturing sector output was strong relative to the entire goods sector but it was also more volatile. This volatility increased in the 1980-2000 period as the average rate of growth of manufacturing output decreased. These observations attribute the decline in growth between periods to a larger decline in growth in goods sector output,

Table 2: Further Measures of Economic Growth and Volatility in Canada: 1961-2000

Period	Mean %	Volatility Std Dev	Persistence
1962-2000			
Growth Rates: GDP	3.7	2.4	0.86
Investment	4.5	6.9	0.82
Exports	6.8	5.5	0.71
Manufactures	3.7	2.4	0.88
Goods	3.1	4.0	0.87
Services	3.8	1.7	0.89
Unemployment: Total	7.7	2.3	0.98
Male 25+	6.3	2.1	0.98
Inflation: GDP Deflator	4.6	3.3	0.97
1962-1979			
Growth Rates: GDP	4.8	1.7	0.69
Investment	5.4	4.8	0.71
Exports	7.1	6.0	0.72
Manufactures	5.1	5.2	0.88
Goods	4.4	3.9	0.84
Services	4.8	1.1	0.75
Unemployment: Total	5.9	1.4	0.97
Male 25+	4.6	1.0	0.95
Inflation: GDP Deflator	5.8	3.2	0.96
1980-2000			
Growth Rates: GDP	2.6	2.5	0.89
Investment	3.8	8.3	0.85
Exports	6.6	5.1	0.69
Manufactures	2.4	6.1	0.88
Goods	2.0	3.8	0.87
Services	2.8	1.7	0.88
Unemployment: Total	9.4	1.6	0.96
Male 25+	7.8	1.7	0.97
Inflation: GDP Deflator	3.6	2.9	0.98

Source: Based on Statistics Canada: Cansim Data Base.

particularly manufacturing output, than the decline in the growth rate of service sector output. However, the increased volatility in growth rates in the later period appear to result from increased volatility in output growth in the service sector and in the manufacturing sector.

The levels and volatility of unemployment rates over the 1961-2000 period match the patterns of growth and fluctuations observed in terms of expenditures and outputs. Across the entire period,

the rise in the average unemployment rate coincides with the decline in growth rates in the first part of the period, 1962-1979, and then the lower average growth rates in the later 1980-2000 sub period. Higher total unemployment rates than unemployment rates for males aged 25 years and over, and greater volatility in those total rates on average, was a result of a broad set of social and demographic factors that go beyond the present study. The unemployment rates for males 25 years and over provide a perspective on the performance of the economy that is more reflective of growth rates and fluctuations. Those unemployment rates reflect clearly the decline in the growth rate of GDP and the increase in the volatility of that growth rate observed in other data. Viewed differently, the differences in GDP growth rates over time might be in part a result of differences in labour force and productivity growth between periods, but the volatility of growth rates was not a result of volatility in labour force growth.

While the growth and stability of the economy appears to have deteriorated over the time period being considered, there was one dimension of the economy that has improved. As the data in Table 2 illustrate, inflation rates declined and became more stable. Breaking the observations into the two sub periods, shows that the decline in the inflation rate was primarily a feature of the 1980-2000 period even though the instability in the inflation rate is not much less in that period than in the earlier period. Discussion later in the paper will note that the improvement in the inflation rate occurred in the time period in which the thrust of macroeconomic policy placed more emphasis on inflation control and on budget deficit and government debt control than on GDP growth rates and unemployment. One question to be considered in more detail below is the extent to which the policy regime that led to improvements in inflation performance was also responsible for the deterioration in growth rates and stability.

As an alternative to the methodology used above, some studies of growth and fluctuations examine these aspects of economic activity by first removing the trends from the data and then measuring volatility by deviations from trends. The study by Basu and Taylor (1999) is one example. There are different methods of removing the trend from the data but one which is commonly used is the Hodrick-Prescott filter. A note of caution in using any de-trended data is raised by Romer (1999), namely that de-trending and upward sloping data series like that for real GDP tends to change the timing of the peaks and troughs observed in the data. Bearing that in mind, Figure 2 illustrates the growth trend and fluctuations in Canadian real GDP based on the Hodrick-Prescott trend and deviations from that trend in terms of a GDP gap, which is the percentage deviation of observed real GDP from trend real GDP.

Although the data are presented in a different way, Figure 2 confirms the earlier description of growth and fluctuations in Canadian real GDP over the 1961-2000 time period. From 1961 until about 1980 the economy's growth trend was roughly constant and fluctuations about that trend were of smaller magnitude and shorter duration than fluctuations observed after 1980. As might be anticipated, trending real GDP over the entire period when growth rates are lower in the later part of the period pushes the trend line down in the middle years. Consequently the change or break in the pattern of fluctuations in real GDP appears before the 1980 date identified earlier on the basis of actual growth rates. Nonetheless, following that break economic activity was clearly more volatile in terms of larger and more persistent deviations from trend as measured by the GDP gap, and the trend itself was more variable.

Thus by all measures presented the Canadian experience with growth and fluctuations in real GDP changed markedly in about 1980. Growth rates declined, the stability of the growth trend declined and the magnitude and persistence of deviations of growth from trend increased. These were not positive developments if, as is usually the case, stable growth along the trend of potential GDP is seen as welfare maximizing. The one improvement in economic performance noted was the decrease in the rate of inflation and in the variability of inflation. These observations provide a basis for a more detailed examination of Canadian GDP growth and fluctuations. They also raise at least two questions about the Canadian experience which are given an initial examination below: How did Canadian experience compare to the experience in other countries over the same period, and particularly to the U.S. experience? What role did changes in domestic policy regimes play?

3. Canadian and United States Growth and Fluctuations Compared:

There is a sharp contrast between Canadian experience with GDP growth and fluctuations and the United States experience over the 1961-2000 period. Figure 3 illustrates US real GDP, the trend in real GDP derived using the Hodrick-Prescott filter, and the GDP gap measured as the percentage deviation of observed real GDP from trend real GDP. Figure 2, above presented Canadian data in the same way. A set of comparative numerical measures is given in Table 3.

Table 3: Growth and Volatility in Canadian and United States Real GDP: 1962 - 2000

	Period	Mean Growth Rate %	Volatility Std dev
	1962-2000		
Canada		3.7	2.4
United States		3.5	2.3
	1962-1979		
Canada		4.8	1.7
United States		3.9	2.5
	1980-2000		
Canada		2.7	2.5
United States		3.1	2.1

Source: Statistics Canada: CANSIM Data Base

The U.S. experience in Figure 3 is a mirror image of the Canadian experience illustrated in Figure 2. First consider the trend real GDP and observed real GDP. In the Canadian case, the trend was steady and variations about the trend were smaller in the first part of the 1962-2000 period than in more recent years. In the U.S. case the trend is smoother and variations about the trend are smaller in the later part of the period, particularly after about 1983, than in the earlier years from 1961-1983. Second consider the volatility of the GDP gaps illustrated for the two

countries in Figures 2 and 3 respectively. The Canadian experience was one of more stability or less volatility in the early part of the period, 1962-1980, than in the later years. The U.S. experience was the opposite. The U.S. economy experienced remarkable stability, in terms of smaller and shorter lived GDP gaps, over the period from 1984 to 2000. Thus despite strong economic linkages between the two economies the patterns of growth and fluctuations have been strikingly different.

The decline in the volatility of growth in U.S. real GDP has attracted comment and analysis in recent years. Indeed Taylor (1998) called this recent period in U.S. economic experience “the Long Boom” and that label would extend to at least the third quarter of 2000. He argues that economic policy and in particular monetary policy deserves considerable credit for this economic performance. McConnell and Perez-Quiros (2000) illustrate and document a structural break in the volatility of U.S. GDP growth in the first quarter of 1984, and examine the causes of that break. They find that the decline in volatility results from a coincident decline in the volatility of durable goods production, but note as well a possible link to monetary policy. In Canada, by contrast, the last part of the 1980-2000 period has been dominated by what Fortin (1996) called “the Great Canadian Slump”. This experience is illustrated by the deep and prolonged recession of 1991, noted in the growth rates in Figure 1, and the durable negative GDP gaps seen in Figure 2. Indeed it is arguable that these gaps, constructed on the basis of the Hodrick-Prescott trend, strongly understate the extent of the slump in Canadian GDP. Estimates of the GDP gap presented by the Bank of Canada in recent years illustrate a large and persistent GDP gap for most of the 1990's (Bank of Canada, Nov 2000, p18). These observations are a part of the ongoing debate about the sources of economic fluctuations and the roles played by monetary and fiscal policies as causes of fluctuations or contributors to stability. One way to approach these issues is to consider patterns of GDP growth and fluctuations during different policy regimes. The question raised is whether different policy regimes were the causes of different patterns of economic growth and fluctuations observed in different time periods. The same question can be posed in terms of different countries rather than time periods but that question is left for future work and not explored in this paper.

4. Growth and Fluctuations Under Different Policy Regimes:

In a recent paper the Governor of the Bank of Canada, Gordon Thiessen (2001), discussed the historical evolution of Canadian monetary policy in terms of six time periods and the corresponding policy issues or regimes. Four of these regimes fall neatly within the 1961-2000 period in which the Canadian experience with GDP growth and fluctuations is considered in this paper, namely: 1962-1970, 1971-1981, 1982-1990 and 1991-2000. Each period involved a particular policy environment along with a set of policy objectives. Thiessen (2001) discusses both. In some cases shorter sub-periods are identified by Duguay and Longworth (1998) based on particular policy concerns or actions.

The first period, 1962-1970, was a period of fixed exchange rates which meant, in terms of a simple Mundell-Fleming model, little independence for monetary policy but enhanced power for fiscal policy. Thiessen argues that the fiscal policy emphasis was on growth while the power of the Bank to resist inflationary pressures was constrained by the exchange rate commitment. The

fixed exchange rate was abandoned in 1970 in favour of a floating rate, which offered greater independence, power and effectiveness for monetary policy. This second period, 1971-1981, with a flexible exchange rate was also notable for the emergence of stagflation which could be attributed at least in part to the actions of the OPEC oil cartel during a time of strong overall demand in the international economy. The policy regime that emerged in response to these conditions was formalized in 1975 as monetarism, with the focus on inflation control through the use of money supply growth rate targets. Targets for money supply growth rates were established within a framework of “gradualism” to minimize the negative effect such resistance to inflation might have on GDP growth, (Thiessen (2001) p.42). Thus it is not unreasonable to describe the first two periods, at least from the Bank’s perspective, as times in which the broad orientation of both monetary and fiscal policies was towards growth and low unemployment, but with a growing, underlying concern about inflation.

The economic environment and policy priorities in the later time periods, 1982-1990 and 1991-2000 were different. Severe monetary restraint in 1980-81 in both the U.S. and Canada produced the sharp deep recessions which are clearly illustrated in Figure 1 by the large negative growth rates in real GDP observed in 1982-84. Money supply growth rate targets were no longer satisfactory guides or targets for monetary policy. As Duguay and Longworth (1998) and Thiessen (2001) note, there was a need for a new policy target on which to base policy implementation, and the search for new approach extended over the 1982-1990 period. A shift in policy toward a more explicit framework emerged in about 1987 which led to the setting of official targets for inflation control in 1991. On the fiscal side, as discussed in more detail below, initial attempts at deficit control and debt reduction in the late 1970's and early 1980's were dramatically undone by the automatic and discretionary budgetary responses to the recession of 1982-83. Consequently, from 1984 on, the declared objective of budgetary policy was deficit reduction and debt control, within a growing economy, but growth was a means to an end not the objective (see Curtis, 1997a, 1997b). In the last period, 1991-2000 these policy priorities were further clarified. Targets were set, initially for inflation rates in 1991 and subsequently targets were also set on the fiscal side for budget deficits and balances. The implicit and at times explicit underlying argument was that stable inflation at low levels, stable balanced budgets and declining debt ratios were prerequisites for growth and stability in real GDP. Thus the policy regime shifted from one which emphasized growth and low unemployment to one which emphasized inflation control as the prime objective of monetary policy, with deficit and debt control as fiscal objectives.

These broad policy regimes, over the 1961-2000 period and sub periods, are illustrated by some simple but widely used policy indicators. In the case of monetary policy there is a choice of indicators. In their study of Canadian monetary policy in the late 1980's and early 1990's Laidler and Robson (1993) define and employ a set of indicators that involve both interest rates and money supply growth rates in various ways. More recently, the Bank of Canada has developed and used a “monetary conditions index” that combines current interest rates and exchange rates relative to base values to measure the influence of monetary policy on economic activity. Other recent work as illustrated by Taylor (1999) has concentrated on the shortest term interest rate, the Federal Funds Rate in the U.S., or the Overnight Rate in Canada, as both proximate targets and indicators of monetary policy. This approach has been widely adopted in recent research on the

optimum formulation of monetary policy and in the analysis of policy, as surveyed by Clarida, Gali and Gertler (1999). While the short term interest rates appear to be the indicator of choice in studies of U.S. monetary policy there is some debate about their usefulness in small open economy cases. This is reflected in part by the Bank of Canada's use of a monetary conditions indicator in addition to overnight interest rate targets. Ball (1999) also advocates the use of such an index, combining interest rates and exchange rates. However, in a study which examines several more complex monetary conditions indexes that also include growth rates of money supply, Fung and Yuan (2000) find that for Canada the overnight interest rate contains all the significant information available on the effect of monetary on economic activity.

There are two important unresolved issues here. The first is the question of the measuring the thrust of monetary policy or alternatively the neutrality of monetary policy. Fung and Yuan (2000) also try to define neutral monetary policy. The main options are an arbitrary choice based empirically on recent values of monetary variables, a value for real interest rates based on historical values, or based on an examination of declared intentions by policy makers (see Romer and Romer, 1994). None of these is particularly satisfactory but neither is the issue of immediate concern here when policy regimes can be compared in terms of relative as opposed to absolute thrust. The second issue is that of interpreting the meaning of the correlation, or lack of correlation between monetary policy indicators and economic conditions such as GDP growth and inflation. As Tanner and Pescatrice (1998) argue, the implementation of monetary policy in a way that stabilizes GDP growth despite exogenous disturbances would produce no correlation between monetary policy indicators and GDP growth. This is an interesting question in terms of the evaluation of both monetary and fiscal policy that is noted here but left as a area for further work. The immediate concern is the possible relationship between the broad patterns of growth and fluctuations observed in real GDP, and the general nature of monetary policy regimes over and within the same time periods. A limited selection of monetary policy indicators is used for this purpose. The objective is to identify, if possible, coincident patterns that might raise questions for more formal and technical study. The broad result is that the patterns observed in monetary policy indicators are remarkably similar to the patterns of growth and variation seen in real GDP.

Figure 4 provides the first illustration of a monetary policy indicator namely the real overnight interest rate. The Bank of Canada currently conducts its policy by setting targets for the nominal overnight rate and announcing those targets implicitly through its announcements on the Bank Rate. However, it is the real interest rate, defined as the nominal rate adjusted for expected inflation, that influences economic activity. Although the Bank does not control the real interest rate directly it can include information on current and expected inflation rates in its decisions about the nominal rate. Whether or not it does, it is the real rate that provides an indicator of the possible effect of policy on economic activity. The real overnight rate in Figure 4 has been calculated *ex post* by subtracting the annualized inflation rate from each quarterly observation on the nominal overnight rate. Vertical lines have been drawn in this and subsequent figures to define the policy regimes described above.

The plot of the real overnight interest rate suggests some patterns in monetary policy that are similar to the patterns in the growth and fluctuations in real GDP. First consider a broad

subdivision of the time period based on the shift in the monetary policy regime in 1981, and the almost coincident break noted in the data on real GDP growth rates. Based on the average value of real overnight rates, monetary policy was apparently more restrictive after 1980 than before 1980. Furthermore, the magnitude of the short term fluctuations in the real overnight rate was significantly larger in the later period than in the earlier period. Within these broad sub-periods there were some large departures from the general or average values. From 1971 to 1976 real overnight rates were negative, suggesting powerful monetary stimulus. Conversely, in 1980 and 1990-91 real overnight rates were remarkably high, approaching and exceeding the 10 percent level, suggesting strong monetary restraint. These observations are consistent with common criticisms that easy monetary policy contributed to the inflation problems that developed in the 1970's, and that excessively tight monetary policies caused the recessions of 1982 and 1991. In more general terms, there is a remarkable correlation between the average value and volatility of real overnight rates and the average value and volatility of growth rates in real GDP, but interest rates are only part of the monetary policy story.

As noted earlier, it could be that the real overnight rate does not give a complete or accurate indication of monetary policy, in part because it ignores the coincident values and movements in the exchange rate. Although data are not presented here it is the case that the exchange rate defined as the domestic currency price of foreign currency was lower on average before 1980 than after. Thus the restrictive effects of higher interest rates after 1980 might have been offset by the stimulative effects of a higher exchange rate. This issue is addressed by the construction and use of a monetary conditions index, examples of which are presented in Figures 5 and 6.

Figure 5 shows a nominal monetary conditions index based on nominal 90 day prime corporate paper yields and the Canadian dollar price of the U.S. dollar. The base period is 1970Q1 such that the index measures the weighted sum of changes in the interest rate and the exchange rate from their values in 1970Q1 according to the following formula:

$$MCI70Q1 = (R90 - 8.44) - (100/3) * (\ln ER - 0.0703196).$$

By this formula $MCI70Q1 = 0$ in 1970Q1, its base period. The 1:3 weighting on interest rate and exchange rate changes respectively from base period values follows from the empirical work of Duguay (1994) and the Bank of Canada's weighting in its MCI. However the $MCI70Q1$ differs from the Bank MCI in its base year, which in this case marks the end of the fixed exchange rate period, and in its use of the US dollar exchange rate rather the C-6 exchange rate index which is available only from 1980. Nonetheless it shows roughly the same patterns as does the Bank's index in the post 1980 period and allows an extension back to 1961. As the formula suggests, upward movements in the index reflect increases in the interest rate or decreases in the exchange rate or a combination of the two, any of which tends to restrict expenditures on domestic goods and services and therefore indicates a tightening or restriction of monetary conditions.

The $MCI70Q1$ shown in Figure 5 does suggest that by ignoring exchange rates the real overnight interest rate provides an incomplete picture of monetary policy. In broad terms the $MCI70Q1$ suggests a persistent tightening of monetary policy in the period before 1980 and a persistent easing after 1980. However there were notable departures from these trends in 1973, 1980-81 and

1987-91. Monetary conditions appear to have tightened sharply in each of those periods, with a timing consistent with the policy regimes and inflation issues noted by Thiessen (2001) and Duguay and Longworth (1998). However, this is a nominal monetary conditions index which does not include the real interest rates and the real exchange rates which are relevant to expenditure decisions. Thus the patterns of monetary conditions it suggests and those suggested by the real overnight rate are not comparable.

Figure 6 is provided to address this issue. It shows both nominal and real monetary conditions indexes. The nominal index is as defined above. The Real Monetary Conditions Index is constructed according to the same formula on the same base period but uses ex post real interest rates and real exchange rates rather than nominal rates. Ex post real interest rates are defined, for this index, on a quarterly basis as the nominal 90 day prime commercial paper rate minus the quarterly annualized inflation rate. Real exchange rates are defined quarterly as the nominal exchange rate multiplied by the ratio of the US GDP deflator to the Canadian GDP deflator. Constructed on this basis the index includes the effects of the domestic inflation on the real cost of financing expenditures, and the effects of differences between Canadian and US inflation rates and nominal exchange rates on the prices of exports and imports.

The real monetary conditions index suggests broad patterns of monetary policy similar to those observed in terms of real interest rates. In the first part of the period, from 1961 to 1975 the index has a small negative value, on average, and small variations about that average. Monetary policy might be described as moderately more expansionary than in the base period and quite consistent over time. It is of note that the strongly expansionary monetary policy suggested earlier in Figure 4, on the basis of the real overnight rate, was offset in part by a high real exchange rate according to the Real MCI. After 1975 the Real MCI suggests a significant change in monetary policy. The index is on average much higher and the fluctuations about that average are much larger in the 1975-2000 time period. Three clear episodes of sharply restrictive policy are indicated, peaking in the years 1976, 1980 and 1991. In between those years conditions eased substantially. These observations offer confirmation of the similarity of the broad patterns of monetary policy and the patterns of growth and fluctuations in real GDP already noted in terms of real interest rates. Broadly speaking, in the first half of the 1961-1980 period monetary policy was, on average, moderately expansionary and consistent with a tendency to tighter policy in the later years. GDP growth was strong and stable but rates of growth were declining. In the second half of period, from 1980-2000, monetary policy was initially much more restrictive on average (1980-1991) and much more volatile before shifting to a more persistent expansionary pattern from about 1992 on. As noted before, GDP growth from 1980-2000 was lower on average, fluctuations in growth rate were much larger in the period after 1980. These observations would lend support to an argument that the broad patterns of growth and fluctuations in real GDP reflect the broad patterns of monetary policy pursued over this 1961-2000 time period. More detailed and technical analysis of the effects of monetary policy is required to provide a more rigorous test of that support.

A further and final consideration of this link between monetary policy and economic growth is provided by considering monetary policy in terms of a Taylor Rule. The basic approach originates with Taylor (1993) and has been used in a variety of subsequent studies. Two recent

examples are provided by Judd and Rudebusch (1998) and Taylor (1999). The procedure compares actual monetary policy as indicated by a nominal short term interest rate, in this case the overnight rate (ONR), to the monetary policy required to produce an optimum GDP growth and inflation outcome based on policy responses to economic conditions. A simple and widely used bench-mark rule is as follows:

$$\text{ONR}^* = B_t + r^* + 0.5(B_t - B^*) + 0.5(\ln y - \ln y^*) \cdot 100.$$

By this approach the central bank conducts monetary policy by setting the nominal overnight interest rate at a target value, ONR^* , based on the bank's objective which is to minimize the variance of inflation relative to some inflation target B^* , and the variance of real GDP, y , relative to potential real GDP, y^* . Defined in this way, and calculated on the basis of historical data, ONR^* provides a measure of what might be considered "appropriate" policy. For present purposes the calculation is made on the assumption that the equilibrium real overnight rate, $r^*=2.0$, that the inflation target $B^*=2.0$ and that inflation and GDP objectives are assigned equal weights as policy objectives. Potential GDP, y^* , is derived by applying the Hodrick-Prescott filter to observed real GDP. It is important to stress that this is simply an illustrative example. Establishing appropriate values for the equilibrium real interest rate r^* , potential GDP and the weights in the policy rule are all important, unanswered research questions

Nonetheless, Figure 7 uses this approach to provide another perspective on monetary policy and economic performance through a comparison of the actual ONR with the target ONR^* based on the simple Taylor rule. Once again there is a clear difference between the nature of monetary policy before and after 1980. Before 1980 monetary policy was more expansionary, overnight rates were lower, than the policy needed to stabilize inflation rates and real GDP, according to the rule. This was particularly the case in the mid 1970's when serious inflationary pressures developed. Moreover, the shorter term comparison of movements in ONR and ONR^* suggests that policy did not respond as vigorously to variations in output and inflation as the "optimum" rule required. After 1980 the observations are generally the opposite. Monetary policy was on average too restrictive in the sense that the overnight rate was generally above the target ONR^* . However, the shorter term variations were generally larger than what the rule suggested was required for stability. Once again it appears that there was a relationship between the thrust and volatility of monetary policy and the lower and more volatility GDP growth in the period after 1980.

These observations on growth and fluctuations in real GDP and monetary policy regimes and conditions are clearly preliminary. The objective is simply to raise the question of the possible relationship, motivated in part by the arguments advanced in the US context by studies such as Romer and Romer (1994) and Romer (1999). Those studies led to a wider examination of the possible role of policy as a cause of post war fluctuations in real GDP, and that work continues. The Canadian experience with GDP growth and fluctuations is remarkably different from that in the US, and there appears to be a link between the Canadian experience and Canadian monetary policy that calls for further study. That is about as far as the observations made here can take us. They provide the basis for more intensive work on monetary policy and monetary policy rules in

Canada within frameworks similar to those used recent U.S. work, modified to take into account the small open economy conditions that affect economic activity and policy.

5. Growth and Fluctuations under Different Fiscal Policy Regimes:

Defining and identifying fiscal policy regimes is a more complex task than identifying monetary policy regimes. It does not have the benefit of a recent summary to provide guidance comparable to that offered by the Bank of Canada (Thiessen, 2001) with respect to monetary policy. There are also questions raised by the structure of the government sector and the division of fiscal powers between levels of government. As a simplification the discussion of fiscal policy is limited to the budget balances and fiscal policies of the federal government. It integrates three main considerations. First it identifies broad fiscal regimes in terms of the apparent objective of budget policy and shifts in that objective. Second it notes the detailed description of policy provided by Perry (1989) based on budget statements and specific budget provisions. Third it considers what might be defined as coordination issues: monetary policy, exchange rate policy and fiscal policy interactions, as these may affect the impacts of fiscal initiatives on economic activity, particularly in terms of the growth and fluctuation patterns of concern here. This approach to the identification of policy regimes inevitably encounters questions of policy indicators and their interpretation, and questions about discretionary policy relative to the automatic stabilization effects of established tax and transfer programs. Some of these issues are explored using the suggestions of Blanchard (1993) and Taylor (2000) for alternative indicators of discretionary fiscal policy, alternative approaches to automatic stabilization, and the proposal for a “fiscal policy rule” approach to an examination of fiscal actions and regimes. These more empirical approaches are considered in the later part of this section.

The empirical basis for an identification of major fiscal policy regimes is provided by two summary budget concepts. Figure 8 shows the federal government primary budget balance as a percent of nominal GDP. This measure of the budget records actual federal expenditures, transfers and revenues resulting from the expenditure, transfer and tax programs implemented by the government and driven by nominal GDP. By construction it excludes interest payments on the public debt which are the result of past budget balances and past and present monetary conditions. It also adjusts for the effects of inflation on the size of the budget by measuring the balance relative to nominal GDP. Figure 9 shows the same budget balance, the primary balance, estimated on the assumption that the economy operated at ‘full employment’ or potential GDP, as estimated by the Department of Finance (2000). Expenditures, transfers and tax revenues have been estimated at potential GDP. As a result the effects of cyclical variations in nominal GDP on the budget balance have been removed.. Changes in the budget balances observed in Figure 9 are interpreted as the results of discretionary changes in the government’s policy with respect to expenditure, transfer or tax programs. Differences between the measures of the budget in Figure 8 and those in Figure 9 show the effects of variations in GDP on the budget balance, or the automatic stabilization effects of the components of the budget that are linked to GDP. Clearly questions raised by the construction and interpretation of these budget measures are important for the evaluation of fiscal policy and are considered in more detail below.

An examination of federal government budget data suggests three main fiscal policy regimes within the 1961-2000 time period. The first runs from 1961 to 1974, a period of generally rising primary budget surpluses and, as noted previously, a period of comparatively strong and stable growth in real GDP. According to Perry (1989) fiscal policy initiatives during this period were directed at short run variations in GDP growth and increasingly at inflation control. It was a time of significant expansion in social programs and in the size of the government sector relative to the economy in total. However the primary budget surpluses, strong nominal income growth and low interest rates reduced the government debt to GDP ratio to a postwar low by 1974. Figure 8 illustrates the clear upward trend in the primary balance with short term variations reflecting both policy initiatives and the effects of variations in GDP. Figure 9 shows no trend in the cyclically adjusted balance which suggests that strong income growth was the main cause of rising primary surpluses, an observation that is consistent with tax reform initiatives implemented at the end of this period. In summary terms this time period was a regime of fiscal stability and perhaps neutrality with an underlying tendency to restraint from fiscal drag.

By contrast the period from 1975 to 1985 was a time of fiscal activism and turmoil. The cyclically adjusted primary balance in Figure 9 shows strong discretionary fiscal stimulus from 1974 to 1977 which Perry(1989) identifies with the combined effects of tax reform and policy responses to sharp energy price increases. The shift in both actual and cyclically adjusted balances to large deficits is in sharp contrast to the previous fiscal regime. Furthermore, concerns with inflation, the deficit and rising debt ratios result in a reversal of discretionary policy through expenditure restraint and tax increases. These raised the cyclically adjusted primary budget balance to a surplus and combined with strong growth to push the actual primary budget into surplus as well in 1981. However this fiscal restraint was quickly reversed in 1982 in the face of a deep recession and rising unemployment. The following three years of strong cumulative discretionary fiscal stimulus produced large budget deficits which, in combination with low growth and high interest rates, triggered strong growth in the debt to GDP ratio. This was a regime of strong fiscal activism with large initiatives on both expansion and restraint in the face of turbulent economic conditions. The net result was a shift in the federal government finances to deficits and debt ratios that imposed severe restraints on future fiscal initiatives (Curtis, 1997b).

After 1985 the focus of fiscal policy was deficit and debt control, not aggregate demand management to provide stabilization and growth. The strength and persistence of the resulting fiscal restraint is clear in Figure 9 in the consistent rise in the cyclically adjusted primary balance in every year except 1993, which perhaps by coincidence was an election year. This rising balance reflected the discretionary policies of tax increases and expenditure reductions the were used to address deficit and debt concerns. Initially the declared target of policy was balance in the primary budget, then after 1994 the government set targets for the total budget balance and these targets were raised over time. Departures from the steady improvement in the actual primary budget balance similar to the rise in the cyclically adjusted balance were caused by cyclical variations in GDP. The recession of 1991 and the prolonged recovery induced automatic fiscal stimulus which is evident in the years 1991-94 from a comparison of Figures 8 and 9. Finally, at the end of the period when fiscal restraint had eliminated the deficit and brought the growth in the debt ratio under control, the budget data confirms a return to some fiscal expansion

through a combination of tax reductions and new expenditures but within the context of strong primary budget surpluses and a balanced total budget. This at least starts out as a return to the fiscal regime of the 1960's.

From this summary of observations on a limited set of fiscal indicators it appears that while there were clearly different fiscal policy regimes in the 1961-2000 period, these regimes and changes in them do not coincide with either the previously identified regimes in monetary policy or the shift in the pattern of growth and fluctuations in real GDP. However, using the observations on GDP growth as a framework, the period of fiscal stability from 1961 to 1975 does cover a large part of the period of stability in GDP growth. As noted above this is also a period of relatively stable monetary policy, as described by the real monetary conditions index, despite the shift from fixed to flexible rates. It appears that during this period both policies attached a higher weight to reducing short term variations in unemployment and GDP growth than to inflation, but this is clearly a perception that invites more detailed investigation.

Both fiscal and monetary policy regimes shifted in 1975 without immediate disruption to the pattern of growth and fluctuations in real GDP. Fiscal policy launched expansionary initiatives in terms of tax reform and energy policy that aimed to ease inflationary pressures by easing supply side constraints to sustain employment, perhaps with some success. Monetary policy attacked inflation through the setting of money supply growth rate targets within a strategy of 'gradualism'. Under flexible exchange rates the monetary policy of restraint should have dominated the fiscal expansion through both interest rate and exchange rate channels. This did not happen. The exchange rate depreciated in response in part to non-monetary factors and external financial conditions rather than appreciating, and restrictions on money supply growth appeared to have smaller effects on expenditure than were anticipated. In short it seems the shift in fiscal and monetary policy regimes in opposite directions offset the effects of either on aggregate demand. GDP growth continued and inflation was not controlled. Thus despite a clear shift in monetary and fiscal policy regimes in 1975, it appears that the entire period of relatively strong and stable growth in real GDP from 1961 to 1980 coincided with a period of combined monetary and fiscal policy that was expansionary, or at least accommodating.

Briefly, in the 1979-1981 period, fiscal and monetary policy imposed significant coordinated restraint on the economy. As noted earlier, fiscal restraint followed concern over the deficit and debt effects of the shift to fiscal expansion in 1975. Monetary restraint was a sharp tightening of monetary conditions in line with those in the United States aimed at reducing inflation. This was a coordinated domestic fiscal and monetary restraint combination and it marked the end of the period of relatively high and stable growth in real GDP. However, the strong impacts of this policy mix on both growth and inflation led to a quick reversal of the restraint package and a shift to fiscal expansion with monetary accommodation. GDP growth rates responded to the stimulus but the stability in those growth rates is not re-established in Canada. As noted above, by contrast, real GDP growth in the U.S. was more stable after 1981 than it had been previously.

The coordinated expansionary policy was short lived. Fiscal deficits and high interest rates destabilized the debt ratio inducing the shift to restraint in 1985. Concerns about an acceleration of inflation shifted monetary policy toward restraint in 1987 and formal inflation targets in 1991.

Coordinated restraint was re-established leading to the recession of 1991. Recovery from this recession was prolonged perhaps as a result of the monetary policy focused on inflation targets as argued by Fortin (1996), and perhaps as a result of the larger fiscal adjustments required for deficit and debt control when the economy experienced the recessionary effects of monetary policy. The shifting patterns of both fiscal and monetary policy in this period after 1980 were much more complex than the patterns observed before 1980. Disentangling their effects requires a more formal analysis such as that used by Duguay (1994) for the period up to 1990. The descriptive approach used here does suggest however that the post 1980 period of slower and more volatile growth in real GDP did occur during a period when fiscal and monetary policies had shifted to give much higher weights to deficit and debt control and inflation control respectively, and much lower weight to unemployment and GDP growth. This may account for greater volatility in GDP growth, but it is also of note and worth further exploration that Ball (1999) cautions that when exchange rates are flexible, strong inflation targeting in a monetary policy regime that uses the short term interest rate as an instrument will create conditions for instability in GDP growth rates. Leith and Wren-Lewis (2000) have also examined questions of stability and the interactions between fiscal and monetary policy rules. Thus in broad terms there is a case for a more detailed investigation the relationship between the change in the pattern of real GDP growth and fluctuations in Canada and the underlying patterns of monetary and fiscal policy. Or posing the question a different way, was the stronger growth and greater stability in the U.S. economy after 1980, and in comparison with the Canadian economy, the result of 'better' U.S. monetary and fiscal policy in that time period?

Leaving that question for future consideration there are two technical points of interest in the preceding discussion. The first concerns the use of the cyclically adjusted budget balance as an indicator of discretionary fiscal policy, and the patterns of fiscal policy observed on the basis of that indicator. The second concerns the size and magnitude of automatic fiscal stabilization that comes from changes in the government's budget balance induced by growth and fluctuations in real GDP. Clearly these two issues are interdependent because what is observed as induced changes in the budget balance is dependent on the extent of the change in the balance that has been defined as arising from discretionary policy. Romer(1999) and Romer and Romer (1994) have considered the importance of automatic stabilization in the fiscal policy program relative to growth and fluctuations in the U.S. economy. Blanchard (1993) offers a critique of the cyclically adjusted budget as an indicator of discretionary policy and suggests an alternative construction and indicator. Taylor (2000) suggest a focus on the role of fiscal policy as a stabilizer, in a sense similar to the stabilization role that lies behind his monetary policy rules. He illustrates a fiscal policy rule by which the budget balance has a reaction to fluctuations in real GDP and inflation and discretionary policy shifts the parameters of the rule. When applied to U.S. data this methodology uncovers changes in fiscal policy regimes that may be related to the larger change in economic growth and fluctuation. A similar approach to Canadian experience is used here on an exploratory basis.

As a first step consider some issues raised in the estimation of the cyclically adjusted budget balance. It is an estimate of the budget balance that would occur if the economy were operating at potential output. Constructing such an estimate clearly involves two steps. One step is to establish some definition and estimate of potential output. The next step is to estimate

government revenues and expenditures at that level of output defined as potential output. This is the procedure followed by the Department of Finance to derive the estimates of cyclically adjusted balances published in the annual *Fiscal Reference Tables*, and presented in Figure 9 above. But there is considerable debate over the definition and estimation of potential output, and consequently over the interpretation of the resulting budget balance estimates. For example, Department of Finance estimates of potential output are made using a production function, input estimates and productivity estimates at full employment rates for labour and capacity utilization. By contrast, the estimates of potential output used by Taylor (1999) or Judd and Rudebusch (1998) are the values of real GDP derived by applying the Hodrick-Prescott filter to actual real GDP to derive a smoothed trend. The implication is that the economy operates, on average, at potential output. Alternatively, Fair (2001, P.70, fn 6.) reports a definition and calculation of potential output based on potential productivity and potential employment with both of these potential series derived from peak to peak interpolations. Kim and Nelson (1999) examine Friedman's "plucking" model of fluctuations which also views potential GDP as the peaks of cyclical variations. Different definitions of potential output will clearly result in different estimates of potential output and different cyclically adjusted government budget balances. These differences will occur in both the absolute values estimated and the changes in those values over time, raising questions about interpretation and the evaluation of discretionary fiscal actions on the basis this fiscal indicator.

Recognizing some of these issues Blanchard (1993) suggested an alternative approach. The objective is to discover the extent to which observed changes in the budget balance are changes induced by changes in economic activity as opposed to changes in discretionary policy introduced by the fiscal authority. The direct approach is then to estimate the response of the budget balance, or components of that balance, to variations in economic activity, thereby establishing first the cyclical component of the budget change. Discretionary or structural changes in the budget balance can then be derived as the residual change after the cyclical change has been removed. Using changes in the unemployment rate as measures of fluctuations in economic activity, and estimating the effect of variations in unemployment on the budget balance provides estimates of cyclical budget changes which can be treated as the automatic stabilization provided by the budget program. Taylor (2000) notes this approach is similar to that used by the Congressional Budget Office in the U.S. to calculate the structural (cyclically adjusted) budget balance by removing the estimated cyclical changes. Blanchard's methodology has been used by Kneebone and MacKenzie (1999) in their study of recent fiscal adjustments by governments in Canada. It is used here to provide an alternative to, and a comparison with, the cyclically adjusted balances published by the Department of Finance. The broader objective continues to be to identify fiscal regimes and the possible contributions of both discretionary and automatic fiscal policy to the growth and fluctuation in real GDP.

Cyclical and structural components of the Canadian federal government budget balance were derived from two estimations. In both cases the specification, following Blanchard (1993) and Kneebone and MacKenzie (1999) was:

$$RPBB = B_0 + b_1URM25 + b_2TREND + b_3D1975 + b_4D1980 + u$$

where the dependent variable is the federal government primary budget balance as a percent of nominal GDP. The independent variables are the unemployment rate for males aged 25 years and older, the trend in the primary budget balance as a percent of nominal GDP, and two dummies to reflect the shift in the budget balances observed in Figure 8 in 1975, and the change in GDP growth patterns in 1980, although the 1975 dummy was insignificant in the annual case. The parameter b_1 measures the effect of cyclical variations in economic activity on the budget balance. Estimation using quarterly, seasonally adjusted data at annual rates for the period 1961:1 to 2000:3 gives:

$$\begin{aligned} \text{RPBB} = & 1.663 - 0.3237\text{URM25} + 0.0987\text{TREND} - 0.5401\text{D1975} + 1.1914\text{D1980} \\ & (6.59) \quad (7.48) \quad (17.30) \quad (3.06) \quad (6.38) \\ \text{Adj } R^2 = & 0.85. \end{aligned}$$

Using annual data for the time period 1961 to 1999 gives:

$$\begin{aligned} \text{RPBB} = & 1.218 - 0.2867\text{URM25} + 1.0476\text{TREND} + 1.0646\text{D1980} \\ & (3.11) \quad (3.76) \quad (14.68) \quad (3.28) \\ \text{Adj } R^2 = & 0.87. \end{aligned}$$

These budget equations were then used to estimate the quarterly and annual structural or “unemployment adjusted” primary budget balances using the unemployment rate URM25 lagged one period in each case. The results are quarterly and annual estimates of the what the primary budget balance would have been if unemployment had remained constant at its value in the previous period. Changes in these estimates of “constant unemployment” budget balances from one period to the next are the results of discretionary changes in tax and expenditure policy. The “constant unemployment primary budget balance” (CUPBB) is a **structural budget balance** concept. It provides an indicator of discretionary policy that is different than, but comparable to, the “cyclically adjusted primary budget balance” (CAPBB) estimated by the Department of Finance.

Cyclical components of the federal government budget balance are derived using the estimates of the structural balances and the data on actual balances and simple budget identity such as:

$$\text{PBB} = \text{Structural balance} + \text{Cyclical balance}.$$

This gives two different but comparable measures of cyclical balances, namely:

$$\text{CBB1} = \text{RPBB} - \text{CUPBB}, \text{ and}$$

$$\text{CBB2} = \text{RPBB} - \text{CAPBB},$$

which differ in terms of the definitions and procedures used to estimate the structural balances of the discretionary fiscal policy program. These **cyclical budget balances** are used as indicators of the automatic stabilization influences that result from the effects of changes in economic activity on government revenues, expenditures and budget balances.

Figure 10 shows the structural and cyclical budget balances estimated quarterly using the unemployment rate as the indicator of the cyclical in economic activity. The pattern of discretionary policy as indicated by the structural balance is broadly consistent with that discussed above. Fiscal stability with structural surpluses until 1975. Fiscal activism or turmoil with fluctuating structural balances in the period 1975 to 1985, or to 1993 and then strongly rising structural surpluses in the last seven years. Cyclical balances were much more volatile as expected and illustrate the impacts of fluctuations in economic activity on the budget balance. The question to be considered below is the extent to which these movements in the structural and cyclical components of the budget balance were related to fluctuations in real GDP, and may have exerted a stabilizing influence on GDP.

Before turning to that question consider a comparison of the alternative estimates of structural and cyclical budget balances provided by the Department of Finance with those based on adjustment to constant unemployment. The Department of Finance estimates of the Cyclically Adjusted Primary Budget Balance are constructed on an annual basis and the comparison here is made with annual estimates of the Constant Unemployment Primary Budget Balance based on the annual budget function estimated above. The methodology for distinguishing between structural and cyclical components is as already discussed. Figure 11 provides a comparison of the two estimates of the annual structural balance. As indicators of discretionary fiscal policy the two structural balance estimates suggest the same broad pattern of fiscal activity, a pattern consistent with that discussed already on the basis of the quarterly estimates. From these data it appears reasonable to think in terms of three broad fiscal regimes: 1961-1974, 1975-1984 and 1985-1999. As before these were, respectively, times of fiscal stability and budget surplus, fiscal turmoil, deficits and rising debt and fiscal austerity to eliminate deficits and control debt. Different volatility between the budget estimates in Figure 11 reflect the different divisions of the total primary budget between structural (discretionary) and cyclical (induced) components. The Department of Finance estimates fluctuate more from year to year, suggesting a more activist policy stance than that suggested by the estimates based on adjustments for annual changes in unemployment rates. As a consequence automatic or cyclical variations in the budget are much smaller by Department of Finance estimates than by the alternative approach.

Taylor (2000) discusses the assessment of the stabilization effects of the government budget and its structural and cyclical components. To illustrate the relative importance of discretionary policy and automatic stabilizers in moving the budget balance over time he provides estimates of the responses of the total budget balance, and its structural and cyclical components to the GDP gap. Similar estimates for the Canadian federal government budget are presented in Table 4. These estimates, like Taylor's, are based on bivariate regressions using the output gap as the independent variable and the structural, cyclical and total budget balances derived from the methodologies discussed above as the dependent variables. The GDP gap is the percentage deviation of actual real GDP from the Hodrick- Prescott trend GDP used previously in the discussion of monetary policy and policy rules. (Taylor uses the U.S. Congressional Budget Office estimates of potential GDP in his analysis). In the case of the relationship between the structural balance and the GDP gap two estimates are reported. The first is based on a one period

lag in the gap to recognize the discretionary aspect of changes in the structural deficit as deliberate policy responses to economic conditions, which can only occur with a lag. The second estimate is the contemporaneous relationship between the gap and the structural balance which is a part of the overall relationship between the gap and the budget balance.

Table 4: Estimated Responses the Federal Government Budget Balance and Components to the GDP Gap 1961-2000

Sample Period	Structural		Cyclical	Total
	Gap(t-1) (a)	Gap (b)		
Part A: Quarterly Budget Data and Estimates (CUPBB):				
1961:1- 2000:3	0.26 (0.09)	0.26 (0.09)	0.02 (0.04)	0.29 (0.10)
1961:1 - 1974:4	0.07 (0.08)	0.06 (0.08)	0.12 (0.08)	0.18 (0.10)
1975:1 - 2000:3	0.31 (0.12)	0.31 (0.12)	- 0.01 (0.05)	0.31 (0.13)
1975:1 - 1984:4	0.20 (0.05)	0.16 (0.05)	0.05 (0.07)	0.21 (0.09)
1985:1 - 2000:3	0.20 (0.18)	0.23 (0.18)	0.06 (0.06)	0.17 (0.20)
Part B: Annual Budget Data and Estimates:				
i) Using Annual CUPBB:				
1962-1999	0.23 (0.19)	0.08 (0.20)	0.18 (0.08)	0.25 (0.22)
1962-1974	0.03 (0.22)	- 0.04 (0.22)	0.31 (0.20)	0.27 (0.23)
1975-1999	0.26 (0.25)	0.09 (0.26)	0.15 (0.08)	0.24 (0.28)
1975-1984	0.27 (0.11)	- 0.01 (0.15)	0.21 (0.13)	0.21 (0.20)
1985-1999	0.37 (1.10)	- 0.02 (0.39)	0.36 (0.11)	0.01 (0.42)
ii) Using Annual CAPBB:				
1962-1999	0.15 (0.32)	- 0.10 (0.32)	0.35 (0.12)	0.25 (0.22)
1962-1974	0.10 (0.21)	- 0.02 (0.20)	0.29 (0.16)	0.27 (0.23)
1975-1999	0.18 (0.43)	- 0.13 (0.43)	0.37 (0.16)	0.24 (0.28)
1975-1984	0.31 (0.26)	- 0.03 (0.28)	0.24 (0.11)	0.21 (0.20)
1985-1999	- 0.16 (0.63)	- 0.67 (0.62)	0.68 (0.23)	0.01 (0.42)

Note: Standard errors in parentheses.

Source: CUPBB estimated by author. CAPBB: Department of Finance, *Fiscal Reference Tables*, 1985 and 2000.

Three sets of estimates are presented in the table. The first is a set of quarterly estimates based on the quarterly constant unemployment rate primary budget balances, CUPBB as defined and discussed above. The second and third sets are annual estimates based on the CUPBB and the cyclically adjusted primary budget balance, CAPBB, from the Department of Finance. Absolute values of the estimated impact of the GDP gap and a comparison of the values derived from different methods are both of interest. The questions are: to what extent and in what way were primary budget balances affected by variations in the GDP gap, and were the effects primarily a result of discretionary reactions to the gap or automatic cyclical responses built into the components of the fiscal program? A very mixed set of results as presented in the table suggests ample room for further work on both the methodology used to identify the discretionary component of budget changes and the linkages between budgets and variations in GDP.

Consider first the quarterly estimates presented in Part A of the table. They suggest, in column (d), a significant positive relationship between the total primary budget balance and the GDP gap which would be a stabilizing influence on the economy over the entire sample period 1961:1 to 2000:3. It is of note however that this relationship is not significant in all the sub-period estimates reported. In particular, the effect is weak in the first part of the period 1961:1 to 1974:4, and much stronger and significant in the later 1975:1 to 2000:3 period. Furthermore, when that long second period is further divided into 1975:1- 1984:4 and 1985:1 to 2000:3 the significant link between the budget balance and the gap is only in the 1975:1 to 1984:4 period. After that, when the declared intent of policy was deficit and debt control rather than stabilization, the effect of the GDP gap on the budget balance is not significant. In terms of identifying fiscal policy regimes, the results of the previous descriptive approach are confirmed by these quantitative estimates which find a significant stabilizing relationship only in the 1975:1 to 1984:4 period. The other columns in the table (a) to (c) provide the breakdown of budget changes into changes in the structural budget balance and changes in the cyclical balance. By the methodology used here it appears that the changes in the total budget balance in response to variations in the GDP gap were predominantly changes in the structural balance. Cyclical changes are very small and provide no significant evidence of automatic stabilization. The important indication of a change in policy regimes appears to have been in the 1975:1 to 1984:4 period when the change in the structural balance in response to the gap is much larger and more significant than in preceding or subsequent periods.

Part B of Table 4 presents estimates of the effects of the GDP gap on the primary budget balance based on annual data, and compares the results of using two different methodologies used to separate the structural and cyclical components of these effects. Starting again with column (d), it is of note that the estimated effects of variations in the GDP gap on the total primary balance are positive and smaller than those observed on the basis of quarterly data, but more importantly the standard errors are large. Indeed the estimated effect of variations in the gap on the total budget balance is not significant in any of the time periods reported. The other columns in the table report estimates on the effects of the GDP gap on the structural and cyclical components. Different methods result in different separations of these component effects. The structural balance estimated on the basis of constant unemployment rates, CUPBB, is more responsive and the cyclical balance less responsive to gap variations than those estimated on the basis of the Department of Finance's cyclically adjusted balance, CAPBB. Apart from that the general results are quite similar. Responses of the structural balance to variations in the gap, even with a one year lag on the gap, are not significant with the exception of the estimate for the period 1975-

1984 under the CUPBB in Part B(i) of the table, but the perverse negative coefficient on this balance under the CAPBB, 1985-1999 is of particular note. On the other hand, the cyclical component of the budget balance responded positively and significantly to the GDP gap for both estimates of that budget component, suggesting strong automatic stabilization over the entire sample period and particularly in the last sub-period, 1985-1999, when announced discretionary policy objectives were deficit and debt control, and the coefficient on the structural deficit had switched to a perverse negative value. In more general terms these annual evaluations of the primary budget balance and its components seem again to suggest a change in fiscal regimes in 1974 and again in 1985. They also suggest significant automatic stabilization through the cyclical component of the budget throughout the entire 1961-1999 sample period.

Finally, it is of note that these results based on Canadian data and the concepts described here differ with the results reported by Taylor (2000). He finds, for U.S. data from 1960:1 to 1999:3, a strong significant positive response of the total budget balance to the GDP gap, albeit with the gap defined in a different way. This response indicates a large cyclical effect and a very small structural balance effect in the U.S. budget. A division of the sample period at 1982:4 gave results that indicate perverse discretionary policy in the early part of the period with a significant negative coefficient on the structural balance. By contrast, after 1982:4 the coefficient on the structural balance was large, positive and significant suggesting effective discretionary stabilization policy. This appears to indicate a clear shift in the U.S. fiscal policy regime which combined strong stabilizing responses in both structural and cyclical components of the budget, with higher coefficients on the cyclical balance than those reported for Canada in Table 4, and thus stronger built in stabilization. Differences between Taylor's results and those presented here, together with the differences in Canadian results based on alternative methodologies, identify a need for a more detailed examination of the approaches used to identify and evaluate fiscal policy programs.

In summary, however, it appears reasonable to think in terms of three broad fiscal regimes: 1961-1974, 1975-1984 and 1984-1999. As before these were, respectively, times of fiscal stability and budget surplus, fiscal turmoil, deficits and rising debt, and fiscal austerity to eliminate deficits and control debt. The relationship between these fiscal regimes and the observations on growth and fluctuations in real GDP, in broad terms, suggests that the focus on growth and full employment in the first two regimes coincided with the period of higher and more stable growth from 1961 to 1981. Average growth rates did decline in the latter part of this period and concerns about both inflation and fiscal deficits increased. After 1981, when deficits and the control of the public debt ratio displaced full employment and growth as proximate objectives of fiscal policy, growth in real GDP was lower on average and much more volatile. These observations provide a basis for further work on both the methodology for the analysis of fiscal policy and the impact of fiscal policy on growth and fluctuations in Canada over time, and in Canada as compared to other countries.

6. Summary and Concluding Observations:

Growth and fluctuations in the growth rates of Canadian real GDP over the past forty years raise a number of interesting topics for further study. The objective of this paper was to examine this growth experience as a background and context for the more focused study of specific issues. Two general observations led to further questions about economic experience and policy. First,

there was a break in the pattern of growth and fluctuations in Canadian real GDP that resulted in lower but more volatile growth rates in the last twenty years as compared to the first twenty years of the 1961-2000 time period. Second, while there was also a break in the pattern of growth and fluctuations in U.S. real GDP at about the same time, U.S. growth rates in contrast to Canadian growth rates were higher and more stable in the last twenty years than in the preceding twenty years. These observations call for a detailed examination of the time series properties of Canadian GDP growth to establish with more precision the timing and the magnitude of the change in the growth pattern, and to explore the time series properties of the growth in the components of real GDP. The objective would be to discover the sources of the changes in growth rates and the volatility of growth rates. Recent studies of these same questions in the U.S. provide both an initial set of methodologies and a basis for a comparison of Canadian and U.S. experience. Extending that analysis to a broader set of OECD countries would extend the comparisons and perhaps provide further insight into that underlying processes.

Observed changes in the patterns of growth lead to questions about the role played by policy in the growth experience. A preliminary examination of Canadian monetary policy leads to the observation that changes in the patterns of growth were coincident with shifts in monetary policy regimes. A set of more difficult questions arises from that observation including questions about methodologies used to identify monetary policy and policy changes, and methodologies used to evaluate the impact of monetary policy on GDP growth. Observations on fiscal policy raise similar issues. There were clear shifts in the declared objectives of fiscal or budgetary policy over the period, but the direction and impact of fiscal actions was more obscure. Extracting information about fiscal policy from budget data remains an area for research, particularly with respect to the identification of structural and cyclical components of changes in budget balances. That is an essential first step in an analysis of the impact of policy programs and changes in policy programs on GDP growth. Furthermore, preliminary observations raise questions about the stabilization role played by changes in government budget balances over this period in Canada, and in comparison with the U.S. experience. Some recent work on the U.S. experience argues that policy changes have been the major source or cause of fluctuations in U.S. growth rates. What would a more detailed analysis of Canadian experience show?

Further work on policy and growth in Canada involves some important developments in methodology that extend beyond the work on the U.S. economy. The most obvious of these is the need to examine policy in the context of a small open economy in which exchange rate policy has an important role to play. Current work that extends, for example, Taylor rules for monetary policy is an important step in this direction. In addition, there are important questions about the potential stabilizing or destabilizing effects implementing monetary policy through short term interest rates and inflation targets in small open economies with flexible exchange rates, about interactions between monetary policy and fiscal policy rules and targets, and about the implications of the choice of the fiscal policy instruments, tax changes versus expenditure changes, used to pursue fiscal objectives. An examination of recent Canadian experience offers the opportunity to explore these issues in some detail along with the larger questions about the sources of the change in patterns of growth and fluctuations over the 1961-2000 time period. This paper provides a background to more detailed and intensive study of all these questions.

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Figure 1: Canadian Real GDP Growth Rates (Quarterly at annual rates)

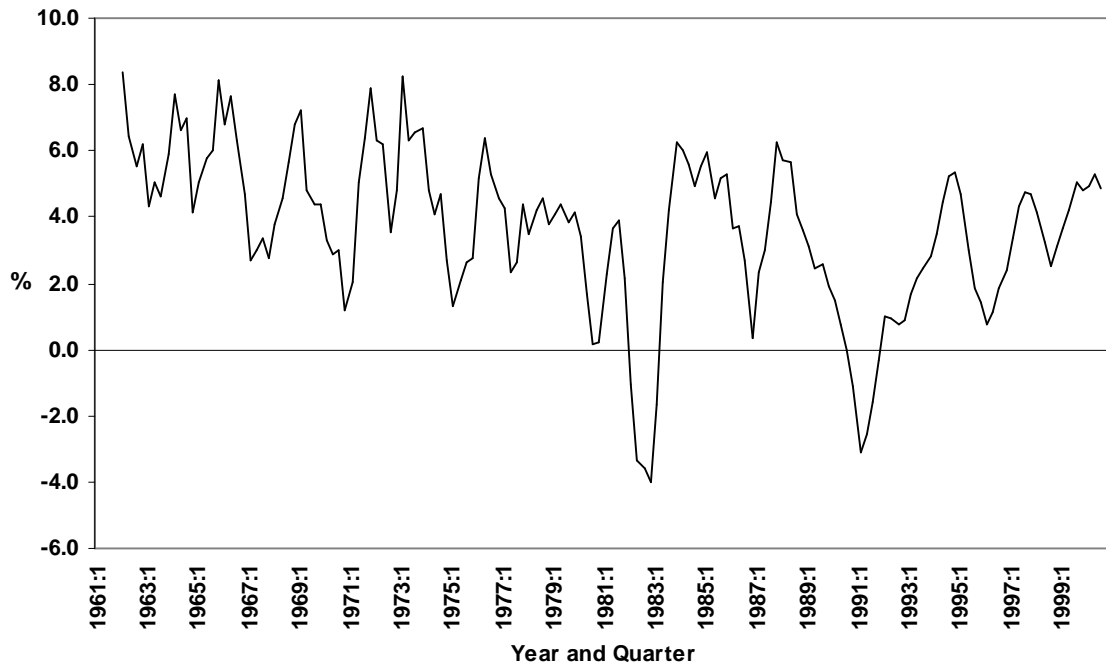


Figure 2: Trend Real GDP, Actual Real GDP & GDP Gap: Canada 1961:1-2000:3

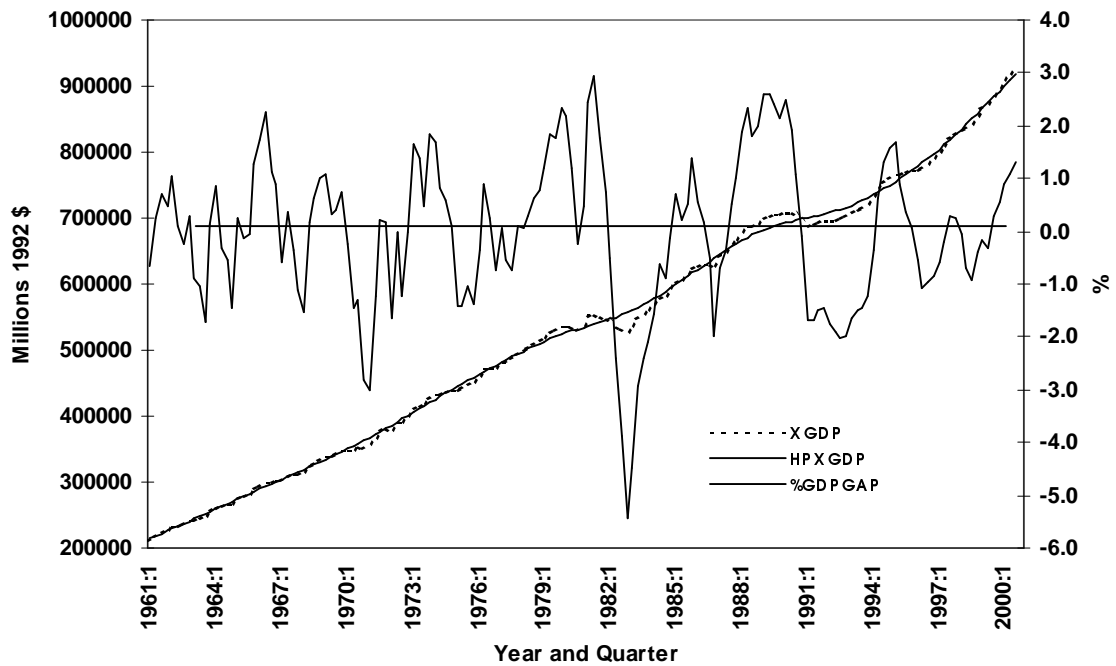


Figure 3: Trend Real GDP, Actual Real GDP & GDP Gap: U.S. 1961:1 - 2000:3

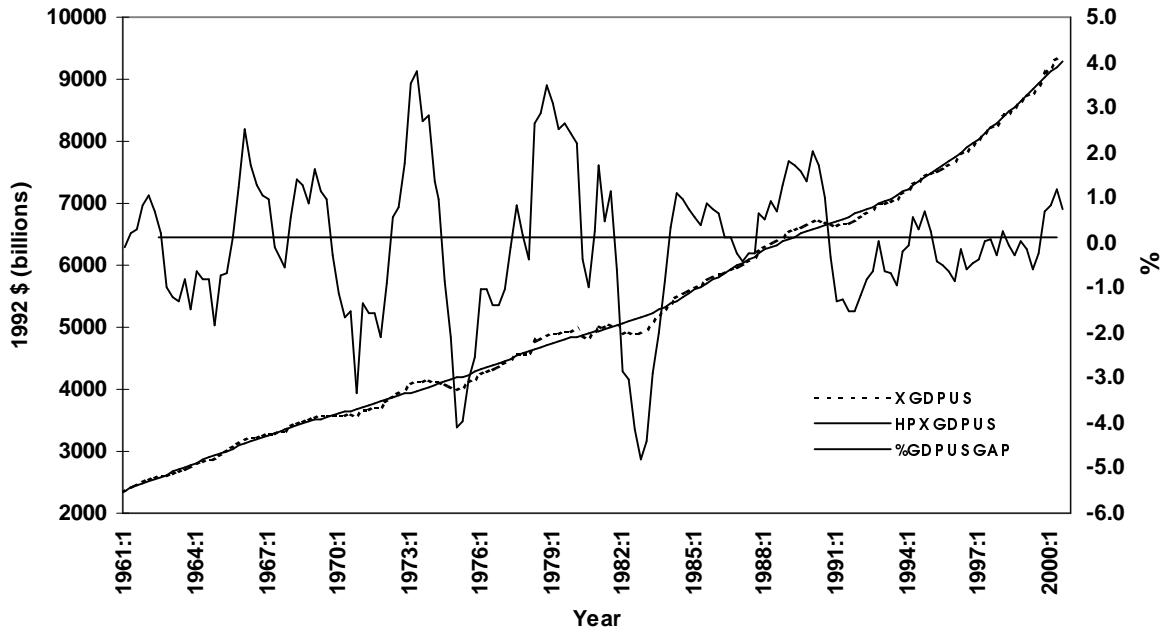


Figure 4: The Real Overnight Interest Rate in Canada: 1962:1 - 2000:3

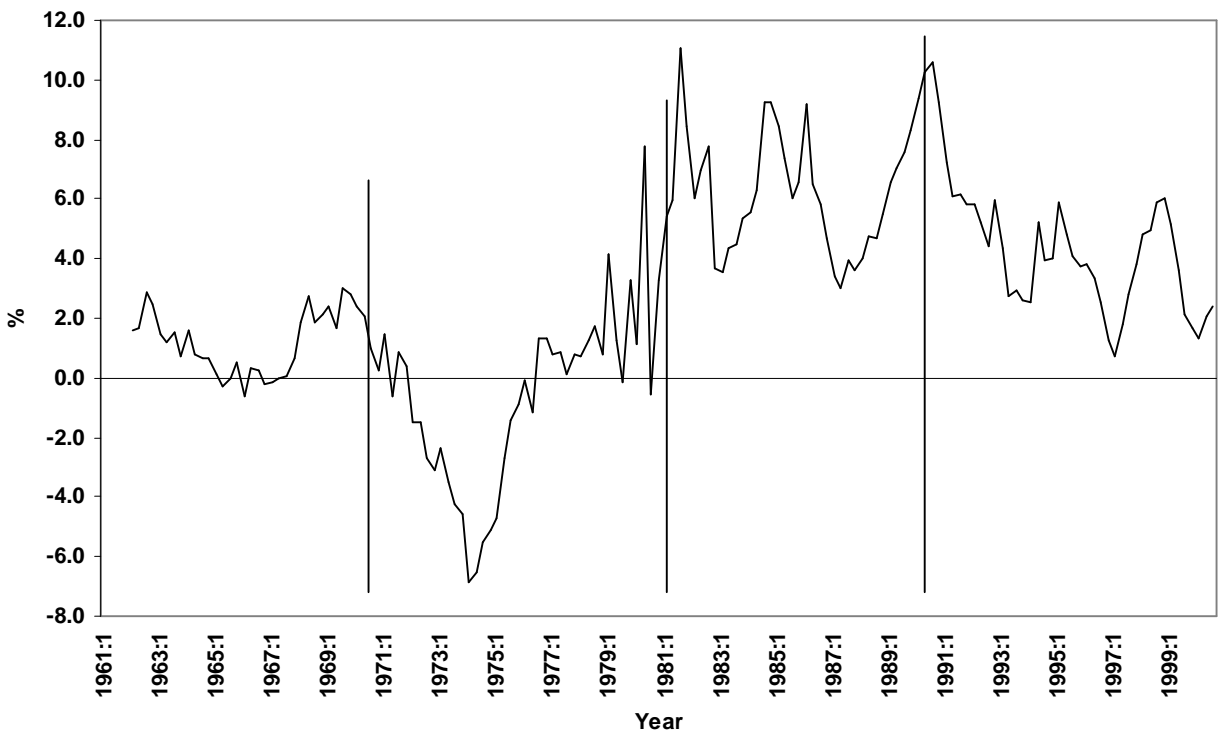


Figure 5: A Nominal Monetary Conditions Index (1970:1 = 0)

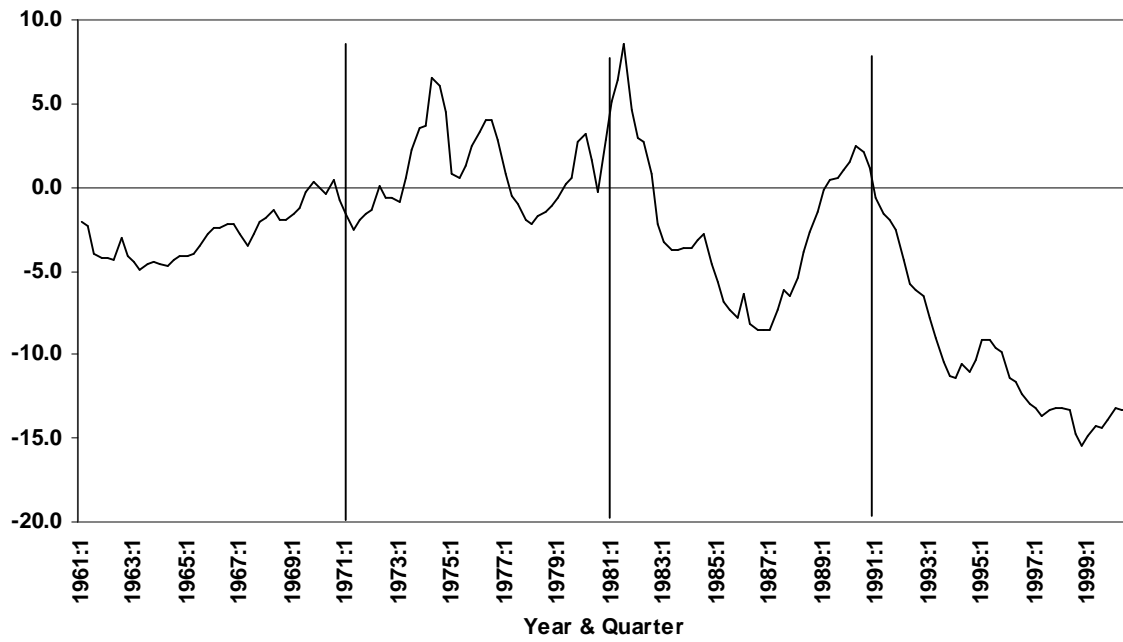


Figure 6: A Real Monetary Conditions Index (1971:1 = 0)

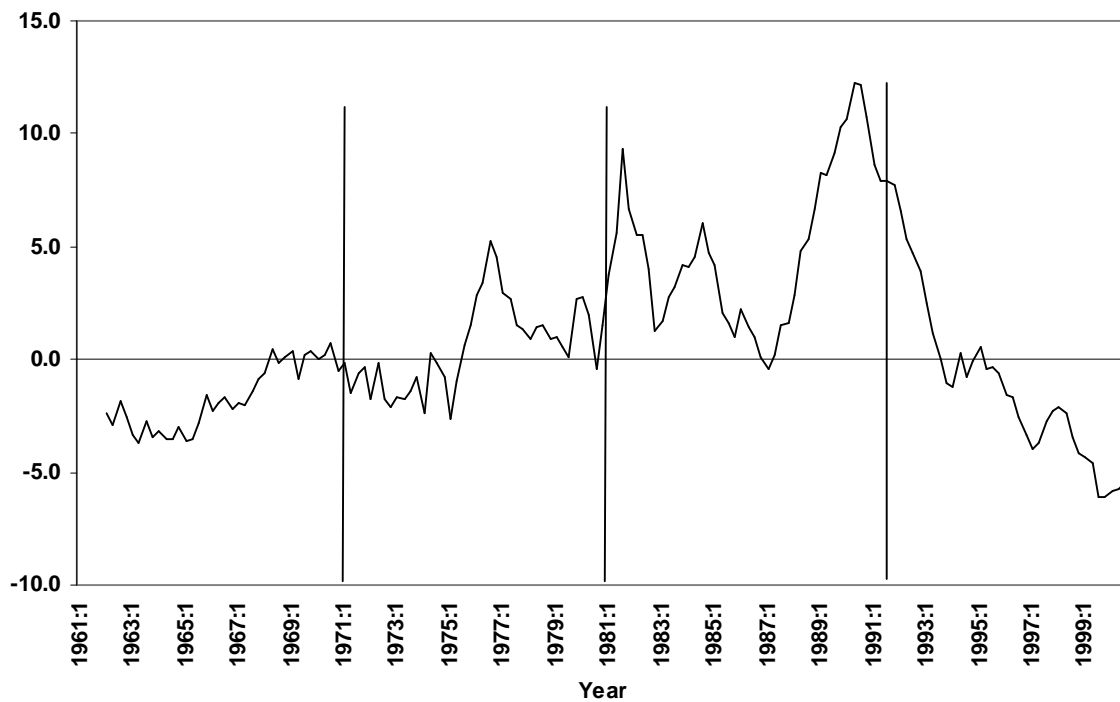


Figure 7: Nominal Overnight Interest Rates: Actual Values and Taylor Rule Compared

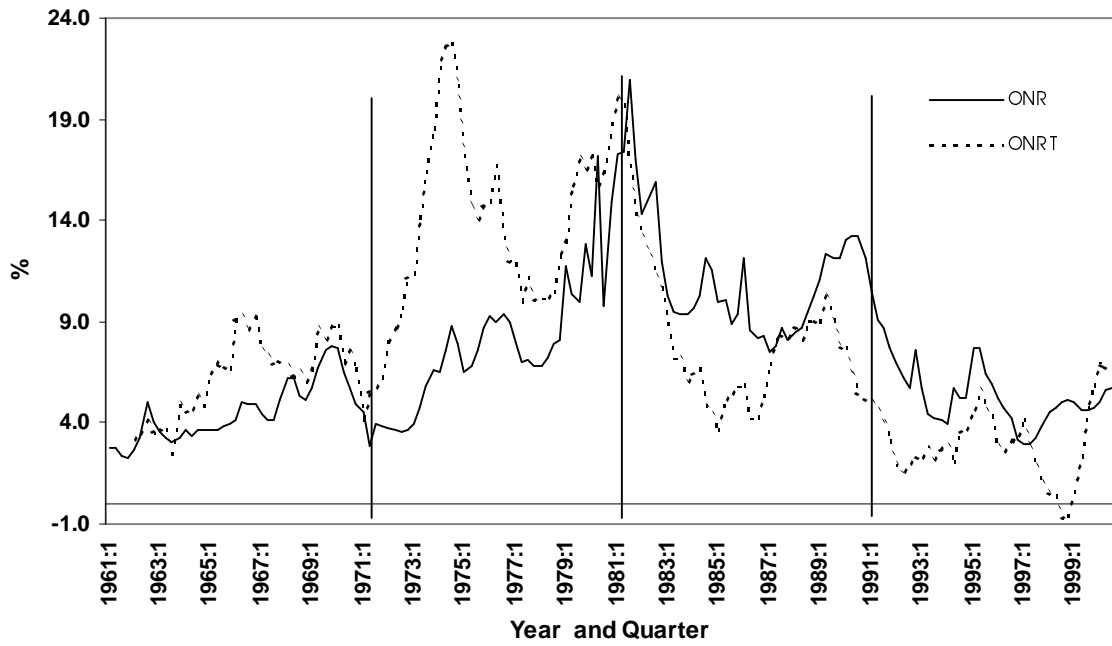


Figure 8: Federal Govt Primary Budget Balance (%GDP)

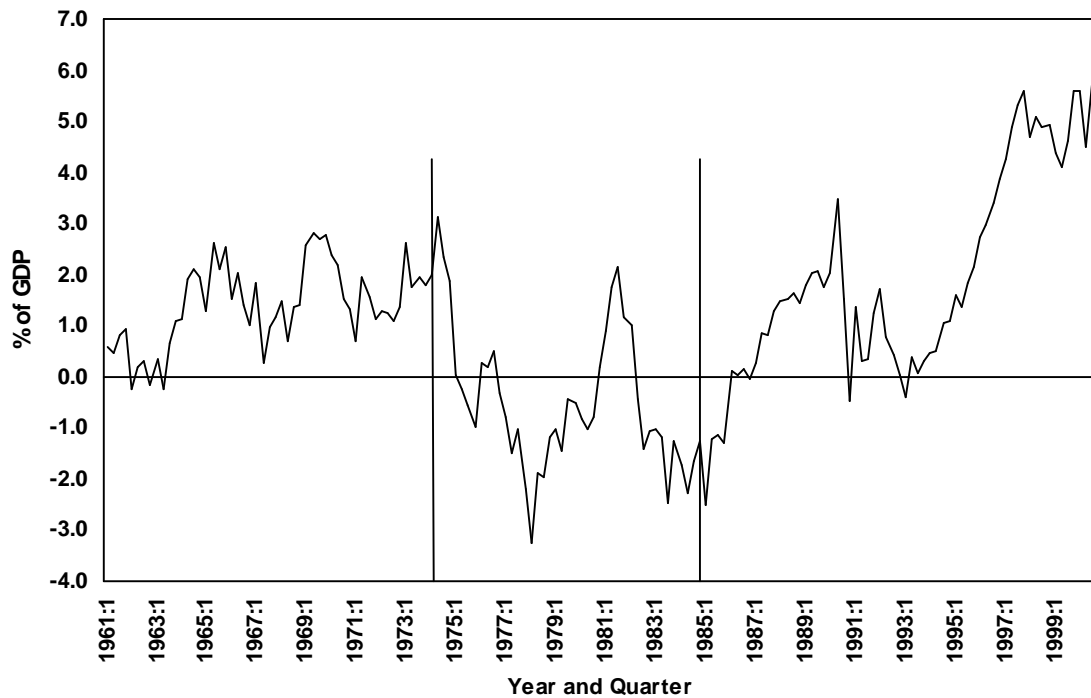


Figure 9: Federal Govt Cyclically Adjusted Primary Budget Balance (% GDP)

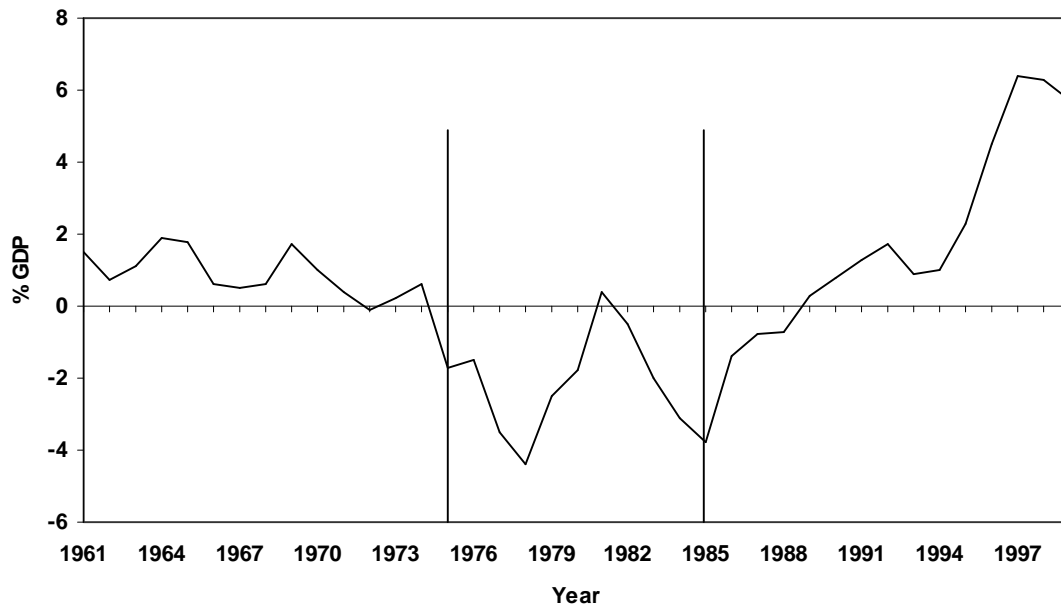


Figure 10: Constant Unemployment and Cyclical Primary Budget Balances (%GDP)

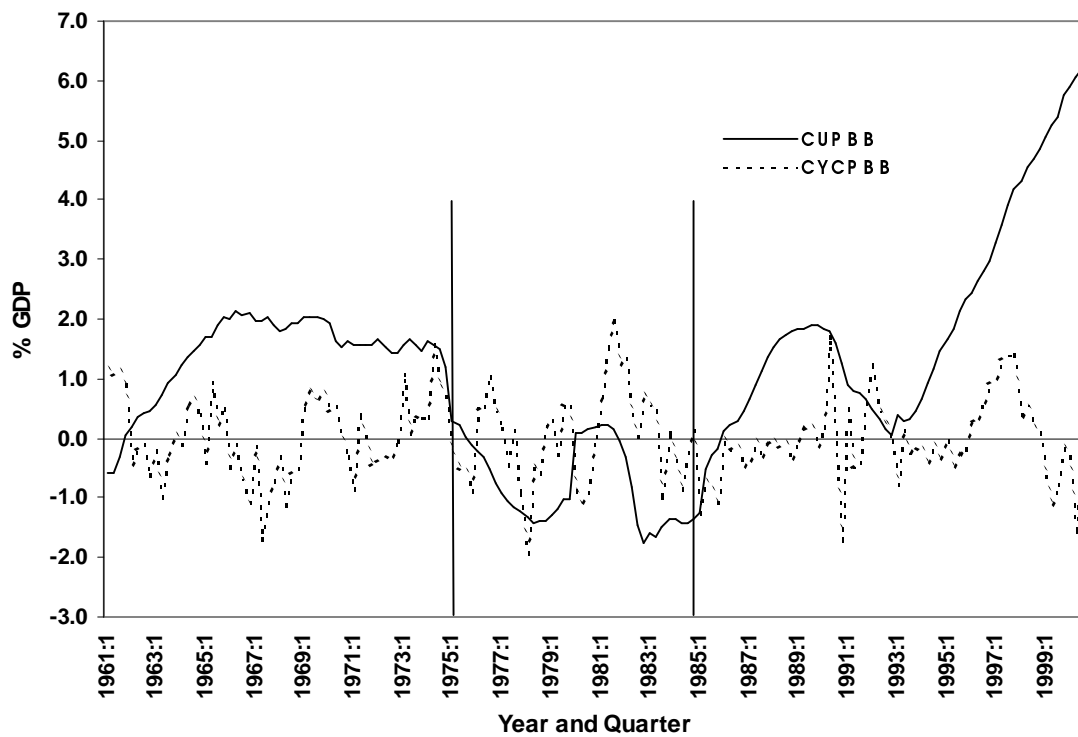


Figure 11: Comparison of Cyclically Adjusted and Constant Unemployment Primary Budget Balances (% GDP)

