

Introduction

Since the abandonment of the gold standard, countries have utilized different regimes in order to establish the foundation upon which to base modern exchange rates. The fixed exchange rate, mostly adopted by developing nations today, is where a country's currency is pinned against that of another stronger economy, such as the United States; the benefits being that one's currency becomes relatively more stable and predictable. Conversely, the floating exchange rate regime allows a country's currency to float within the foreign exchange market, meaning its strength is gauged relative to that of all other floating currencies in the world. Although this causes a greater sensitivity to external shocks to its economy, the major advantage is that the fluctuating exchange rate will act as a dampener and reduce the effects of internal shocks that could potentially be economically debilitating.

It is the latter alternative that developed nations have opted for, and so the question: "what factors cause the fluctuations in floating exchange rates" has made its way to the forefront of the international trade forum. This is truly an important question as trade is one of the channels through which a country can gain significant amounts of wealth. Knowing the factors which can lead to increased amounts of imports relative to exports, better terms of trade or increased productivity, for example, will allow countries to take advantage of this channel. The only problem is that these factors are almost countless in number and cataloguing them is a daunting task, to say the least. Hence, many economists and researchers have attempted to isolate the most dominant of them.

Three major arguments that have been proposed for causing or explaining exchange rate fluctuations are: purchasing power parity, commodity prices, and the current account. Purchasing power parity states that exchange rates simply equate the price levels between countries and their relative purchasing powers. Commodity price movements have been associated with exchange rates for countries whose majority exports consist of them, and hence, the strength of their currencies is very sensitive to such movements. Finally, the current account is a good indication of the demand for a particular country's exports and, thus, their currency.

This paper will concentrate solely on the relationship between Canada and the United States and the specific factors which affect their trade relationship. These two countries are the largest trading partners of each other and establishing the factors that determine the trade balance between them is of particular interest.

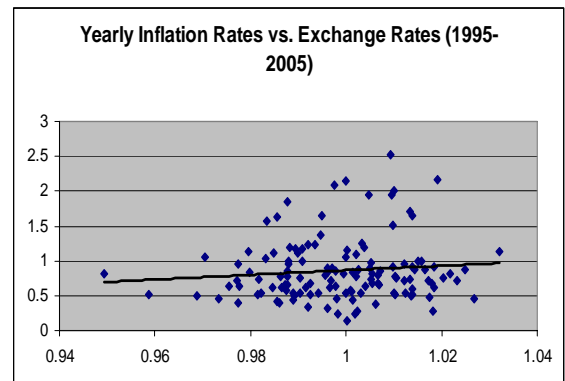
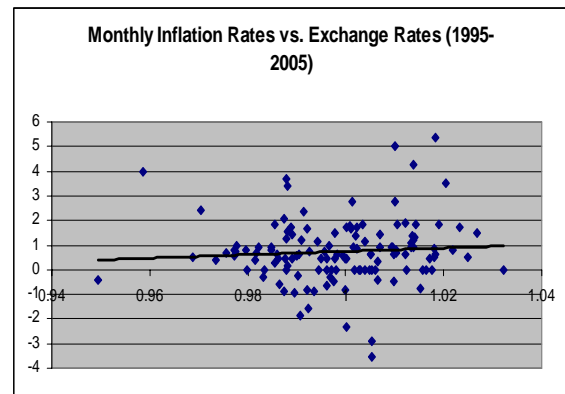
Purchasing Power Parity

The idea behind purchasing power parity (PPP) is that the exchange rate between two different countries is simply the ratio of their price levels. In other words, any unit of money in any country should have the same purchasing power when used in another country (Taylor and Taylor, 2004). PPP affects the exchange rate exactly through this relationship. As the price levels of individual countries fluctuate, so does the exchange rate in order to equalize the purchasing power between them. This is not to say that the exchange rate is a rigid function that is pinned against ratios of price levels; rather, advocates of this theory state that when there are deviations, international arbitrage is possible and will dampen any such divergence (Taylor and Taylor, 2004).

There are three variants of the PPP equation. The first is the above stated relationship that is also known as the law of one price. The second takes into account more than a single good to determine the exchange rate, and so equates it to the ratio of the sum of all goods between two countries; this is what is known as absolute PPP. The final variant, relative PPP, is an extension of absolute PPP that considers differences in goods offered between countries: the change in the exchange rate is equal to the ratio of inflations between two countries (Rogoff, 1996).

How accurate is PPP in determining exchange rates? Supporters of the law of one price state that if there were differences in the price of the same good between countries, then there would be risk-free profit involved with simply shipping it across borders. The original price differential would eventually disappear and prices would equalize across countries. The only problem with this theory is that one can simply look at something like the Economist's Big Mac index and see how completely ineffective the law of one price actually is (Taylor and Taylor, 2004). The price of the same good, in this case the Big Mac, in different countries that is normalized to a single currency is not uniform and such a differential across nations is persistent over time. The reason for this is that trade and non-trade barriers, such as transportation and other transactions costs, for example, create inefficiencies that increase the price of importing and exporting certain goods. For example, strict inspection regulations will significantly increase transportation costs of certain products and, hence, their prices will reflect such costs. To support this, Engels and Rogers (1995) show, using CPI data for Canadian and U.S. cities, that variation in prices is positively correlated with distance. Thus, it is clear there are persistent, short run deviations from the law of one price.

For absolute PPP, it is very difficult to test as not all countries produce the same goods or in the same quantities, so a good in one country's basket may have a different weight in another country's, or it may not be in any other's basket at all. Hence, it is more practical to test whether or not relative PPP holds. Taylor and Taylor (2004) use data from the UK and the US to create scatter plots of the differences between the two countries' inflations and exchange rates. They show that, in the short run, there are marked deviations from the 45o line, meaning that the changes in inflation are not being offset by the changes in the exchange rate. However, in the long run (they take the annualized version of the previous graphs over 29 years), they show that the scatter does seem to collapse onto the 45o line. Thus, PPP seems to hold in the long run, but not in the short run (Taylor and Taylor, 2004). Applying this to the Canada and US case, we see that these results do indeed occur by performing the same tests:



Using monthly and yearly inflation rates for Canada and the US¹ and the monthly nominal exchange rate between the two, these graphs show the monthly relative PPP using the method of calculation outlined by Rogoff (1996). Both monthly and yearly inflation rates are used simply for consistency. If PPP were to hold strictly, this would imply a real exchange rate of one, and hence, all points should lie on the horizontal line with intercept one. However, a general view of the graphs indicates that this is not the case for each month; they support the hypothesis that there are significant deviations from PPP in the short run. However, by examining the trend line, we can plainly see that the long run trend approaches one, supporting the latter hypothesis that PPP holds in the long run. These results beg the question: what accounts for the fluctuations and convergence we see in the PPP relationship between Canada and the US?

Current Account

In the particular case of these two countries, one possible explanation relies on the fact that they are each other's largest trading partner; trade measures such as the current account are very sensitive to changes in the terms of trade, tariffs or non-trade barriers which would have very large effects in either country. Perhaps it is the case that exchange rate fluctuations are related to how they trade between each other.

Rodriguez (1980) explores this relationship through a model which looks at the effects of trade flows on exchange rates. By establishing that the exchange rate is dependent on the demand for domestic and foreign money, and that the demand and actual holding of foreign money is a function of the current account, he concludes that based on these connections, any change in the current account can directly affect the

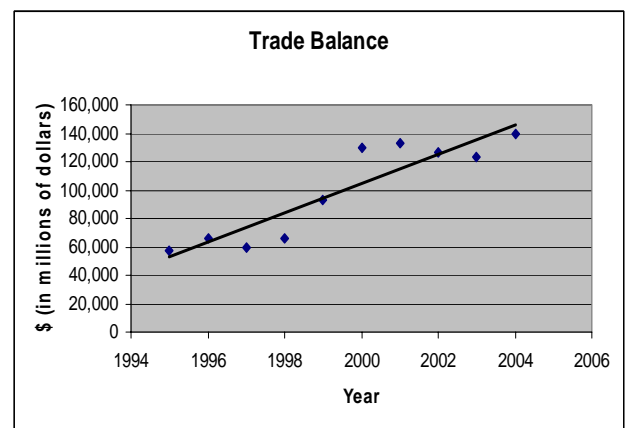
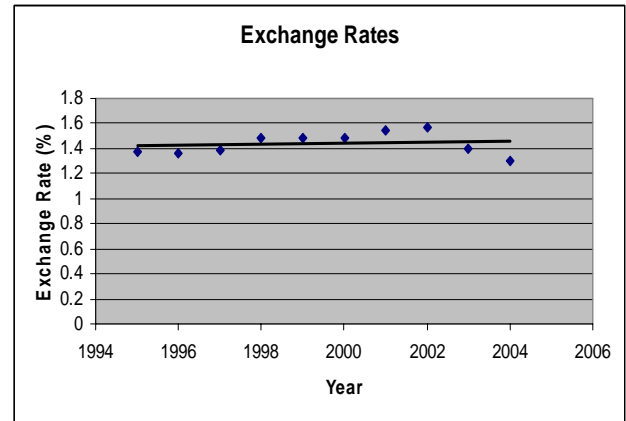
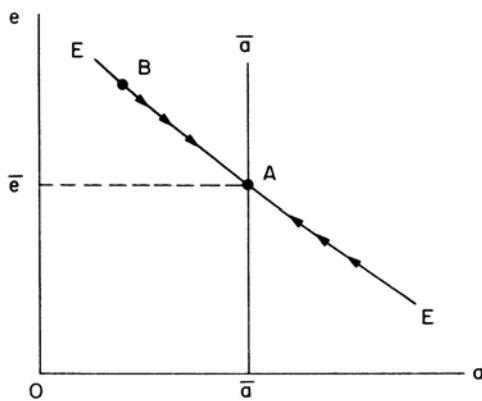
exchange rate. This argument is based on the idea that there exists some portfolio equilibrium that consists of all agents owning both domestic and foreign money in some optimal combination. In turn, he postulates that within this portfolio, the weight that each currency holds is determined by expectations of their future values. For example, an exogenous shock to the terms of trade in favour of one country will allow it to increase its imports because the relative price of its good has gone up. However, this will cause a current account deficit as the same increase will decrease foreign demand for their goods. The connection between this deficit and the exchange rate is in the change in expectation of the relative price of that particular country's currency. If a country is running a trade deficit, they will eventually have to repay that debt which will decrease their reserve of foreign money. If it is known that such a deficit exists, all other agents in the economy will expect the price of foreign money to rise and, hence, demand more foreign money. And due to the relationship between the exchange rate and the demand for domestic and foreign money, a change in foreign money demanded will directly decrease the exchange rate.

Dornbusch and Fischer (1980) create a non-monetary model to explain the relationship between the current account and the exchange rate. They come to the same conclusion as Rodriguez (1980), but they do not explain the process in terms of demand for money, rather they utilize saving and investment. Rises and falls of the terms of trade will increase and decrease the demand for foreign goods, respectively. Furthermore, for any level of the terms of trade, there is a corresponding savings rate at which agents will accumulate external assets. They come to the conclusion that current account deficits indicate an increased amount of wealth for a country (or an improvement in the terms of trade); this will lead to an increase in foreign investment (or dissaving) which leads to an

¹ Data acquired from the Bank of Canada and the US Department of Labor websites: <http://www.bls.gov/cpi/>, <http://www.bankofcanada.ca/en/rates/index.html>

increase in the exchange rate. Conversely, a current account surplus will eventually lead to a decrease in the exchange rate through the same channel.

In the long run, the terms of trade will remain constant and the level of external assets as well as the exchange rate will tend towards their steady state values. In the following graph², e is the exchange rate, a is the level of external assets and EE is the curve which relates the two.



So then, how robust is the model in predicting the actual exchange rate and trade balance trend between Canada and the US? The following graphs³ show the annual exchange rates and the trade balance between the two countries between 1997 and 2004.

They plainly show that a consistently positive and growing current account surplus is having little to no effect on the real exchange rate between the two countries. This is most likely accounted for by the fact that the current account is not the only determinant of the exchange rate. Many other factors such as trade barriers, productivity increases, or expectations may also play significant roles in the relative value of currency and could possibly negate the effects a current account surplus does have.

Commodity Prices

An alternate argument related to the current account that has been posited is that exchange rate fluctuations are partially caused by parallel fluctuations in world commodity prices. This is particularly pertinent to commodity-exporting countries like Canada

² Graph acquired from Rodriguez (1980).

³ Data acquired from the Bank of Canada and Industry Canada's websites:

<http://www.bankofcanada.ca/en/rates/index.html>,
http://strategis.ic.gc.ca/sc_mrkti/tdst/engdoc/tr_homep.html

where more than a quarter of its exports consist of commodities such as forestry products, wheat, base metals, and crude oil (Chen and Rogoff, 2003). In addition, many developing countries are majority commodity exporters and, hence, the exchange rates of many different countries will be sensitive to these price movements (Cashin, Céspedes, and Sahay, 2004).

In an empirical paper, Chen and Rogoff (2003) investigate whether there is, indeed, a correlation between world commodity prices and the exchange rates of 3 developed countries, Canada, New Zealand, and Australia. They come to the conclusion that commodity price fluctuations are key identifiers in explaining the exogenous components of terms of trade shocks, but their effects are difficult to establish in standard terms of trade measures. Cashin et al. (2004), also attempt to empirically model this connection; however, as opposed to Chen and Rogoff, they state that there is strong evidence that these fluctuations in commodity prices have significant effects on exchange rates for commodity-dependent countries. In fact, their exchange rates do not follow PPP even in the long run, but instead are dependent on the long run trend of real commodity prices. In their empirical analysis, they report elasticity figures of 0.42, meaning a 10% increase in commodity prices should be followed by a 4.2% increase in the exchange rate. Their strongest result lies in the 85% explanatory power of real commodity prices in accounting for fluctuations of real exchange rates.

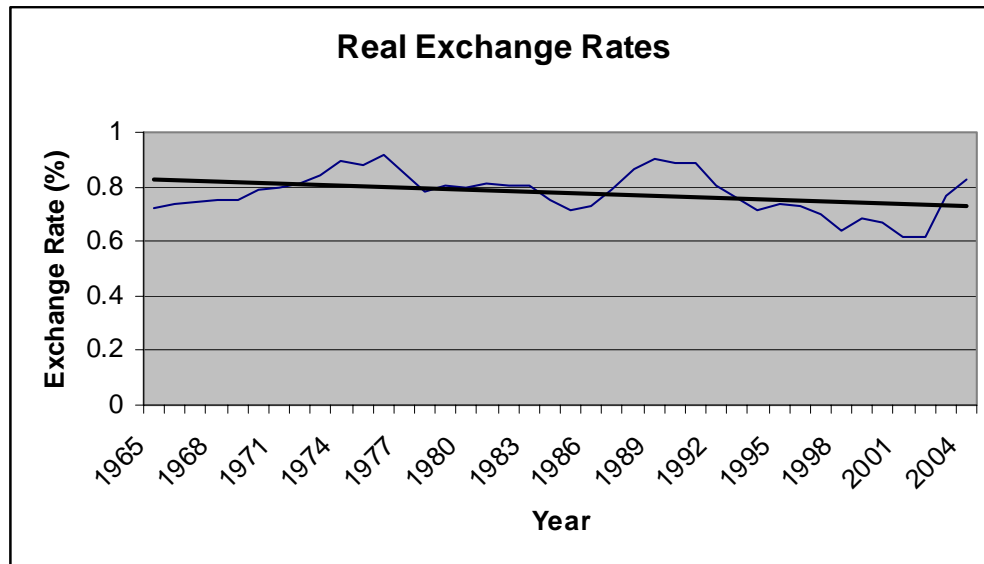
Cashin et al. generalize these results to all 58 countries in the world whose exports depend largely on commodities. However, the question remains whether or not these results apply specifically to Canada and its individual

circumstances. It should be noted that in addition to having a large portion of their exports consisting of commodities, a proportionally large share goes to a single country; hence, the Canadian-US exchange rate will be significantly more sensitive to a number of other factors that those 57 other countries may not be. Laidler and Aba (2001) explore, specifically, how world commodity prices affect the Canadian-US relationship:

“...because Canada remains an important commodity exporter, the Canadian dollar remains very much a commodity currency. When commodity prices fall, as they have on average since 1995, Canadian living standards must fall. The exchange rate on the US dollar is the messenger that brings this news, not the cause of the problem.” (Aba and Laidler, 2001)

Hence, the authors have no doubt that Canada is significantly affected by commodity price fluctuations; but instead of discussing how they affect Canada's exchange rate directly, they instead focus their discussion on how commodities are changing within Canada's international trade. Firstly, the decreasing share that commodities retain in total Canadian exports has resulted in a proportional decrease in the sensitivity the exchange rate experiences. Secondly, it is non-energy commodities, and not energy, that dominate these effects; although it is the case that one of Canada's major commodity exports is energy, their own domestic demand eliminates any gain that would have occurred due to an increase in its real price. Taking these factors into account, the decreasing real

All-Commodity Index, Real US Dollars
1993 = 100, Quarterly



price of commodities⁴ should have a negative effect on the real exchange rate.

The real exchange rates were calculated using the GDP deflators for both the US and Canada and the nominal exchange rate between 1965 and 2004.⁵ As we can

see from both graphs, the general trend is that both are decreasing over time; however this is not sufficient in concluding that commodity prices are major determinants of exchange rates. As you can see from the graphs, the short run fluctuations do not coincide with one another indicating that the effects may not be as significant as some of the authors have indicated. A possible reason being that the trade relationship

⁴ Chart acquired from the Bank of Montreal's Commodity Price Report of November 2005: <http://www.bmo.com/economic/commod/mcpr.pdf>

⁵ Data obtained from the International Monetary Fund's International Financial Statistics website:

<http://www.imfstatistics.org/imf/ifsbrowser.aspx?branch=ROOT>

between Canada and the US is simply too complex and sensitive to pinpoint a single major determinant amongst many; hence, it is too early to determine whether commodity prices are indeed one of such determinants.

Conclusion

As we can see from the previous three arguments, it is extremely difficult to explain the factors that affect the Canadian-US exchange rate. Although factors that theoretically should have a direct effect on the trade relationship are experiencing long run changes in themselves (the long run growth of the trade surplus, for example), their effects in actuality are quite minimal. The theory states that aspects such as current account surpluses and commodity price fluctuations have direct effects on exchange rates. Via increased saving and foreign asset accumulation, a current account deficit generally leads to an increase in the exchange rate. Both Rodriguez (1980) and Dornbusch and Fischer (1980) come to this conclusion; yet when we look at the data, a consistently increasing current account surplus between Canada and the United States shows no evidence of this theory holding. In a related argument, Chen and Rogoff (2003) and Cashin et al. (2004) show empirically that commodity prices

fluctuations have very significant explanatory power of parallel fluctuations in the exchange rate. However, again, empirical data shows a large variation in real commodity prices but a relatively inflexible real exchange rate over the same period. The long run trend is very similar but not to the 85% explanatory power figure which Cashin et al. posit.

So then, what can explain the changes in the real exchange rate? PPP defines the exchange rate to be the all-encompassing equalizer of all price levels between countries; however, it is a quagmire within itself as it cannot possibly reconcile the large, volatile short run deviations that with the long run trend towards a real exchange rate of one we empirically see. One possible explanation is that there simply is not one single explanation. Perhaps it is the case that each of these factors does, indeed, play a major role in determining exchange rates as all of this research predicts, and that the small variation in exchange rates is actually the result of all of these factors offsetting one another. Regardless, this issue is, as of yet, unresolved and requires much more research before we can properly delineate the exact factors and their effects on exchange rate determination.

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