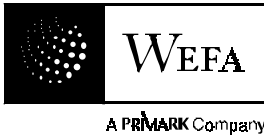


May 1999



THE CANADIAN DOLLAR: WHY DO SUCH BAD THINGS HAPPEN IN SUCH A GOOD ECONOMY?

Dale Orr

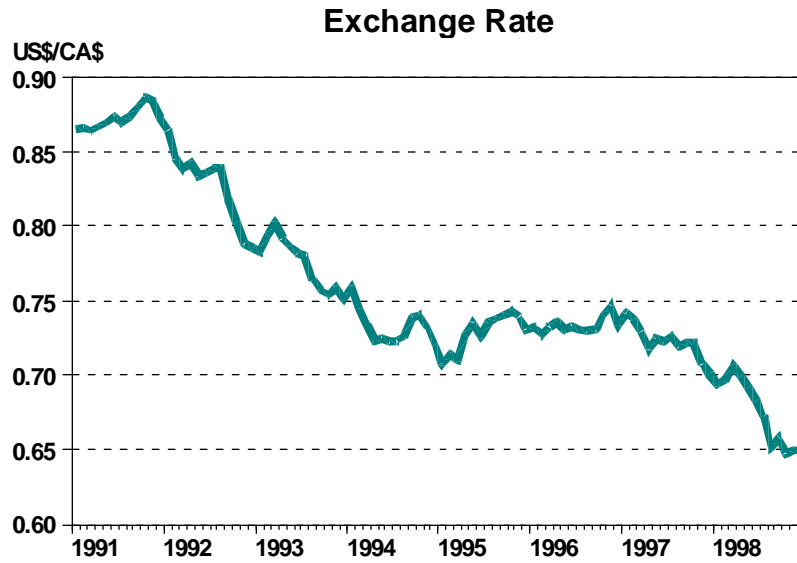
Since late 1991 the Canadian dollar has fallen from 88 cents U.S. to 65 cents. When we examine the economic fundamentals which normally explain movements in exchange rates we would not expect this sharp and rather steady decline in the value of the Canadian dollar. Most importantly, Canadian inflation has been below U.S. inflation every year since 1991. This paper examines this apparent anomaly in performance, and offers some reasons that may explain this weakness in the Canadian dollar.

Even in retrospect it is difficult to understand why the Canadian dollar came under such heavy pressure over the 1992 – 1998 period.. Our inflation performance was very good, exports were strong, and commodity prices were rising for most of the period. Obviously the economic fundamentals were overwhelmed by concerns over government debt, weak interest rate spreads and the fact that the U.S. dollar was in heavy demand. The Bank of Canada opted not to raise interest rates sufficiently to maintain the value of the dollar, giving priority to reducing the output gap. Expansionary fiscal policy could not step in to compensate for higher interest rates because the debt burden was too high and rising.

The Canadian Dollar Has Been Very Weak, Especially Considering Canada's Economic Performance

During many trading days of July and August 1998 the Canadian dollar reached its lowest level since being introduced into circulation in 1858. Finally on August 27, 1998 the Canadian dollar reached an all-time low of 63.1 cents U.S. While other major currencies also had periods of extreme weakness in 1998, the Canadian dollar was unique. Over the past year as well as over the past eight years, the Canadian dollar has not only been weak relative to the U.S. dollar, it has been virtually the weakest of all major currencies. Because the previous peak for the Canadian dollar was about 89 cents U.S. in October 1991, this paper focuses the performance of the Canadian dollar over the 1992 to 1998 period.

Figure 1



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Figure 2

Performance of Canadian Dollar Relative to Major Currencies

	% Change 1991 – 1998 (Year End)
U.S.	-27
France	-16
Germany	-14
Italy	12
U.K.	-10
Japan	-24
Australia	-4
Export Wtd.	-24

This weakness in Canada's currency would not be surprising if Canada's economic performance had also been weak. However, since 1991 Canada's economic performance has been reasonably strong.

Over the 1992 – 1998 period the Canadian economy has had:

- Economic growth at about the long term equilibrium level (avg. 2.8%)
- Productivity almost as good as the Americans (1.3% avg. vs. 1.7%)
- Inflation much better than the Americans (1.4% avg. vs. 2.6%)
- Strong export performance (10% avg. real growth, net export surplus 6 of 7 years)

- A steadily falling unemployment rate
- Credible progress in getting its fiscal house in order

This paper selects a “previous peak” as its starting point for the analysis, and initially highlights the apparent anomalies in an attempt to emphasize that fundamental economic forces do not provide a strong explanation of the Canadian dollar over recent years. A strong argument can be made that the Canadian dollar was “overvalued” due to the tightening of monetary policy over the previous years. Following the construction of this puzzle several reasonable explanations will be provided which will put the reader somewhat, but not entirely, at ease. It is the conclusion of this paper however that:

- the fundamental economic conditions which explained the performance of the Canadian dollar in previous decades are not as reliable in explaining the performance of the dollar over the 1990’s.
- even when we muster all of our knowledge together, the Canadian dollar can be expected to move significantly off-course from the best forecasts for reasonably long periods of time.

The Basic Economics of Exchange Rate Determination

Of course the value of the Canadian dollar is determined by the demand for Canadian dollars, as represented by exports and capital inflows, and the supply of Canadian dollars as represented by imports and capital outflows. While flows of trade are important, flows of capital are more important and becoming increasingly important. The amount of Canadian currency exchanged in world currency markets is about 13 times the total receipts and payments for Canadian traded goods and services transacted each working day. What makes exchange rates volatile and difficult to forecast is that, to an increasing degree, capital flows between countries are based on expectations of economic and financial performance. Therefore, understanding exchange rate movements and forecasting exchange rates is increasingly an issue of understanding why foreign investor’s confidence in an economy changes, prompting them to buy or sell a currency.

Obviously over the longer term if expectations are not fulfilled or are based on misinformation, they must, and they will move towards reality. The long run equilibrium value of the exchange rate is based on the economic fundamentals. However, at any point in time the value of the Canadian dollar can be, and is, heavily influenced by the views of traders on the future strength of the Canadian economy.

As part of the basic economics of exchange rate determination it is also important to keep in mind that the Canadian dollar is a relative price. That is the value of the Canadian dollar, as most often and most importantly expressed in terms of U.S. dollars, is determined not only by what happens in Canada, it is also determined by factors that impact the confidence of foreign investors in the U.S. economy.

This analysis, in an effort to emphasize a point, focuses on a “peak (late 1991 at 89 cents) to trough (late 1998 at 65 cents). It can be argued that the Canadian dollar was “overvalued” in late 1991 and “undervalued” in late 1998. That is, had nothing changed with respect to any of the economic fundamentals at these times, traders would have moved the dollar closer to the long run equilibrium value over the coming months. The dollar averaged 86 cents over the 1989-1991 period and 71 cents over the 1996-1998 period. Therefore, even if the dollar was overvalued by a penny or so at 89 cents in late 1991 and undervalued by a penny or so in late 1998, the fundamental issues and analysis still remain.

The fundamental economic factors which are expected to determine the performance of a currency over the medium term are:

- relative rates of inflation
- terms of trade
- relative productivity
- fiscal performance
- political stability
- interest rate spreads

Under a flexible exchange rate policy, the Bank of Canada can, at least theoretically and within a reasonable range, increase the spread of Canadian interest rates over U.S. rates sufficiently to prevent the dollar from falling. Therefore the examination of why the Canadian dollar fell from 89 cents down to 65 cents over the 1992 to 1998 period can really be addressed in two steps. First, given Canada’s reasonably strong economic performance over the 1992 – 1998 period why did the Canadian dollar come under such unrelenting and severe downward pressure? Second, given that the Canadian dollar did come under severe and unrelenting pressure over the 1992 – 1998 period, why didn’t the Bank of Canada increase interest rates more often and more sharply to prevent the dollar from falling?

Why Did the Canadian Dollar Come Under Severe Pressure?

In this section we examine those fundamental economic factors which are normally thought to be the most important determinants of the exchange rate. Recall from above that the value of the Canadian dollar is determined, not by the performance of the Canadian economy relative to any historical standards, but by the performance of the Canadian economy relative to the U.S. economy. To be even more precise, since the value of the exchange rate is set increasingly by traders in financial markets, the exchange rate is determined by the expectations of the performance of Canadian economic and financial markets relative to their American counterparts.

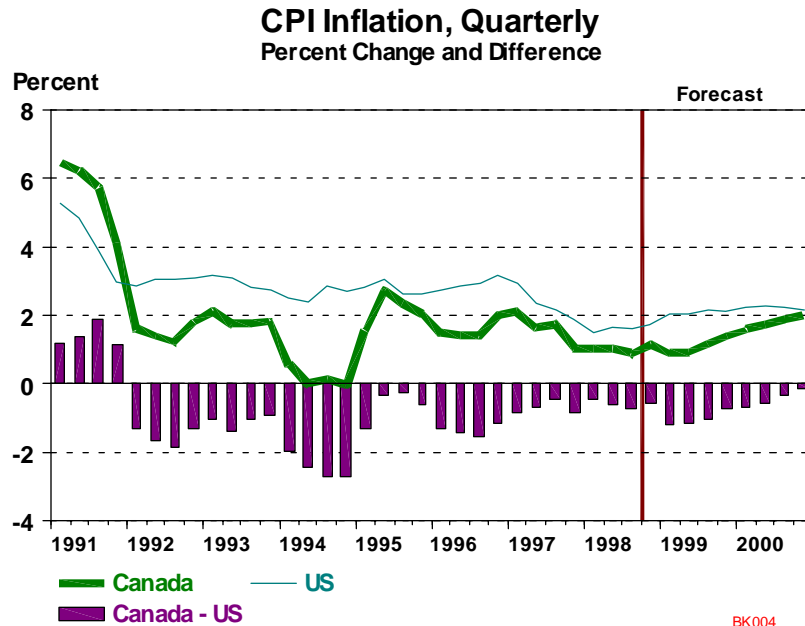
This analysis focuses on understanding the determinants of the exchange rate over the 1990's for the purpose of forecasting its value over the medium term. It is distinctly possible that some factors that were important in determining the value of the Canadian dollar in previous decades are now less influential. Before proceeding to examine the economic factors it must also be recognized that the determination of the exchange rate is obviously a multivariate relationship. That is, even where a strong and reliable positive relationship between the exchange rate and some other determinant exists, the exchange rate may well move in the opposite direction for some short periods of time due to some other factor.

Inflation

If Canada had more inflation than the U.S. - and these inflationary expectations are built in - this would put downward pressure on the Canadian dollar. Historically, over the 1972 – 1998 period the U.S. outperformed Canada on inflation, offering a partial explanation for the falling Canadian dollar over this historical period. As expected therefore differences in inflation rates do provide a reasonable explanation of exchange rate movements over the past 25 years. This analysis is documented in McCallum, August and September 1998.

The Bank of Canada began tightening monetary policy about 1989 and in 1991 the Government of Canada adopted inflation targets as the key guiding principal for monetary policy. Since 1991 the Bank of Canada has been very successful in keeping inflation, specifically "core" inflation, within the target band, which currently is 1% – 3%. Inflation has been lower in Canada than in the U.S. each year since 1991. Since 1991 the CPI in Canada has risen only 10% points cumulative compared to over 18% in the U.S. These inflationary expectations have now been built in. Inflation in Canada is expected to continue to be lower than in the U.S. for the next several years as well.

Figure 3



Therefore, on the basis of Canada's inflation performance we would have expected the Canadian dollar to have risen since 1991, rather than to have fallen. At this point inflation forecasts should be expected to provide slight upward pressures on the Canadian dollar.

Terms of Trade, Commodity Prices

If the prices of the goods which you export are not rising as fast as the prices of the goods you import – this can put downward pressure on the exchange rate. To be more precise, changes in our terms of trade relative to changes in the U.S. terms of trade, are a fundamental determinant of the exchange rate.

Over the 1992 – 1998 period the terms of trade have turned only slightly against Canada. Our export price deflator has increased 17%, whereas our import price deflator has increased 20%. These averages do conceal some significant movements over the period

These price deflators are themselves influenced by changes in the value of the exchange rate so they provide an incomplete indication of the impact of the terms of trade on the exchange rate. It is therefore important to supplement this measure by an examination of movements in commodity prices in U.S. dollars. Since over 80% of our imports as well as our exports are with the U.S., we expect this data to generally be reflective of the change in our terms of trade relative to the U.S. It nevertheless

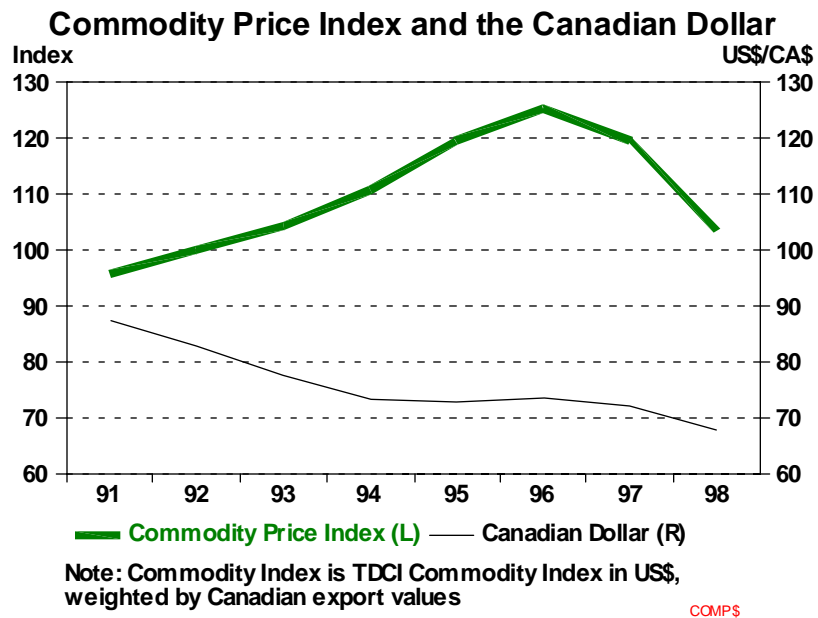
appears that the terms of trade provide only a partial explanation of the fall in the value of the Canadian dollar over the 1992 – 1998 period.

Commodities comprise just over 30% of Canada’s merchandise exports. Due to falling commodity prices and increasing exports of manufactured goods, commodity exports now account for a smaller fraction of Canada’s exports than in 1992. However, because exports have been a rapidly rising fraction of GDP, commodities exports have been a rising fraction of Canada’s GDP since 1992.

The exchange rate models of the Bank of Canada treat energy prices separately from other commodity prices, for reasons that can and should be the subject of discussion. Over the much longer term (1972 – 1998) changes in commodity prices (real terms - excl. energy, 1972 – 1997) provide a good explanation for changes in the value of the Canadian dollar (see Bank of Canada 1995 and see John McCallum, 1998). Therefore changes in commodity prices, when judiciously defined, can provide a reasonable amount of explanatory power to changes in the value of the Canadian dollar over the past 25 years.

However movements in the Canadian dollar can – and do - depart from commodity prices. Specifically, commodity prices in U.S. dollars weighted by Canadian exports, rose significantly and steadily by 30% over the 1992 – 1996 period. At the same time the Canadian dollar fell sharply and steadily from 89 cents in 1991 to 73 cents in 1996. Therefore, while the price of our commodity exports was increasing steadily and significantly for five years in a row, even in real terms, the Canadian dollar fell by 16%.

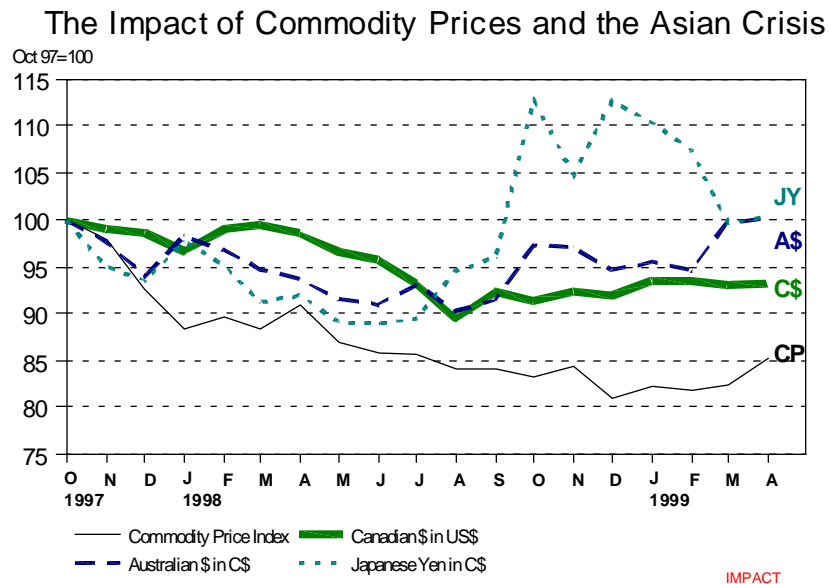
Figure 4



Since the onset of the Asian crisis in late 1997, changes in the value of the Canadian dollar have been much more correlated to changes in commodity prices. From the time the commodity price index began its descent in October 1997 to the end of 1998 the commodity price index fell by 23% while the Canadian dollar fell by 11.2%. In 1999, the 5.4% increase in commodity prices has been matched with a 3.5% increase in the Canadian dollar.

We must be careful in attributing the fall in the value of the Canadian dollar since mid 1997 to the fall in commodity prices and the Asian crisis. Australia is much more dependent on commodity exports than Canada, particularly more dependent than Canada on exports of commodities as well as other goods and services to Asia. The impacts of the Asian crisis are often identified as beginning in October 1997 following the devaluation of the Thai baht in July 1997. That is when commodity prices began their sharp descent. The Australian dollar did fall sharply relative to the Canadian dollar over the October 1997 to August 1998 period, but had virtually regained its October 1997 value by late 1998. Japan has suffered severe recession since October 1997. However, by late 1998 the yen had more than recovered the value lost to the Canadian dollar since October 1997.

Figure 5



If the principal factors driving down the value of the Canadian dollar since late 1997 have been the Asian crisis and the fall in commodity prices, why hasn't the Canadian dollar performed better relative to the Australian dollar and the Japanese yen over this period? The fact that Canadian interest rate spreads, Canadian inflation performance and debt performance were all supportive of a stronger dollar over this period, emphasizes

the challenge in explaining why “such bad things happen to the currency of such a good economy.”

I therefore conclude that attributing changes in the value of the Canadian dollar to commodity prices requires a judicious selection of commodity index and a judicious selection of time period. I am very uneasy with an explanation of the determinants of the exchange rate which relies heavily on the 1970's and 1980's and fits much less well in the 1990's. Accepting the conclusion that there is a generally positive relationship between commodity prices and the Canadian dollar over the 1972 –1998 period, we must question the meaning, the interpretation and indeed the value, of this conclusion when commodity prices and the Canadian dollar can – and indeed have - moved sharply in the opposite direction for five years in a row. Especially when this applies to five of the past seven years. Japan and Australia, countries at the heart of the commodity price collapse and the Asian crisis, have fully recovered their losses in value to the Canadian dollar.

I conclude that the relationship between commodity prices and the Canadian dollar is a complex. Neither currency traders, nor some Canadian experts really understand this relationship. It is most important to note that the Canadian dollar can and has (1992 – 1996) moved in the opposite direction of commodity prices for rather lengthy periods of time.

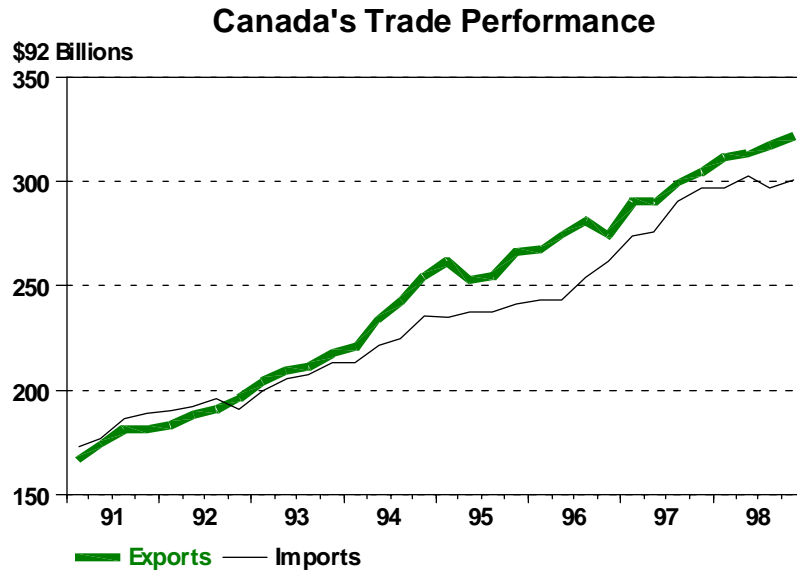
Real Economic Performance

Most economists would expect that the exchange rate of a “well performing” economy should appreciate. That is, if Canadian productivity keeps up to that in the U.S. then we should be able to maintain our competitiveness and our net export position. The exports should keep up the value of the dollar, and lead to economic growth. The economic growth should lead to capital inflows, increased confidence in the economy and further capital inflows.

Canada's productivity at the aggregate level (Real GDP/hours worked) has not quite kept up to the U.S. over the 1992 – 1998 period (.90% avg. vs. 1.18%). However our exports have increased sharply, particularly to the U.S. We have run a merchandise trade surplus every year since 1991 except for 1992.

Export growth has lead economic growth every year. Over the 1992 – 1998 period cumulatively exports grew 70% in real terms compared to GDP growth of 20%. In spite of this leadership by exports, economic growth has not been quite as strong as in the U.S. (2.8% avg. vs. 3.4%)

Figure 6



It is of course true that to some extent our export strength is the result of the fact that the Canadian dollar has fallen, making our exports more competitive. Note however that over the four year period 1994 – 1997 inclusive the Canadian dollar was very stable in the 73 cent range. Over this four year period our strong export performance was maintained. Exports exceeded imports and grew more rapidly than GDP in each of these years while the dollar was stable. Our strong export performance is one normally associated with countries whose currencies are rising in value.

Canada's economic performance "on the real side of the economy " over the 1992 – 1998 period has been reasonably strong. However, given the 1991 – 1992 recession, and the output gap which has persisted since then, there was clearly scope for more stimulative fiscal and monetary policy. Even today, after a steady six year decline in the unemployment rate, an output gap in the 1% - 2% range still remains.

Economic growth could have, and perhaps should have, been stronger over the 1992 – 1998 period, particularly coming out of the 1991-1992 recession. However given this performance on the real side of the economy, particularly our export performance, economists would not have expected downward pressures on the Canadian dollar.

Debt

High and increasing levels of government debt can put downward pressures on the dollar through several different avenues. First, as government debt increases, rising interest payments to foreigners on debt requires an increasing trade surplus to finance it, putting downward pres-

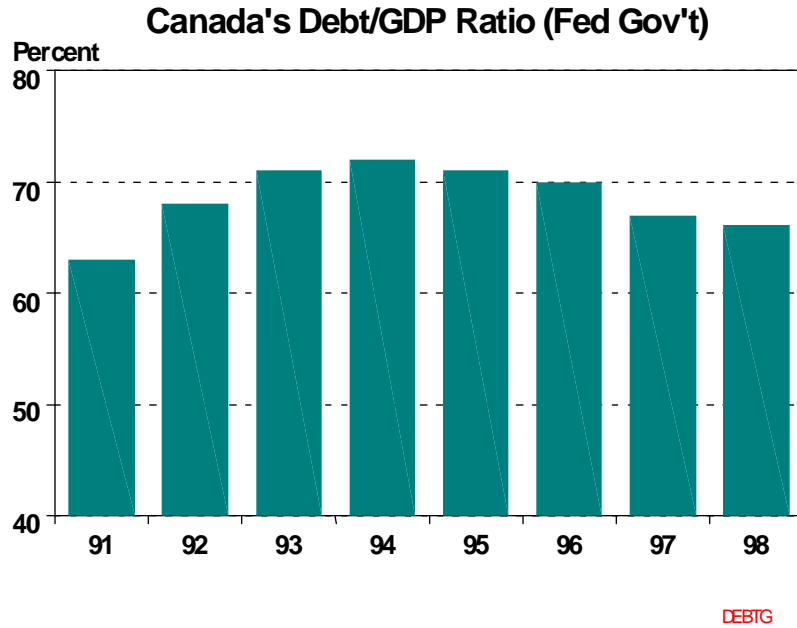
tures on the dollar. Second, at a given nominal interest rate, as government debt rises, international investors require a larger interest rate premium. If this is not forthcoming, capital inflows fall, providing downward pressure on the dollar. Third, when a government has a very high level of debt, an increase in interest rates to defend the dollar will result in increased debt charges. An increase in debt charges further constrains fiscal flexibility and can cause the government to miss its deficit reduction target.

This analysis indicates the relationship between the debt/GDP ratio and the exchange rate is not monotonic. That is, the debt /GDP ratio has an indirect, depressing impact on the exchange rate when the debt/GDP ratio moves beyond an "acceptable" level. The "acceptable" level is a function of several factors, most obviously Canada's debt/GDP ratio relative to other countries with whom we are competing for international capital. Another important factor behind the aggregate debt/GDP ratio is the fraction of the debt that is foreign held.

The Mexican peso crisis of 1994 spread to Canada and other high debt countries. The Canadian dollar came under severe pressure and this was instrumental in convincing the Canadian government, and specifically Finance Minister Paul Martin, to adopt a deficit reduction strategy in 1994. The fact that the only major currency to lose value to the Canadian dollar over the 1992 – 1998 period is the only other country with a debt burden to match Canada's - i.e. Italy - is strong evidence that a high debt burden produces severe pressures on a currency.

Canadian federal government debt increased from 425B\$ to 580B\$ between 1992 and 1998. The federal government debt/GDP ratio has fallen from its peak of 72% in 1994, to stand at 64% today. However the debt/GDP ratio must fall well below 60% and preferably below 40% for the government to have any meaningful fiscal flexibility. WEFA forecasts that it will be 2004 before the federal debt/GDP ratio falls below 50%.

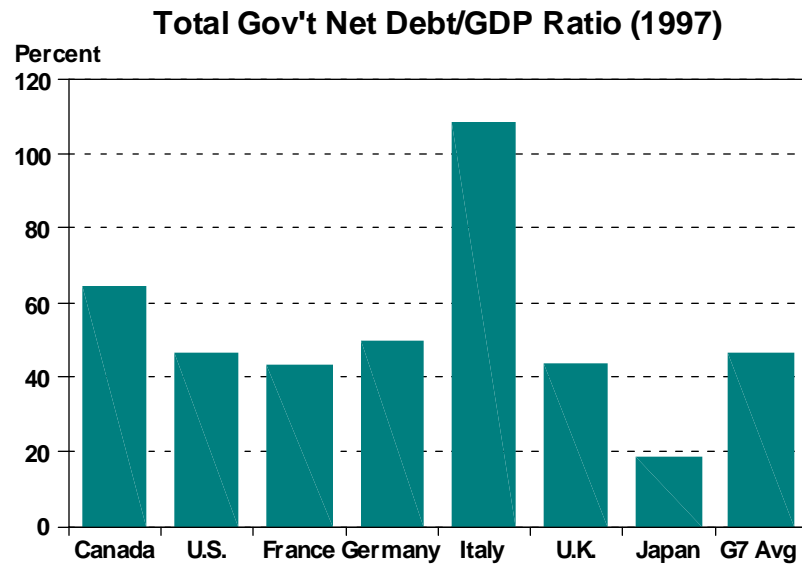
Figure 7



Last year the federal government realized a small surplus, offset by an equally small deficit on behalf of the provincial governments. All provincial governments are committed to fiscal restraint and most have several years of surpluses behind them. Ontario, Quebec, and perhaps B.C. are expected to move into surpluses in the next several years.

On a national and National Accounts basis Canada's debt/ GDP ratio has been higher than that of all other G7 countries except Italy in recent years. Amongst G7 countries, the two countries with the highest debt burdens - Canada and Italy - are the same two countries whose currencies have lost the most over the 1992 – 1998 period. Canada has the highest foreign debt/GDP ratio of any G7 country.

Figure 8



NDEBTG

There is no doubt that Canada's high level of debt contributed to downward pressure on the Canadian dollar over the 1992 – 1995 period. This is the conclusion reached by John McCallum in his recent report (Sept. 1999). However by 1995 the commitment to debt reduction was well accepted and the debt /GDP ratio for the federal government had begun to fall. If the debt burden is a significant determinant of the exchange rate then why didn't this improved performance, and increased credibility ease the pressures on the Canadian dollar after 1996? It could be that although confidence in Canada's commitment to getting its fiscal house in order began to build in 1996, the level of the debt/GDP ratio was still simply too high. It could also be that the risks, the lack of firm commitment to debt reduction and the slow pace of debt reduction do not instill sufficient confidence to provide noticeable upward pressures on the Canadian dollar.

I conclude that the high level of government debt seems to provide a partial explanation for the fall in the Canadian dollar over the 1992 –1998 period. The downward pressures on the Canadian dollar due to the debt burden have probably eased somewhat in recent years, and I expect they will ease sharply if the debt/GDP ratio continues to fall.

Quebec Separation

The threat of the separation of Quebec from the rest of Canada can bring downward pressures to the Canadian dollar for several reasons. First, if Quebec were to separate from Canada, many economists feel that both the Quebec economy and that of the rest of Canada would be weaker.

The whole is greater than the sum of its parts, for many reasons. Second, apart from the strength of the components after final resolution, the process of separation, the transition to the new order, would likely result in significant disruption to economic policy and financial markets. The expectation of this temporary weakness brings downward pressure to the dollar. Third, and probably most realistic, increasing strength of the separatist movement in Quebec increases the probability that the demands of the Quebec government will continue to bring distortion and disruption to the conduct of economic policy in Canada.

It is probably the case that over the 1992 – 1998 period, as well as in previous decades, pressure from the government of Quebec has caused distractions and distortions to Canadian economic policy which have weakened the performance of the Canadian economy. A Canadian economy weaker than otherwise has indirectly resulted in downward pressure on the Canadian dollar. It may well be that the more realistic threat to the performance of the Canadian economy is the threat of continued disruption and distortion to Canadian economic policy instigated by the Quebec separatist movement, as opposed to the threat that Quebec may ever separate to form a truly independent country.

The Quebec government plans to hold a referendum on separation when they identify that the “winning conditions” for separation exist. Currently public opinion polls do not favor the separation of Quebec from Canada in any meaningful sense, in fact they never have. It is therefore quite uncertain when a referendum will be held. There is no prospect of a referendum in 1999, but some prospect of a referendum on some form of independence in 2000.

In conclusion, strong support for the separation of Quebec from Canada could potentially bring significant downward pressures on the Canadian dollar. Increased support for the separatist party probably has brought temporary downward pressures on the dollar at various times over the 1990's. It is unlikely that the threat of separation will be a significant factor over 1999. However, over the next few years, the possibility of the development of “winning conditions” for a referendum on separation are a source of risk to the Canadian dollar.

The U.S. Dollar

It is important to recall that the value of the Canadian dollar is a relative price. Since over 80% of our trade, and most of our capital flows are with the U.S. it is most meaningful to consider the value of the Canadian dollar relative to the U.S. dollar. The value of the Canadian dollar on a “trade weighted” basis is also sometimes used in analysis and is readily available.

The value of the Canadian dollar therefore can change when there is no change of conditions in Canada. If international investors have more or

less confidence in the U.S. economy or U.S. financial markets, and unchanged views about Canadian markets, the value of the U.S. dollar will change relative to all currencies, including the Canadian dollar. When the Canadian /U.S. exchange rate changes it is always important to examine whether there has been a change in the value of the U.S. dollar and the Canadian dollar relative other currencies. That is, is it the Canadian dollar or is it the U.S. dollar that has moved relative to the other major currencies?

To some extent the decline in the Canadian /U.S. exchange rate over the 1992 – 1998 period is explained by increased confidence in the U.S. economy and U.S. currency. Over this period the high growth/ low unemployment and low inflation U.S. economy was the envy of the world. This economic performance was echoed in the rise in the demand for U.S. financial assets such as U.S. stocks and U.S. bonds. In 1990 the U.S. dollar accounted for only 49% of foreign exchange reserves globally. In 1997 this portion rose to 57% but is now threatened with the introduction of the euro.

On a trade weighted basis the U.S. dollar rose by 14% over the 1991-1998 period, using year end 1991 and 1998 values. The U.S. dollar gained 27% relative to the Canadian dollar and Canada accounts for about 20% of the U.S.'s trade. Therefore, over this period the U.S. dollar gained 27% on the Canadian dollar but only 11% on average from its other trading partners.

While the U.S. dollar also gained on the currencies of the other developed countries, these gains were much more modest: France (11%), Germany (13%) and the U.K (17%) and Japan (3%) even less. Of the other major currencies only Italy lost as much to the U.S. dollar (40%) as Canada.

Figure 9

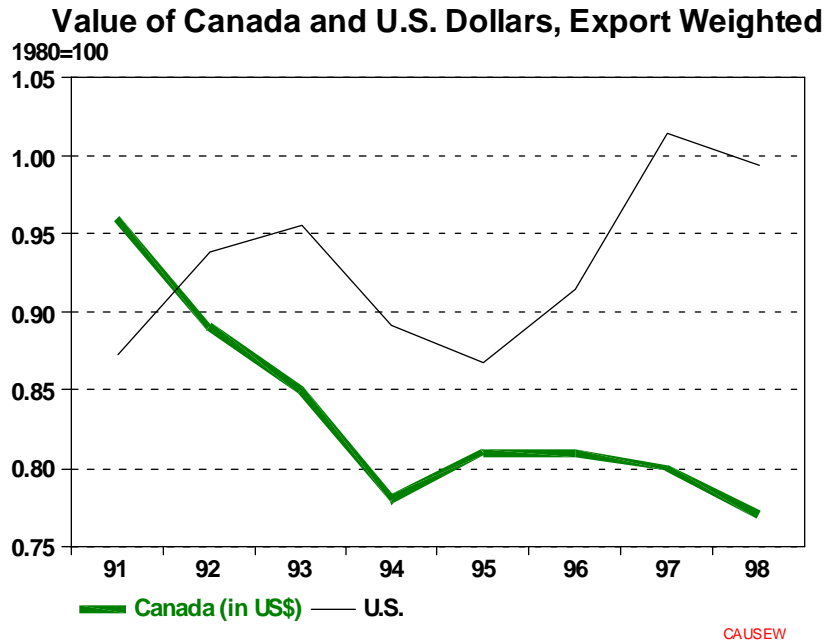


Figure 10

Performance of the U.S. Dollar Relative to Other Currencies

	% Change 1991 – 1998 (Year End)
Canada	27.1
France	11.0
Germany	12.9
Italy	39.6
U.K.	17.5
Japan	3.1
Australia	23.2
Export Wtd.	14

Some of the loss in the value of the Canadian dollar over the 1992 – 1998 period therefore can be attributed to the strength of the U.S. dollar rather than to conditions unique to Canada. If one sets the U.S.'s other trading partners as a standard, then about 37% (11/27) of the loss in value of the Canadian dollar could be attributed to strength which the U.S. dollar exhibited over other currencies as well as the Canadian dollar. On the other hand, the largest most developed European countries (Britain, France and Germany) lost on average 14% to the U.S. dollar over this period. In this sense about half of the 27% loss experienced by the Canadian dollar could be attributed to factors not unique to Canada.

The Current Account and Capital Flows

In spite of the surplus on trade examined above, the negative balance of net foreign investment income has, except for 1996, resulted in a deficit for Canada on current account. However, I do not consider this negative balance on current account to be an important reason for the fall in the value of the dollar. The U.S. has consistently had a large negative current account balance. As well, Canada's current account deficit improved steadily over the 1992 - 1996 period while the Canadian dollar fell.

There will, however be downward pressure on the dollar unless inflows of capital from abroad offset the deficit on current account. Virtually by definition, (abstracting from significant changes in official reserves) over the 1992 – 1998 period, the inflows of capital from abroad were not sufficient to offset downward pressure on the Canadian dollar – otherwise the dollar would not have fallen. Therefore the question of relevance is, “Why were inflows of capital from abroad not sufficient over the 1992 – 1998 period to prevent downward pressure on the dollar.” After all, the current account deficit was falling sharply over this period so the capital inflows required to prevent downward pressures on the dollar were falling. Of course, these capital flows are most influenced by the level of interest rates in Canada relative to those in other countries, particularly the U.S.

The Canada/U.S. interest rate spread was reduced over the 1992 - 1998 period, and this was of course a major reason why the net capital inflows fell sharply, and fell below the level required to prevent downward pressures on the dollar. For example, the balance of new security issues placed abroad fell sharply over the period. Non resident holdings of Government of Canada bonds fell. In addition however, equity market investors, seeing greater returns abroad, shifted to the U.S. market relative to the Canadian market. The net flow of liabilities to non-residents fell over the period. This analysis is developed in the paper by Daly, 1998.

The relevant question here is, “Why didn't the Bank of Canada raise interest rates sufficiently to prevent this downward pressure on the dollar.” One could also ask the related question, “Why didn't the Bank of Canada sell foreign exchange from their reserves to supplement the declining demand for Canadian dollars? These policy questions will be addressed below when we focus on monetary policy.

In conclusion, obviously there was a significant deterioration in the capital inflows into Canada over the 1992 – 1998 period, particularly the 1996 - 1997 period. Had capital inflows been stronger, by definition the downward pressure on the dollar would have been reduced. The lower interest rate spread was a principal reason for this deterioration of capital inflows, but poor stock market performance, and a surprising lack of confidence in the future strength of the Canadian dollar given the economic fundamentals, were also important determinants.

We proceed therefore to examine the performance of the interest rate spread over this period and why the Bank of Canada opted not to raise

interest rates sufficiently to prevent the downward pressure on the Canadian dollar.

Interest Rates

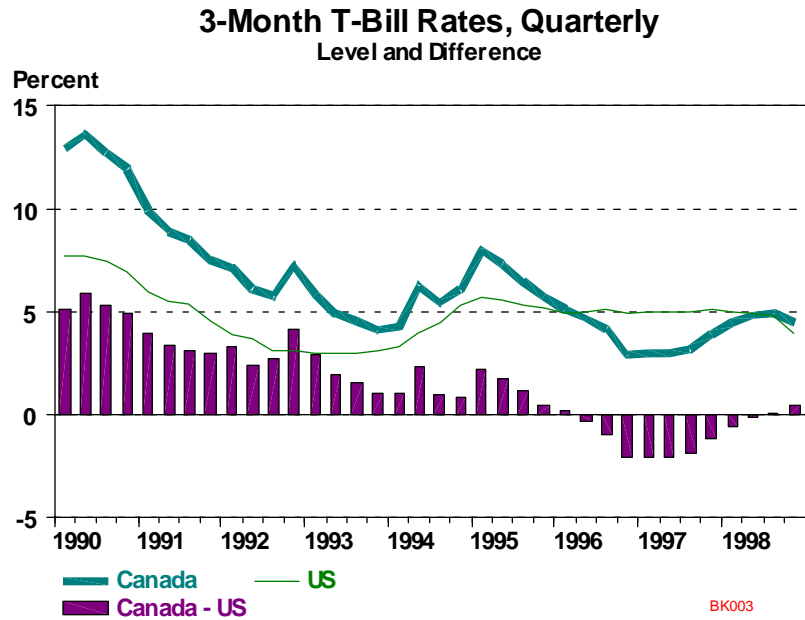
Interest rate performance is quite appropriately left as the final consideration when examining the relationship between economic fundamentals and the performance of the dollar.

As a general statement, Canada must maintain a positive nominal interest rate spread over the U.S. While the risk of default with both Canadian and U.S. bonds is near negligible, there is certainly no advantage to Canada in this respect. For international investors Canadian financial markets are marginally less convenient, more expensive and “thinner” to deal in. The only reason an international investor would select a Canadian bond over a U.S. bond at the same nominal interest rate is if there was an expectation that the Canadian dollar would rise over the term of the bond. That is, a certain interest rate premium is generally necessary to keep the Canadian dollar stable. Expectations of a rising Canadian dollar can – and have supported – a negative spread at the short end. However, it is simply not possible for there to be a strong consensus in the market that the Canadian dollar will appreciate significantly over the short, medium or longer term. If and when such a consensus developed, the Canadian dollar would soon rise in response. The word “significantly” must be emphasized here because transactions costs do provide some buffer.

Whenever economic, financial or political factors cause downward pressure on the dollar the Bank of Canada can, in theory at least, increase the spread over U.S. rates sufficiently to compensate for these downward pressures, to stabilize the dollar. The Canada/U.S. interest rate spread can be increased to attract capital inflows which would provide upward pressure on the Canadian dollar if the government is willing to accept the macro economic implications of reducing aggregate demand.

That being said, the monetary policy issue is, “Why didn’t the Bank of Canada increase the interest rate spread sufficiently over the 1992 – 1998 period to prevent the dollar from falling? Note that over the 1992 – 1996 period the Canada – U.S. spread on short rates declined steadily, turning negative in early 1996.

Figure 11



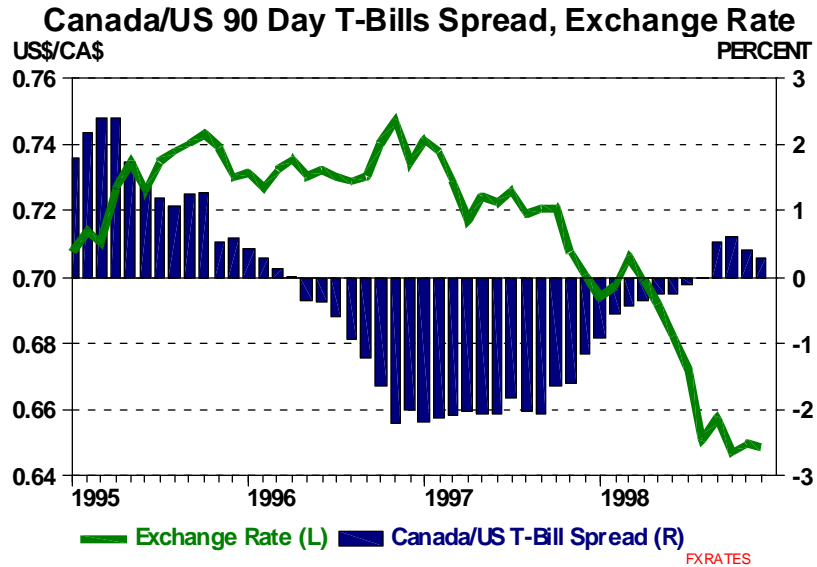
This declining and eventually negative spread, particularly mid 1995 to mid 1997, was possible because the lower rate of inflation in Canada since 1991 had finally resulted in expectations of lower inflation in Canada - and expectations of upward pressures on the Canadian dollar. The spread on long bonds was also falling over this period and turned negative in late 1997. The exchange rate was stable over this mid 1995 – mid 1997 period. The stable Canadian dollar in the presence of the low interest rate spread is a strong indication of confidence in the Canadian economy and the expectation of upward pressures on the Canadian dollar. This situation of mid – 1995 to mid 1997, with the Canadian dollar holding stable in the presence of unusually low interest rates, was very much the situation the Bank of Canada had in mind when they adopted inflation targets in 1991.

An important issue in Canadian monetary policy, and in forecasting the value of the Canadian dollar, is why didn't this fortunate situation of mid 1995 to mid 1997 continue? When and how can this situation be revived?

In mid 1997, due to a shrinking of the output gap and because the Bank perceived accelerating inflation, Canadian short rates started to increase. In late 1997 commodity prices began to tumble and even the rapid increase in Canadian short rates was not nearly sufficient to prevent severe downward pressures on the dollar. The Bank of Canada increased the Bank Rate five times between June 1997 and March 1998. The negative Canada/U.S. spread was steadily reduced. Finally, when the Canadian dollar came under severe pressure in late August 1998 the Bank of Canada increased the Bank Rate by 100 basis points, moving Canadian short rates above their U.S. counterparts.

In spite of the fact that Canadian short rates increased from 2.8% to 5.0% over the September 1997 – September 1998 period, and the Canada/U.S. spread shrank from – 2.4% to 0, the Canadian dollar fell from 72.1 cents to 63.1 cents over this period.

Figure 12



Of course the Bank of Canada does have a more modest tool in its kit bag to prevent downward pressures on the Canadian dollar. They can sell foreign currency from their reserves. However the potential impact of a change in the holdings of Canada’s reserves is very modest and temporary. In August 1998 the Bank of Canada spent 5.8 B\$ U.S., one quarter of its official international reserves, in a vain and ultimately unsuccessful attempt to defend the Canadian dollar.

The 1998 experience begs the question of whether the stable Canadian dollar in the presence of a low (including negative interest rate spread mid 1995 to mid 1997) was a temporary dis-equilibrium. Did the desirable and hard won conditions of mid 1995 – mid 1997 disappear solely because of the Asian crisis?

When commodity prices stabilize will Canada again be able to establish a negative interest rate spread with the U.S. and maintain a stable dollar? If an economy has a flexible exchange rate policy and a large output gap – are downward pressures on its currency almost inevitable because financial markets perceive a reluctance to increase interest rates?

As was its clear policy, over the 1992 – 1998 period the Bank of Canada put its top priority on maintaining inflation within their target bands. Over this period the Canadian dollar fell steadily and significantly. While, in theory the Bank of Canada could have increased interest rates to prevent

this fall in the dollar, clearly they opted not to. Given that inflation and expected inflation were within the target bands, they opted for lower and lower interest rates in an attempt to close the output gap, rather than to prevent the fall in the dollar. This conclusion should not be surprising. Clearly, this is consistent with the Bank of Canada's policy statements going back to the early 1990's.

Empirical Results

Some of the analysis and hypothesis reviewed above were examined using econometric models of the Canadian dollar.

Results Using the Bank of Canada Model

First, the Bank of Canada kindly provided some results from their model of the exchange rate. The Bank of Canada's model expresses the real exchange rate as a function of the lagged value of the exchange rate, commodity terms of trade, energy terms of trade, and the Canada – U.S. short term interest rate differential and the Can.-U.S. inflation differential. This equation appears to explain most of the movements of the Canadian dollar over the past 25 years.

One of the more interesting features of this model and its results is that the Bank has introduced the impact of commodities on the dollar in two separate terms: prices of "non energy commodities" and prices of "energy." Strictly

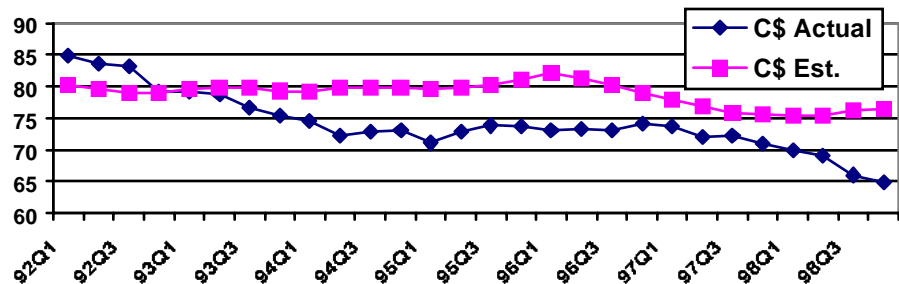
speaking this a bit of a misspeak on the Bank's behalf. Their modeling work is actually apparently based on "commodities – oil" and "oil." . That is, natural gas prices which are also energy prices, are included with other commodities in the Bank's modeling work. Non oil prices influence the dollar in the expected direction. In fact they are by far the most important determinant of the variation in the exchange rate over the 1976Q1 to 1997Q4 period, accounting for about 75% of the equation's explanatory power. Oil prices, on the other hand, have the opposite sign. In the Bank of Canada model higher oil prices are associated with a weaker Canadian dollar. There is no compelling conceptual reason why rising oil prices would be associated with a lower dollar, whereas increasing prices of other commodities (for which Canada is also a net exporter) are associated with a stronger Canadian dollar.

It is relevant to ask, “If the Bank of Canada exchange rate equation is estimated over the 1973Q1 to 1990Q4 period, and then these results used in a dynamic simulation from 1973Q2 to 1998Q4, what values of the exchange rate would be forecasted over the 1992 to 1998 period?”

The table below reports the results of such a dynamic simulation.

Figure 13

The Canadian Dollar: Bank of Canada Dynamic Simulation



First, note that according to this model the exchange rate was “over-valued” when it was at its peak in the early 1990’s. For example in Q1 1992 the Canadian dollar was worth 84 cents, but by this model had an estimated value of only 80 cents. This model forecasts that the exchange rate would have stayed very close to 80 cents from early 1992 until 1996Q4. From 1996Q4 to 1998Q4 the model estimates the dollar would have fallen from 78.9 cents to 76.4 cents. Of particular importance is that this model forecast the exchange rate at 76.4 cents in 1998Q4 relative to the actual of 64.8 cents.

The purpose of this paper is to examine the performance of the dollar over the 1992 – 1998 period, which is a period of remarkable decline. In fact it is because of this fact that it is interesting and important to study the performance of the dollar. At the same time however it must be emphasized that, it virtually follows that this is a period when the error in the forecast from this, or likely any other model of the exchange rate, is going to exhibit an unusually large error.

While the performance of the model appears reasonable by all statistical tests, two key points must be emphasized. First and most important, some of the forecasting accuracy (in the static but not the dynamic simulation) results from the use of the lagged dependent variable. Second, much of the explanatory power results from splitting the influence of commodity prices into two components, “oil” and “commodities -oil .”

While this split increases the forecasting accuracy, it leaves our fundamental understanding of the determinants of the exchange rate somewhat in question.

Results Using the “McCallum” Data Base

In his paper “ Drivers of the Canadian Dollar and Policy Implications,” Aug. 1998 John McCallum duplicated (approximately) the Bank of Canada exchange rate model and its results. In a later paper “Government Debt and the Canadian Dollar” Sept. 1998, these results are improved upon by incorporating government debt. With this data base kindly supplied by McCallum, updated and supplemented by other data, other hypothesis relating to the performance of the Canadian dollar can be tested. The results below could therefore be considered to build on both the Bank of Canada and McCallum results.

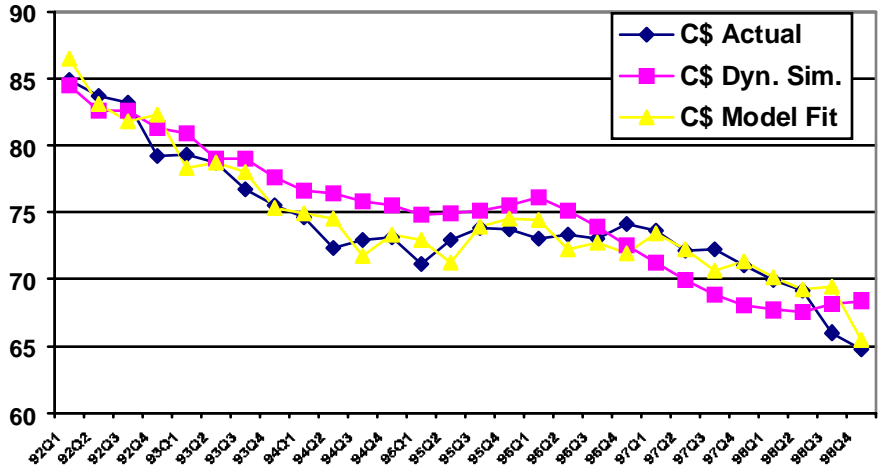
The modeling results which follow make two important changes from the Bank of Canada results and one change from the McCallum results. Like the McCallum results we add debt to the equation. Second, the McCallum results use the Bank of Canada commodity series. This is a production weighted series, suitable for much analysis of the Canadian economy of relevance to the Bank of Canada. However for purposes of modeling the exchange rate, the appropriate weight is probably net exports. We do not have a measure of net exports conveniently available, although there are commodity series which are export weighted. One such series is that of the CIBC, which they have kindly made available to us. Since Canada exports much of its commodity production this export weighted series may give results very close to a net export weighted series.

This model provides a reasonably good explanation of the performance of the Canadian dollar over the 1972Q3 – 1998Q4 period. This model uses the dependent variable lagged both one and two quarters and includes debt. The $R^2 = .976$. Interest rate differentials and (commodity- oil) prices were significant with the expected sign. As in the Bank of Canada results, oil prices were significant with the opposite and unexpected sign. Debt was marginally significant with the expected sign.

The table below reports the forecasts of this model resulting from an estimate over the 1973Q4 – 1998Q4 period (static) as well as a dynamic simulation over the 1992Q1 - 1994Q4 period. As with the Bank of Canada results, this model provides a reasonably good explanation and forecast of the Canadian dollar, even over the 1992 – 1998 period.

Figure 14

The Performance of the C\$: 1992 - 1998



First, note that the fit is much closer after the inclusion of debt. The inclusion of debt helps explain why the dollar was so high in the early 1990's as well as so low in the late 1990's. For 1998Q4 this model forecasts the value of the dollar at 65.5 cents in the static simulation and at 68.4 cents in the dynamic simulation. Both are much closer to its actual value of 64.8 cents, than was forecasted by the Bank of Canada model results reported above.

Like the Bank of Canada results however, these reasonable forecasting results over-play our real understanding of why the dollar performed as it did over the 1992 – 1998 period. In the “Model Fit” results above, considerable explanatory power is provided by the lagged dependent variable (Can.\$ in period t-1 has a t statistic of 12.7 and for period t-2 has a t statistic of 3.3.) As with the Bank of Canada model, oil prices are separated from other commodity prices, and provide their explanatory power with the opposite and unexpected sign, with a t statistic of 3.2. The addition of debt to the Bank of Canada specification does add explanatory power, has a theoretical justification, and provides results which put the formerly overwhelming explanatory power of non-oil commodity prices in more reasonable perspective. It is interesting to note that when the commodity variable is more appropriately defined (export weighted vs. production weighted) the commodity variable regains some of its explanatory power.

Conceptually, there should be a variable which reflects any influences on the U.S. dollar which are exogenous of the influence of the Canadian economy. In many instances the U.S. dollar rises in value due to in-

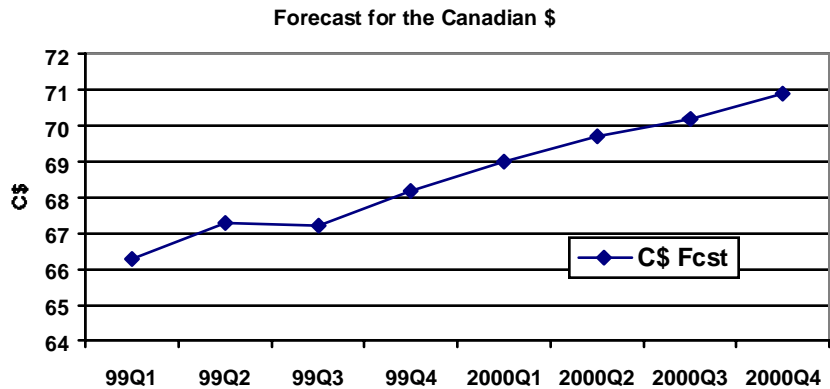
creased confidence in the U.S. economy or U.S. financial stability. In such cases the U.S. dollar increases relative to all currencies, including the Canadian dollar. The “flight to quality,” which resulted in increased financial flows to U.S. financial instruments over the Asian crisis is such an example. One variable that may be appropriate would be a U.S. trade weighted (- Canada) value of the U.S. dollar. Further analysis will focus on this improvement to the model.

Forecasting the Value of the Canadian Dollar

The model referred to above, based on the McCallum data, including debt, is used as the basis for forecasting the value of the exchange rate over the 1999 – 2000 period. The forecasts of exogenous variables are taken from WEFA’s most recent economic outlook. Canada is expected to maintain lower inflation than the U.S., commodity-oil prices are expected to rise gradually over the period in line with the U.S. GDP deflator, oil prices are expected to fall from their 17.50 (WTI US\$) level in May 1999 down to \$16.50 at year end and back up to the \$17.50 level by year end 2000. Canada is expected to maintain a small positive spread over U.S. rates at the short end.

From the Chart below it can be seen that the Canadian dollar is forecast to rise gradually over the next two years, reaching 71 cents by 2000Q4.

Figure 15



The Complex Role of Commodity Prices

Because Canada is a net exporter of commodities, we would expect a rise in commodity prices to be associated with upward pressure on the Canadian Dollar, *ceteris paribus*. The Bank of Canada has found that this is the relationship, and it is very strong for commodity prices other than oil prices. Increases in oil prices however, surprisingly, are associated with a weaker dollar and this association is quite robust. The empirical relationship is strong and plays an important role in forecasting the value of the dollar. While there are several quite plausible reasons for this unexpected relationship, they are better characterized as “*post hoc* inspired” possibilities.

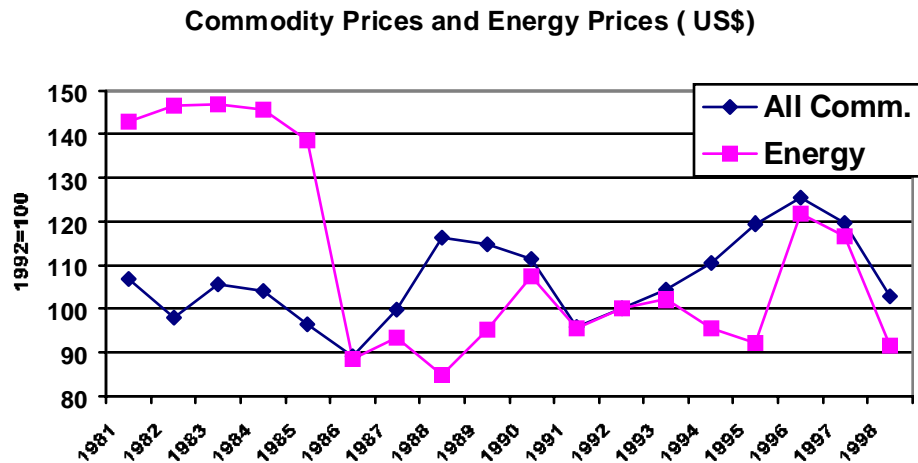
Before proceeding further it is instructive to review the relationship between commodity exports and GDP. Canada is a net exporter of commodities. Commodity exports comprise about 30% of our exports. The vulnerability of the economy to a downturn in commodity prices however, is primarily a function of the relationship between net commodity exports and GDP. On a gross export basis, commodity exports were 10% of GDP in 1990 and in 1998 they had increased to about 12%. Commodity imports (primarily oil) have grown from just under 4% in 1990 to over 5% in 1998. Therefore net commodity exports have increased from under 6% of GDP in 1990 to over 7% today. In this sense the Canadian dollar is more vulnerable to a downturn in commodity prices today than it was a decade ago.

It should be noted that the Bank of Canada commodity index weights commodities based on production weights. For purposes of explaining the exchange rate, it would be more appropriate for the indexes to be based on net export value weights. The TD Bank’s commodity index is probably more appropriate for exchange rate modeling purposes. The commodity

price indexes are weighted by average Canadian export values 1994 – 1996. Since we are net exporters of each of the commodities, and export much of what we produce, it is instructive to examine the performance of this commodity index. It is available in annual values 1981-1998.

The chart below indicates the pattern of commodity prices overall as well as the pattern of the energy sub- component. The indexes are U.S.\$., each set at 1992 = 100. The energy sub-component is comprised of oil (WTI US\$/barrel index 1992=100) and Natural gas (NYMEX near month futures US\$/MMbtu. 1992=100) The energy sub-component has a weight of 22.3% of the total commodity index.

Figure 16

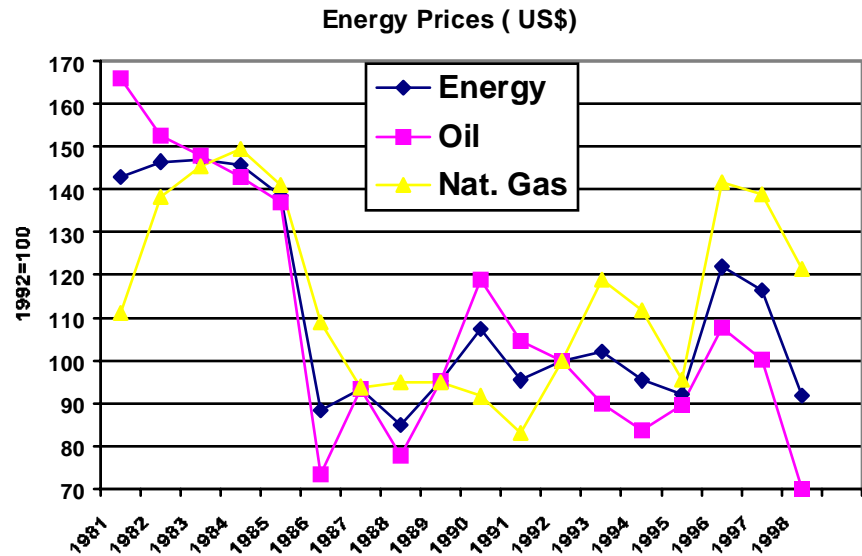


From the chart above it is obvious that over the 1992 – 1998 period energy prices were not as strong as other commodity prices. With both indexes based 1992 = 100, the total commodity index was at 96.9 in 1998 while the energy sub-component was only at 91.7.

To understand the why energy prices perform differently than other commodity prices we next look into the energy index itself. If oil prices impact the dollar in the opposite direction from other commodities, why don't natural gas prices as well? We are a net exporter of natural gas, as we are of oil and other commodities. The chart below, based on the TD Bank's TDCI Commodity Index is U.S. price based. Each series is based 1992 = 100. In the energy sub-component oil has a weight of 57.9%, natural gas 42.1%.

From the chart above it is clear that oil prices took a different route over the 1992 – 1998 period from natural gas prices. From their base 1992 = 100, natural gas prices lay above oil prices every year. From a base of 1992 = 100 natural gas prices were 121.3 in 1998, oil prices were only 70.1 in 1998. Note in particular that over the 1992 – 1995 period natural gas prices rose then fell while oil prices fell then rose. After being at comparable levels in 1995, natural gas prices were much stronger than oil over the 1995 – 1998 period.

Figure 17



Data is not currently conveniently available to substitute the alternative specifications of the commodity price variables into the exchange rate model to report on the sensitivity to alternate specifications. This will be undertaken in future work. In the meantime however, simple correlations between the various commodity price indexes and the Canadian dollar are instructive to indicate how such alternate specifications would likely perform in the model. The simple correlation matrix below details the relationship between each of the commodity indexes over the 1981-1998 period.

Figure 18

Simple Correlation: Energy Price Indexes 1981 - 1998

	All Commodities	Com- modities	Energy (Oil + Nat. Gas)	Oil	Nat. Gas	Can.\$
All Commodities	1.0					
Energy	-.08		1.0			
Oil	-.13		.94	1.0		
Nat. Gas	.04		.76	.49	1.0	
Can. \$	-.08		.14	.41	-.41	1.0

The table above indicates a slight negative correlation between the total commodity price index and the Canadian dollar ($r = -.08$) This relationship would be even more negative when the oil price is extracted from the total commodities price index. This supports the conclusion earlier in the paper that explaining a falling Canadian dollar on the basis of falling commodity prices requires a judicious choice of commodity index as well as time period.

Oil prices, are negatively correlated ($r = -.13$) to total commodity prices. (Oil comprises 13% of the total commodity price index) Over the longer term (here 1981 – 1998) oil prices (WTI US\$) have been positively correlated to the Canadian dollar. ($r = .41$) (C\$ is defined as 67 cents U.S. etc) This positive relationship is not “an energy phenomenon,” because natural gas prices are negatively correlated to the Canadian dollar ($r = -.41$).

I conclude that it appears that separating oil from other commodities improves the forecasting ability of an exchange rate model. However, also removing natural gas prices to group them with oil, would not be a performance enhancing move. The logic of this result is not apparent. Since it is very much an empirical issue, we examine these relationships over the 1992 – 1998 sub-period.

Figure 19

Simple Correlation: Energy Price Indexes 1992 - 1998

	All Commodities	Commodities	Energy (Oil + Nat. Gas)	Oil	Nat. Gas	Can.\$
All Commodities	1.0					
Energy	.61		1.0			
Oil	.52		.81	1.0		
Nat. Gas	.47		.82	.32	1.0	
Can. \$	-.36		.08	.53	-.39	1.0

The correlation matrix above indicates some of the relationships between the commodity price indexes were very different over the 1992 – 1998 period than over the longer 1981 – 1998 period. Over this shorter period total commodity prices are surprisingly negatively correlated with the Canadian dollar. That is, surprisingly, on the basis of received wisdom and the modeling results. Not surprising however based on the analysis earlier in this paper. This analysis supports the proposition that the strong positive association between the Canadian dollar and commodity prices is based very much on the relationship between commodity prices and the dollar over the 1970's and 1980's. This relationship is different in the 1990's. Of course the above correlations are simply indicative. This proposition could be rigorously tested by the model, given appropriate detailed data.

Of particular interest, oil prices moved with other commodity prices in recent years after moving against them in the 1980's. In recent years oil prices have moved with the Canadian dollar, while other commodities, including natural gas have moved against.

This confirms the earlier observation that for some reason the relationship between oil prices and the Canadian dollar are different than the relation-

ship between other commodity prices and the Canadian dollar. Natural gas prices, the other component of the energy price index (weights: oil=58% nat. gas=42%) have a relationship to the Canadian dollar similar to other commodities, rather than being similar to oil.

The analysis above confirms the earlier conclusion that the relationship between commodity prices and the Canadian dollar is a complex one. This relationship has been somewhat different over the 1990's than the 1980's. It is not entirely clear why modeling the Canadian dollar as a function of commodity – oil prices and oil prices separately provides the strongest empirical results. The reason that it does is slightly different for the 1990's than it was for the 1980's. This specification has much to commend it, from the perspective of empirical performance, but much to understand from the perspective of economic behavior.

Conclusions

To conclude, the analysis of the performance of the Canadian dollar over the 1992 – 1998 period can be divided into two segments, the 1992 – mid 1997 and the mid 1997 to present.

Why Did The Canadian Dollar Fall So Steadily And Significantly Over The 1992- Mid 1997 Period.?

Over this period Canada's debt/GDP ratio was getting too high without credible signs of significant improvement. International investors were demanding U.S. dollars for a reserve currency, as a "safe haven," driving up the value of the U.S. dollar relative to most currencies. At the same time rising commodity prices and an inflation performance better than the Americans were providing some offsetting upward pressures on the Canadian dollar. Overall these factors resulted in strong net downward pressure on the Canadian dollar. Rather than raising interest rate spreads to protect the dollar, the Bank of Canada was steadily reducing interest rate spreads, reflecting their priorities on inflation targets and reduction of the output gap. The Canadian dollar would not have fallen as sharply over this period had the Bank of Canada maintained the interest rate spread. With higher interest rates the output gap would not have narrowed, the unemployment rate would not have fallen from 11% to 9 ½ % over this period.

Why Did the Dollar Fall So Significantly From Mid 1997 to End 1998?

By mid 1996 the debt/GDP ratio had turned down and Canadian governments were gaining credibility in getting their federal and provincial fiscal

houses in order. After five years of inflation below the U.S., lower inflationary expectations for the Canadian economy were being built in. Commodity prices had been strong. The combination of these factors had finally instilled expectations of a rising Canadian dollar. Over the mid 1995 – mid 1997 period Canada was able to maintain a negative spread against U.S. interest rates while the dollar held stable. Some modest signs of inflation began to emerge in mid 1997. Much more important, commodity prices began to tumble in late 1997. In addition the volume of exports to Asia fell due to their declining incomes. Even though the Bank of Canada increased the Bank Rate steadily, and sharply and interest rate spreads moved from negative to zero, this was not enough to protect the dollar from falling sharply from mid 1997 to the end of 1998.

This Analysis Explains a Bit, But Leaves a Few Mysteries

The analysis of the role of the key factors affecting the Canadian dollar over the 1992 – 1998 period, in my view, is consistent and reasonable. However, it remains a bit of a mystery why there were such strong downward pressures on the dollar over the 1992 – 1997 period given the economic fundamentals, specifically rising commodity prices and Canada's relatively low inflation. It appears that the consensus of economic forecasts for continuing lower inflation in Canada relative to the U.S. were not overwhelmingly convincing. The fact that governments had commitments to lower the debt/GDP ratio were likewise not overwhelming. Why didn't expectations of a rising dollar develop more quickly?

However, given that these downward pressures on the Canadian dollar did develop over the 1992 – 1997 period, it is very understandable why the Bank of Canada did not increase interest rates sufficiently to prevent the dollar from falling.

The relationship between commodity prices and the Canadian dollar is complex. This relationship is slightly different in the 1990's than it was in the 1970's and 1980's. Oil prices perform differently relative to the Canadian dollar than do other commodity prices. This is not an "energy" phenomenon because the relationship between natural gas prices and the Canadian dollar are similar to that of other commodities, rather than similar to oil prices. Identifying a strong relationship between commodity prices and the Canadian dollar requires a judicious selection of the commodity variable as well as the time period modeled.

The Over-Riding Policy Lesson From the Above Analysis is the Following.

It is unlikely the Bank of Canada should have – or could have if you think they should have – increased interest rates sufficiently to prevent the Canadian dollar from falling over the 1992 – mid 1997 period. The output gap was simply too high. In retrospect, because inflation never really

challenged the upper bounds of the target range, it makes much more sense to argue that the Bank of Canada should have adopted even lower interest rates than they did.

We may have been able to prevent the output gap from lingering so high for so long if we would have been in a position to use expansionary fiscal policy. However we simply were not because the debt/GDP ratio was too high. If the debt/GDP ratio would have been in the 40% range in 1992, rather than in the 68% range and destined to continue upward, then the Bank of Canada may have been able to operate with higher interest rates, leaving fiscal policy to provide the compensating economic stimulus. This is telling evidence that a high debt/GDP ratio not only robs us of fiscal flexibility, it also reduces the options for monetary policy.

I would like to thank Bob Dugan, David Laidler and John Murray for helpful comments on an earlier draft of this paper. I am also grateful to Bob Dugan for undertaking the modeling work and to the CIBC for their co-operation with the commodity index.

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