

An Analysis of the Effects of Exchange Fluctuations on Employment, Output and Productivity in Canada

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Abstract

Since the adoption of the North American Free Trade Agreement (NAFTA), the Canadian dollar has come to be regarded as a petro-currency. Consequently, rising prices of oil and gas (as well as other natural resources) would increase capital inflows that would lead to a higher exchange rate and contribute to the decimation of the export-oriented Canadian manufacturing sector by making Canadian products less competitive internationally. Some have argued that the Canadian economy has started to show symptoms related to the Dutch Disease. One important symptom is the slow rate of productivity growth, which consequently leads to the theory that Canada's productivity performance depends significantly on the foreign exchange value of the domestic currency. This dissertation attempts to address these issues and seeks to solve the question of whether the Canadian economy is suffering from the Dutch Disease, as well as whether or not movements of the Canadian dollar are responsible for the low Canadian productivity growth since the 1990s.

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Table of Contents

1. Introduction	1
2. Literature review	5
2.1 Canada's experience under the Gold Standard	5
2.2 Canada's participation in the Bretton Woods system	8
2.3 Debate over exchange rate regimes	10
2.3.1 Independent floating exchange rates; Monetary accommodation	15
2.3.2 Alternative road to monetary system	19
2.3.3 Dollarization: The end of monetary sovereignty	22
2.3.4 The Currency Board versus the Central Bank	27
2.3.5 North American Monetary Union (NAMU); A misleading solution to a crisis	29
2.4 Forces governing exchange rate movements	40
2.4.1 Macroeconomic fundamentals	41
2.4.2 Microeconomic based model of exchange rate	42
2.4.2.1 Is the Inflation Rate the root cause of exchange rate movements?	43
2.4.2.2 Brief analysis on the current account and exchange rate linkage	45
2.4.2.3 Commodity prices and the exchange rate: Is there a correlation?	47
2.5 The Dutch Disease and real appreciation: Does it pose a severe threat to the Canadian economy?	53
2.6 Low productivity growth; A long-lasting challenge for the Canadian economy	59

3. Empirical analysis	72
3.1 From the oil price index to the exchange rate; An empirical view	72
3.2 The Path to Productivity; An empirical inquiry	90
4. Conclusion	98
Bibliography	101

1. Introduction

The formation of the North American Free Trade Agreement (NAFTA) in 1994 dramatically increased trade and investment between Canada and the U.S. As a result of rapidly expanding trade and investment, the level of integration between Canada and the United States increased to an unprecedented phase. Since then, Canada has become a major net energy exporter in the global market. Therefore, energy prices have become a major component in explaining Canada's real exchange behavior. Consequently, the Canadian dollar is now strongly tied to the movements of energy prices. This means that the movements of the Canadian dollar have become increasingly correlated with oil prices. Hence, the Canadian dollar is mainly viewed as a petro-currency.

In addition to this, the Canadian dollar's rapid rise has further increased the growing difference between the resource boom industry and the manufacturing sector in Canada. This symptom is known as the "Dutch Disease", which refers to the apparent linkage between the expansion of the natural resource sector and a decline in manufacturing activity. Apparently, the high Canadian dollar has strongly infected the Canadian manufacturing sector. Although the high value of the Canadian dollar contributed to a high economic growth as a result of higher energy prices, manufacturing employment has sharply declined during the same period of time (Blecker & Seccareccia, 2008). In fact, the high value of the Canadian dollar forces domestically manufactured goods to become less competitive in the global market, which hurts the manufacturing sector and reduces the tradable sector's competitiveness.

Canada's poor productivity growth is not part of a world-wide phenomenon but is a domestic issue. Indeed, the gap between Canadian and U.S. productivity growth has been widening over the last decade. It has been argued that movements of the Canadian dollar are responsible for the low Canadian productivity growth since the 1990s. The argument is that real exchange rate depreciation reduces the need for firms to stay competitive, much like tariffs, and

therefore less effort is made to improve productivity. However, in addition to the lower incentive to improve their productivity (as a result of a lower Canadian dollar) the import of machinery and equipment becomes more costly, thereby further hindering productivity growth. Additionally, when the currency is overvalued, export prices tend to increase in the global market, thus restricting competitiveness.

Meanwhile, a growing number of academics and politicians in Canada have started to offer solutions to solve these economic problems, namely the Dutch Disease and the slow productivity growth. The most controversial solution to the poor Canadian manufacturing sector performance is the elimination of the Canadian dollar. The leading proponents of this policy believe that the current exchange rate is not an appropriate choice for the Canadian economy. Therefore, they have proposed greater monetary integration between Canada and the U.S. On the other side, the proponents of the current exchange rate regime believe that a greater monetary integration would not be an appropriate response to the Dutch Disease problem. Moreover, the issues resulting from the greater monetary union would be worse than the current economic difficulties faced today.

An important question is whether the current Dutch Disease symptoms, with which the Canadian manufacturing sector is struggling, have been triggered by the movements of the Canadian dollar and whether the creation of the North American Monetary Union (NAMU) could actually eliminate the Dutch Disease in Canada.

Perhaps the most prominent argument in the media discussion surrounding the Dutch Disease issue is the possible relationship between exchange rate behavior and the decline of the Canadian manufacturing sector (Carney, 2012a). Notably, according to the Bank of Canada governor, Mark Carney, the weak performance of Canada's exports, which has been ranked the second-worst in the G20 over the last decade, should not completely be blamed on the high value of the Canadian dollar. Indeed, a significant part of the slow Canadian export growth is dependent

on the structure of the domestic economy (which is based significantly on the exploitation of natural resource), labor cost and weak productivity growth.¹

The aim of this paper is to examine the link between the exchange rate variation caused by oil price changes and its impact on manufacturing employment, output and productivity. This paper proposes to address these issues and solve the question of whether world commodity prices can indeed explain Canada's exchange rate behavior over the last twenty years and whether the Canadian economy is suffering from the Dutch Disease.

The outline of this paper is as follows. Section 2.1 and 2.2 provide a brief history of the Canadian exchange rate under the Gold Standard and the Bretton Woods monetary system. Section 2.3 reviews the debate over the various exchange rate regimes. This debate includes the arguments proposed by both opponents and proponents of the current exchange regime. Proponents propose alternatives for solving the exchange-rate volatility of Canada's floating dollar. The alternative way of preventing exchange rate volatility and its negative impact on the economy is the adoption of the fixed exchange rate regime. Therefore, opting for exchange rate fixity, namely dollarization or a greater monetary integration, is one of the most common solutions that has been proposed to address the current problems affecting the Canadian economy. Despite the attention surrounding a greater monetary integration between Canada and its NAFTA partners, opponents of the current floating exchange rate regime explain that Canada is an optimal currency area. Additionally, opting for exchange rate fixity will not be beneficial to the Canadian economy and could result in further harm. Section 2.4 provides theoretical and empirical background on possible determinants of the real Canadian exchange rate based on a growing number of studies. Section 2.5 provides a brief analysis of the Dutch Disease. Section 2.6 explains why productivity is the main factor responsible for economic growth along with providing different factors responsible for the slowdown in productivity growth. Section 3 discusses empirical functions. This

¹ See the speech by Mark Carney (2012b, p. 8).

² This mechanism developed by David Hume to explain how trade imbalances can be automatically adjusted under the

paper presents an empirical analysis of the relationship between the Canadian exchange rate and energy prices and whether movements of the Canadian dollar are responsible for the slow rate of productivity growth and the widening gap in productivity between Canada and the U.S. Section 4 offers conclusions based on the empirical analysis.

2. Literature Review

Movements of the Canadian exchange rate have been at the center of a long lasting discussion for the past 20 years. The reason why this topic inspires debate and controversy lies in the fact that the Canadian dollar fluctuations substantially impact the Canadian economy. However, over the past years, the kind of attention the Canadian exchange rate has been receiving has indeed changed. The Canadian dollar has become a target by some economists and politicians and, furthermore, is accused of being a threat to the domestic economy. A controversial solution has been provided and this could only result in the elimination of the Canadian dollar. Before making any attempt to declare anything regarding the Canadian dollar, this paper will consider the history of the Canadian currency to see how it has been influenced under various exchange rate regimes.

2.1 Canada's experience under the Gold Standard

When Canada adopted its own currency in 1853, this was done under the prevailing system of the Gold Standard which lasted until World War I (Powell, 2005). The Gold Standard was a monetary system in which countries bound their currencies to a specified amount of gold. By 1900, the majority of developed nations were linked to the Gold Standard (Eichengreen, 1985). The post-World War II gold exchange standard, under the Bretton Woods system, was also associated with a period of relative stability demonstrated by free trade in goods, labor and capital, and strong economic growth. Countries tied their currencies to the U.S. dollar, which was in turn tied to gold. However the previous Gold Standard monetary system eventually caused a severe deflation in the world economy which had been associated with aggravating the Great Depression when the implementation of expansionary monetary policies may have been more appropriate (Eichengreen, 1985). According to Eichengreen (1985), for the smooth and automatic operation of

the Gold Standard, certain conditions are to be fulfilled. There are three essential rules of the Gold Standard which must be met:

- Domestic currencies must be freely convertible into gold at the fixed price
- Gold is imported or exported freely
- The keeping of non-gold money to gold reserves in fixed proportion

Under the Gold Standard, nations with trade surpluses received gold inflows, while countries with trade deficits would have experienced an outflow of gold. According to the quantity theory, an international settlement in gold meant that the international monetary system based on the Gold Standard was self-correcting. Countries with positive trade balances were effectively importing gold in exchange for their exports which led to an eventual increase in a country's money supply causing inflation domestically followed by rising domestic prices, thereby reducing competitiveness. However, for countries with a negative trade balance, an outflow of gold leads to a reduction in the money supply. This reduces domestic prices and therefore increases the competitiveness of a country's goods in the international market. Hence, the result would be self-correction of trade balance in both countries. The price-specie flow mechanism², under the classic Gold Standard, was proposed by David Hume (1752), which showed how the Gold Standard worked. However, in actual practice the central bank could expedite this mechanism by adjusting the interest rate. Higher interest rates trigger a lower investment, which dampen domestic demand. The reduction in domestic demand puts downward pressure on domestic prices therefore, enhancing competitiveness and leading to a higher rate of exports (Eichengreen, 1995). Critics

² This mechanism developed by David Hume to explain how trade imbalances can be automatically adjusted under the Gold Standard. When there is a trade deficit a given country would experience more imports than exports. This contributes to an outflow of gold, and thereby decreasing domestic money supply. Consequently, the price level falls, this in turn makes domestic goods relatively cheaper than foreign goods. This, contributes to a higher level of exports and less imports, hence, self-correcting the trade imbalance.

have raised a number of theoretical and historical objections to the gold standard. Trade imbalances did not normally entail actual movements in gold reserves since most of the adjustment took place via central bank setting of interest rates. Hence, the price-specie-flow mechanism did not operate. In accordance with historical data, observed gold flows were too small to accommodate the trade imbalances. In this case, the domestic macroeconomic adjustment would be similar, in terms of its impact on prices and incomes, but through a different mechanism than that suggested by the specie-flow model (Bloomfield 1959).

“Far from responding invariably in a mechanical way, and in accord with some simple or unique rule, to movements of gold ... , central banks were constantly called upon to exercise, and did exercise, discretion and judgment in a wide variety of ways. Clearly the pre-1914 gold standard system was a managed and not a quasi-automatic one from the viewpoint of the leading individual countries.”
(Bloomfield 1959, p. 60)

Those who are in favor of the Gold Standard believe that an economy would benefit from both flexibility and stability of the Gold Standard concurrently. The primary advantage that has been associated with the Gold Standard is exchange rate and price stability. Exchange rate stability promotes a higher rate of international trade and, price level stability increases domestic specialization. Defenders of the Gold Standard have argued that most countries under the Gold Standard regime benefited from relatively rapid growth and low instability even though the evidence is less clear for the period of anemic growth between 1873 to 1896 (Bayoumi & Eichengreen, 1996).

Regardless, it is not strictly under the Gold Standard that tensions occur between the desires or need to maintain a fixed exchange rate and the desire to mitigate its adverse impacts on the

domestic economy. The history of the currency boards, as demonstrated in Argentina in 2001-2, and, indeed, the Euro-zone crisis of 2010-11, are other examples.

The Gold Standard system broke down at the outset of World War I. Under the confusion of a wide-scale war, each belligerent country, (except for the United States) that abandoned the Gold Standard, resorted to inflationary policies to finance the war, which could not have been possible under the Gold Standard. Consequently, national currencies were devalued and fell in relation to gold (Eichengreen, 1985).

After the war in 1918, efforts were made to revive the Gold Standard. Popular among politicians was the concept that the reestablishment of the Gold Standard could act as a key factor to bringing back the international economic system to the state it held prior to the war. By 1925, the Gold Standard system was widely re-established again. However, the Great Depression of 1929-33 ultimately led to the breakdown of the Gold Standard. Starting with the British in 1931, other countries under the Gold Standard system decided to end their partnership and discarded the Gold Standard monetary regime (Eichengreen, 1985).

2.2 Canada's participation in the Bretton Woods system

In 1944, the Bretton Woods³ system was established as a new monetary order to avoid worldwide economic disasters such as the one experienced in the 1930s. The Bretton Woods system promoted the U.S. dollar to the level of a international reserve currency with a fixed exchange rate of 35 US\$ per ounce of gold. The currencies of participating countries were tied to the U.S. dollar. As foreign currencies were pegged to the dollar, the gold rate could have been set for a long time in advance. The Bretton Woods System also bound the United States to redeem the participating countries' foreign dollar reserves for gold. The aim of the Bretton Woods system was to create a barrier-free world trade system based on fixed exchange rates. Two new institutions

³ The Bretton Woods Conference took place in July 1944 where representatives from 44 nations met in Bretton Woods, New Hampshire.

were created to manage the new monetary system. These were the International Monetary Fund (IMF) and the International Bank for Reconstruction (Powell, 2005).

The Canadian government decided to allow the Canadian dollar to float on September 30, 1950 by abandoning the Bretton Woods par value system.⁴ The IMF heavily criticized this decision because Canada was one of the key players in establishing the IMF and its departure from the Bretton Wood's system could have caused instability for this system as well as the IMF (Powell, 2005). After 10 years of maintaining a relatively stable Canadian dollar, Canada, acting as a 'prodigal son' and returned to the Bretton Woods system in May, 1962 after a period of controversial domestic monetary policies (Bordo et al., 2009). In 1957, after more than two years of strong growth, the economy began to experience a slowdown marked by a sharp increase in the unemployment rate. Observers began to question the wisdom of Canadian monetary policy, especially since the Central Bank continued to tighten monetary conditions until August 1957 (Schembri, 2008). The problem was caused by inappropriate monetary policy which Coyne⁵ was following. During this period, following a strong Canadian dollar, the economy experienced a high value of capital inflows. However, by the mid and late 1950's, the Canadian economy slowed down which resulted in a high rate of unemployment. James Coyne, who became Governor of the Bank of Canada on January 1st, 1955, decided to implement tight monetary policy in order to control the rising inflation and to reduce excessive demand. However, given a relatively high unemployment rate and low inflation, the implemented monetary policy led to higher unemployment and high interest rates. The Canadian economy experienced an additional capital inflow as a result of higher interest rates which contributed to the appreciation of domestic currency and a lower output (Powell, 2005).

At a time of a high unemployment rate, the federal and provincial governments agreed upon running expansionary fiscal policy to control unemployment. Although there were high hopes to

⁴ The floating started on October 3, 1950.

⁵ James Coyne was appointed Governor of the Bank of Canada on 1 January 1955.

combat the high unemployment rate, the expansionary policy resulted in higher interest rates and appreciation of the Canadian dollar. Consequently, the combination of tight monetary policy and expansionary fiscal policy had some negative impact on the Canadian economy. This can be attributed to the misalignment of contractionary monetary policy and expansionary fiscal policy under the floating exchange rate. The policy mix contributed to a higher interest rate and the stronger Canadian dollar, which caused output to fall (Schembri, 2008; Powell, 2005).

These series of incidents and recent management of domestic monetary, exchange rate, and fiscal policies eventually put pressure on James Coyne to resign from his position as the Governor of the Bank of Canada.⁶ The relatively poor performance of the Canadian economy and the controversy over monetary and fiscal policies led to the collapse of the floating exchange rate regime and therefore, Canada transitioned to a fixed exchange rate in 1962, only to return to floating rate in 1970. Since then the Canadian dollar has been allowed to float more or less freely, and since 1998 the Canadian dollar is one of a few currencies that floats freely internationally without central bank intervention (Schembri, 2008; Powell, 2005).

2.3 Debate over exchange rate regimes

Since the post war period, the debate over the adoption of the optimal exchange-rate regime has become one of the most important issues among economists when choosing between microeconomic efficiency and macroeconomic stability. This debate fostered different opinions among policy makers regarding the merit and demerit of various exchange rate regimes.

Economists have held various opinions on the issue of adoption of the most proper exchange rate system which has inspired a long lasting debate among them. In this regard, I wish to call attention to the different points of view between Milton Friedman and Robert Mundell. Although these two Nobel laureates, share many common views, the issue of the exchange rate

⁶ Powell (2005) provides an insightful analysis of the events surrounding the resignation of Governor Coyne.

system produced a long-lasting debate between them. The argument for a floating exchange rate system was first proposed by Friedman.⁷ However by 1970, Mundell discarded his earlier⁸ belief in favor of the floating exchange rate. In this framework, he argued that exchange rate volatility increases capital risk and consequently leads to capital market disruption (see Mundell, 1973a, 1973b). As most economists during the postwar period, Mundell held the same Keynesian view indicating that the implementation of effective monetary and fiscal policy could actively manage the aggregate demand and maintain macroeconomic equilibrium mainly by offsetting the presence of the demand and supply shocks (McKinnon, 2004). In Mundell's earlier writings, he states the benefits associated with a flexible exchange rate as follows:

“Consider a simple model of two entities (region or countries), initially in full employment and balance of payments equilibrium, and see what happens when the equilibrium is disturbed by a shift in demand from the goods in entity B to the goods in entity A. Assume that money wages and prices cannot be reduced in short run without causing unemployment, and that monetary authorities act to prevent inflation....

The existence of more than one (optimum) currency area in the world implies variable exchange rates... if demand shifts from the products of country B to the products of country A, a depreciation by country B or an appreciation by country A would correct the external imbalance and also relieve unemployment in country B and restrain inflation in country A. This is most favorable case for flexible exchange rates based on national currencies.”(Mundell, 1961, pp. 510-511)

⁷ See Friedman's article “The Case for Flexible Exchange Rates”, which was published in 1953.

⁸ For instance, see Mundell's (1961) article “A Theory of Optimum Currency Areas”.

Therefore, Mundell believed that the choice of exchange rate flexibility along with monetary independence is the proper decision for a nation in order to deal with asymmetric shocks. Consequently, during the 1960s, the theory of adopting the floating exchange rate system was presumed to be an efficient factor leading to economic stability. This was favored by many other economists including Mundell (McKinnon, 2004).⁹

However, not only did Mundell's opinions regarding the choice of floating exchange rate regime not stay intact, he also decided to begin a movement based on an opposite theory. Subsequently, by the 1970's Mundell discarded his earlier presumption in favor of flexible exchange rates. He argued that exchange rate volatility increases capital risk and thus leads to capital market disruption (Aliyu & Usman, 2009).

According to Mundell (1973a, 1973b) a floating exchange rate, while implementing a smoother exchange rate regime, creates uncertainty. Moreover, exchange rate movements do not play a stabilizing role when facing asymmetric shocks because the foreign exchange rate market is dominated by the exchange rate dealers' actions rather than economic fundamentals (De Grauwe, 2000). This means that any changes in expectation of those foreign exchange rate dealers regarding the future movements of the exchange rate can influence exchange rate movements.

Furthermore, Mundell (1973a) did point out that under a common currency, a given country, while suffering from an adverse shock, can minimize or reduce the risks associated with its domestic currency assets on the world market. As Mundell states:

“A harvest failure, strikes, or war, in one of the countries causes a loss of real income, but the use of a common currency allows the country to run down its currency holding and cushion the impact of the loss, drawing on the resources of the other country until the cost of the adjustment has been efficiently spread over the future. If, on the other hand, the two countries use separate monies

⁹ Such as Friedman (1953) and Johnson (1972).

with flexible exchange rates, the whole loss has to be borne alone; the common currency cannot serve as a shock absorber for the nation as a whole except insofar as the dumping of inconvertible currencies on foreign markets attracts a speculative capital inflow in favor of the depreciating currency. (Mundell, 1973a, p. 115)

Clearly, viewing the exchange rate adoption topic from different points of view along with considering different factors by economists, have created a lot of diverse ideas. For instance, while Milton Friedman advocates a flexible exchange rate, Robert Mundell is the leading advocate for a fixed exchange rate and common currency. The main difference among economists' opinion is the consequence of their views on how a particular exchange rate regime may affect the economy along with its cost-benefit analysis. Indeed, the cost-benefit analysis of the optimal exchange rate regime differs across various countries. In fact, an optimal exchange rate regime for a particular country may not be the best for another country (Salvatore, Dean, & Willett, 2003).

Canada has been operating under the floating exchange rate regime since 1950. An exception to this was a short period from 1962-1970 when the dollar was pegged at 1 Canadian dollar = 0.925 US dollar (Bougrine & Seccareccia, 2004). After the breakdown of the Bretton Woods system, some countries, including Canada, opted for a floating exchange rate. The floating exchange rate regime means that a country's domestic currency could float freely against other currencies in order to respond to market forces. These market shocks influence the Canadian dollar as they impact currency transactions. Following this, currency transactions are usually measured in either the current account or the capital account of Canada's international balance of payment (Seccareccia, 2002).

Canada has chosen a floating exchange rate regime which is thought to be the most appropriate exchange rate system for domestic economy. However, the current exchange rate regime has recently been aggressively under attack. The Canadian dollar fluctuation over the years

has given reasons to oppose the current exchange rate regime. Hence, the movement of the Canadian dollar has been attributed to causing economic problems. In fact, since the abandonment of most fixed exchange rates in 1970, the Canadian dollar has been fluctuating sharply in response to the possible fundamentals that define its movements. Therefore opponents of the flexible exchange regime have been arguing that Canada's floating exchange rate has not served the country's economic interests. For instance, the depreciated Canadian dollar reduced domestic assets to bargain basement prices for U.S. investors, and had given motivation to Canadian employers to move south of the border. According to Harris (1993), who is one of the main opponents of the current exchange rate regime, "Floating exchange rate provide inherently volatile and unpredictable cost structures" whereas "stable and predictable rates of international exchange and cost calculations to support the volumes of trade and degree of specialization associated with [this trade]." (Harris, 1993, pp. 39-40)

Following the same argument, Courchene and Harris (1999) maintained that the exchange rate misalignment put negative pressure on productivity and competitiveness.¹⁰ They argued that, both overvaluation and undervaluation hurt the economy. Although during an undervaluation period, Canada may experience a higher rate of exports, along with higher productivity, a lower Canadian dollar is detrimental to Canada's economy in different ways. The two main costs that have been noted in their arguments against the current exchange rate regime are: First, it would be costly for manufacturers that are dependent on a high share of imports and intermediate goods, to import their necessities during such a period. The second issue is the relative shift in incomes from wage to profit; this may boost the motivation of Canadian skilled workers to move as wages in the U.S. increase in comparison to Canada. During the short run, industries would withstand the situation by increasing wages and cutting prices in order to maintain their share of the market. However, when the situation lasts longer, they would have no choice but to increase wages to

¹⁰ Exchange rate misalignment is defined as a deviation from the real exchange rate predicted by benchmark.

prevent skilled workers from migrating south. The high labor cost relative to capital makes Canadian industries shift toward the resource based industries with high capital intensity. Undoubtedly, this is not a positive sign for the economy while human capital is the main factor in creating the economic growth.

Although these symptoms sound alarming, this does not warrant blame to the current exchange rate system for causing these harmful damages to the Canadian economy. Furthermore, abandoning the floating exchange rate in an attempt to preserve the economy could result in other negative consequences that will be elaborated upon later. However, whether the Canadian exchange rate is a principal threat to the domestic economy has yet to be thoroughly proven.

Contrary to what has been proposed by opponents of floating exchange rates, proponents believe that when costs and benefits of floating and fixity are weighed together, benefits and advantages of the floating exchange rate have proved to be worth far more than its costs.

2.3.1 Independent floating exchange rates: Monetary accommodation

Before examining the advantages and disadvantages associated with the floating exchange rate, there are important conditions which have to be met in order to obtain the benefits associated with this regime (Murray, 2000). A given country under the floating exchange rate regime has the ability to operate an independent monetary policy. The effectiveness of monetary policy for a country under the flexible exchange rate depends on the monetary policy objectives, the capability of monetary authorities to achieve those objectives and the structure of the economy. If a country under the flexible exchange rate demonstrates the same ability to conduct its domestic monetary policy as a country under the fixed exchange rate, that country would gain nothing from having the benefits associated with an independent monetary policy. Therefore, if a country does not have a good history of implementing monetary policy, not having monetary independence may be

considered as an advantage for that country, since it would prevent that economy from adopting inappropriate policies (Murray, 2000).

In addition to this, the institutional and structural characteristics of a country play an important role in determining the choice of a currency regime. For example, assuming there are two countries, with the same structure and under the same shocks; if their currencies are linked to each other, there would not be much loss since those economies have to respond to the shocks in the same manner and it is probable that their currency fluctuations would follow the same trend. In this case, by maintaining a separate and floating currency, those economies would not gain much benefit (Murray, 2000). However, this does not signify that if two countries have the same structure, along with experiencing similar shocks, they must necessarily opt for identical exchange rate regimes. Should these countries still want to pursue different economic policies, sharing similarities would not be a deterrent for adopting their choice of an exchange rate regime.

In addition to different policy objectives, being under different shocks and having skills to implement efficient monetary policies, there are further conditions which are needed in order to benefit from adopting a flexible exchange rate. One such factor is price and wage stickiness. There are some economists who would argue that, if a country is experiencing flexible wages and prices, the economy can adjust itself under the external and internal shocks and can also maintain full employment. Therefore, in this case, there is no need for a flexible exchange rate and a given country would not gain the advantages of a flexible exchange rate as a buffer to facilitate the adjustment process. The same case is applicable when major factors of production, including capital and labor, are highly mobile across the economy. In such a situation, when an external or internal shock hits the economy, the adjustment process would proceed without the necessity of changing prices. In this case, production factors would react to the shocks and reallocate across the regions and industries. However, realistically, none of these conditions could be met. Thus, it would not be beneficial for a country to adopt a fixed exchange rate (Murray, 2000).

One of the benefits that the flexible exchange rate system could bring for a country is to help the policy-makers by giving them extra tools to stabilize the economy. However, the choice of a flexible exchange rate regime may not provide enough benefits to maintain economic stability. For instance, in an ideal situation, when a shock hits an economy, a high amount of fiscal transfers could be used to provide short-run stabilization. This could be done by giving subsidies to those who are impacted by the shock or by offering support to workers who have lost their job for a short period of time until the economy is recovered from the shock. However, reality proves to be more complex. For instance, trading partners that are engaged in competition may complain about the given subsidies, and more importantly, when shocks affect the economy, it might be difficult to reverse the stabilization tools, i.e. eliminate subsidies and support for those sectors that are negatively affected by shocks (Murray, 2000).

After taking these conditions into account, along with certain other factors, it can be concluded that opting for the floating exchange rate regime would introduce numerous benefits to a given country on different levels. In general, supporters and opponents agree on two main benefits associated with the floating exchange rate.¹¹ Many economists believe that changes in the market demand and market supply of a currency are reinforcing factors to move the currency value. This change can be referred to as “the shock absorbing effect” of the floating exchange rate regime; i.e. the ability to act as a buffer against the economic shocks (Seccareccia, 2002). The importance of the floating exchange rate regime’s role to act as a shock absorber would benefit the economy by protecting it against overseas disturbances. For instance, supporters in defense of Canada’s flexible exchange rate rely on the economic history of Canada. During the Asian Crisis of 1997, Canada experienced a significant currency decline. However, as the world economy recovered from a period of slower growth a few years later, the Canadian dollar started to appreciate. Such movements in the exchange rate have played a major role as a buffer on the

¹¹ See Seccareccia, CCPA 2002.

Canadian economy. For instance, although Canada experienced temporary currency depreciation in 1997, without the advantage of having the floating currency, the domestic economy would have experienced a recession, a higher interest rate and job losses (Eichengreen, 2001; Seccareccia, 2002). Clearly, the movements of the Canadian dollar during the 1990s demonstrated the importance of the floating exchange rate and its crucial role in stabilizing the economy.

The second, and the most important, advantage associated with the floating exchange rate is having monetary policy independence; under the flexible exchange rate regime, monetary policy is implemented to stabilize the economy (Corbo, 2001). For instance, when a given economy is hit by a demand shock, the best way to preserve the economy from recession is to implement monetary policy. Therefore, execution of monetary expansion along with currency depreciation could pull the country out of a recession. This occurs on account of domestic goods becoming more competitive in the international market, which in turn would contribute to a higher level of output and employment. However, under any alternative monetary regime, the potential benefit from the monetary independence might be futile.¹²

By forgoing potential benefits, there are certainly disadvantages associated with the choice of the floating exchange rate. Nothing is complete in this world and economic policies and theories are not excluded from this rule. Opponents of the floating exchange rate argued that the flexible exchange rate system has the disadvantage of high real and nominal exchange rate volatility. Some scholars in the field argue that countries have a supposed ‘fear’ of adopting the flexible exchange rate system due to the commercial risk associated with exchange rate adjustments with regard to currency mismatch or the effect of the nominal exchange rate on inflation (Corbo, 2001). However, it is important to note that this effect is not as strong as it is thought to be and thereby cannot be interpreted as a critical issue (Obstfeld & Rogoff, 2000).

¹² In reality, even under more restrictive fixed exchange rate regimes, this would not prevent countries from conducting independent monetary policy. For instance, in case of China, there is upward pressure on its domestic currency and they hold large amounts of reserves. Consequently, despite having a fixed exchange rate, China is still able to run monetary policy by cutting interest rates, as it did following the financial crisis.

These disadvantages associated with the flexible exchange rate, such as currency risk premium¹³ and currency mismatch, are manageable through appropriate financial regulation (Corbo, 2001). Moreover, there are some other factors that are claimed to cost the Canadian economy under the floating regime, i.e. having loose fiscal policy, a lower trade level along with lagging productivity growth and a lack of competitiveness in the international market. The question of whether choosing a floating exchange rate would cause these negative aspects on the domestic economy and its possible dangers will be thoroughly discussed in following sections.

In this context, opponents of the flexible exchange rate regime have proposed different remedies to help this economic situation quickly. One suggestion, which, on some levels is the harshest option, proposes to eliminate the Canadian dollar and replace it with an alternative choice under a different exchange rate regime. Subsequently, in the following sections, the options proposed by opponents of the floating currency will be clarified. Furthermore, this paper will explain why an alternative monetary regime would not be a proper choice for the domestic economy.

2.3.2 Alternative road to monetary system

Resulting from the growing concern with combating inflation and central bank policy credibility, by the mid-1980s, many policy-makers and authorities such as the IMF reached a consensus in favor of a fixed exchange rate regime, since it was generally believed that the fixed exchange rate was able to stabilize the inflation rate. Moreover, it was assumed that a fixed exchange rate system would result in lower real exchange rate volatility, which could have a significant impact on resource allocation. Therefore, it was concluded that fixed exchange rate adoption would reduce any inefficiency in resource allocation, and this would result in a higher rate of foreign trade and economic growth (Corbo, 2001). However, this consensus collapsed

¹³ The risk premium is defined as the expected excess return to foreign currency.

during the 1990s, as a result of many severe currency crises in the world including the Mexican crisis in 1994. Therefore, due to the high level of capital mobility during the post war period, a new approach started to develop. This indicated that a floating exchange rate system and fixed exchange rate regime, such as a currency board arrangement, were reasonable exchange rate systems because they both provide flexibility, which prevents an economy from being faced with the effects of a currency crisis (Berg & Borensztin, 2000).

There is a consensus nowadays that, with today's high amount of capital mobility, the adjusted pegged exchange rate regime, which had been used during the post war period, could lead to a currency crisis. The Asian crises, which occurred in 1997, were a result of adopting peg exchange rates to the U.S. dollar by five Asian nations. While such a policy of pegging the exchange rate in many Asian countries ensured the stability of the nominal exchange rate relative to the U.S. currency, it also had its own consequences for the Japanese yen as a result of the U.S. dollar changes. During this period, Asian countries experienced a real depreciation as a result of the U.S. dollar weakness relative to the Japanese yen. Therefore, because of the appreciation of the U.S. dollar during 1996, the value of Asian currencies began to appreciate relative to the Japanese yen (Salvatore, Dean, & Willett, 2003). Ito (2000) explained the contribution of the Asian Crisis in 1997 as a result of pegged Asian currencies to the U.S. dollar as follows:

“The exchange rate regime was de facto dollar pegged. In the period of yen appreciation, Asian exporters enjoy high growth contributing to an overall high, economic growth, while in the period of yen depreciation, Asian economies' performance becomes less impressive...Moreover, the dollar peg with high interest rates invited in short-term portfolio investment. Investors and borrowers mistook the stability of the exchange rate for the absence of exchange rate risk” (Ito, 2000, p. 280)

Hence, many economists agree that the intermediate regimes are likely to eventually collapse (Summers, 2000; Fisher, 2001; Klein & Marion, 1997). However, the question of which exchange rate regime is most appropriate for countries has become a subject of heated debate. Some countries have tended to adopt a more flexible exchange rate, while, on the other side, some have decided to pursue a more fixed exchange rate. The exchange rate regime may be adopted by different methods. These consist of the adoption of a new common currency (which occurred in the Euro-zone), a currency board arrangement and tying directly via peg one currency to that of others (Salvatore, Dean, & Willett, 2003).

The debate over the most appropriate exchange rate regime has become a concern again after a series of crises during 1990s. All countries which suffered from the crises had some sort of fixed exchange rate regime. This is not a surprising fact since the exchange rate system has a mechanism which can affect the economy, particularly through price and wage flexibility during the economic shocks. Surely, all countries are prone to nominal and real shocks; in this sense, real shocks, which indeed play a key role in explaining business fluctuations, refer to changes in trade and aggregate demand such as investment and government spending. Conversely, nominal shocks refer to changes in the interest rate and the nominal stock of money. The exchange rate regime that a country adopts may be critical to an understanding of one's capacity to respond to real exchange rate variability. Furthermore, the choice of adopting a proper exchange rate system is crucial since it is a key factor in implementing a successful monetary policy (Corbo, 2001).

Each of these three exchange rates regimes, namely the currency board, dollarization and monetary union can have different influence on the economy in terms of, "seigniorage"¹⁴, interest rate premium, financial depth, access to lender of last resort¹⁵ and influence on decision role"

¹⁴ The amount of revenue that governments obtain by issuing new money in a given period in order to acquire real resources.

¹⁵ Central bank of a country that has the authority and financial resources to act as the ultimate source of credit.

(Williamson, 2000, p. 172). This paper will briefly discuss each of these exchange rate regimes and explain why none of these can serve as “the light in the darkness” for the Canadian economy.

2.3.3 Dollarization: The end of monetary sovereignty

The U.S. dollar dominates the world international financial markets and countries respond differently to this dominance. Some countries decide to give up their own domestic currency and choose the U.S. dollar, namely dollarizing, as it happened in Ecuador and Panama¹⁶ (McKinnon, 2004). Dollarization has its own supporters who praise this monetary system based on the advantages that it could provide to the economy. However, it is an obvious fact that dollarization also has its own disadvantages which makes it a less attractive choice for Canada.

In this sense, advocates of dollarization believe that dollarization does not lead to a currency crisis. Since a domestic currency does not exist, by definition there would be no depreciation which could lead to further capital outflow as a result of uncertainty and fear caused by depreciation. While dollarization reduces the risk of currency crises by the elimination of exchange rate risk, it cannot free a country from other external crises such as a debt crisis engendering sovereign risk¹⁷. A debt crisis can occur for different reasons. For instance, one reason could be budget imbalance resulting either from increased spending or from low revenues (Berg & Borensztin, 2000).

Another benefit associated with dollarization that is advocated by its supporters is its ability to facilitate economic integration with global economies by lowering transaction costs and maintaining the prices at a stable level. When a country opts for dollarization, its citizens are not financially penalized in international trade because any step regarding exchanging local currency to the U.S. dollar and hedging in foreign exchange market has been eliminated. Hence, dollarization would increase international trade and investment (Salvatore, 2001). Moreover,

¹⁶ Panama (since 1904), Ecuador (since 2000).

¹⁷ Sovereign risk is the probability that a country may not pay its debts. This may lead to a debt crisis.

dollarization allows banks to reduce their reserves since there is no need for them to distinguish between foreign and domestic currency deposits. For instance, after the official dollarization in Panama, banks were able to hold 5 percent less reserves compared to the period during which it was not a dollarized country (Moreno-Villalaz, 1999).

Maintaining a low inflation rate is another advantage of dollarization which is commonly advocated by its supporters. This would trigger lower interest rates and influence consumer and corporate demand positively. Thus, this could generate a substantially higher investment. When a country opts to abandon its domestic currency by adopting the U.S. dollar, it would demonstrate the same inflation and interest rate as the U.S. This tends to facilitate investment which contributes to a higher rate of economic growth. For instance, fully-dollarized Panama experienced a lower inflation rate compared to Argentina and Brazil which were not dollarized completely. The reason for a similar inflation rate between the U.S. and a dollarized country is related to the inability of conducting monetary policy by dollarized nations. Consequently, having a similar inflation rate, could contribute eventually to a lower interest rate for dollarized countries at a comparable level to the U.S. Despite their loss of monetary policy instruments, the lower inflation rates and interest rates can still be beneficial to the nation as the latter could lead to increased consumer spending and business investment (Salvatore, 2001).

Additionally, proponents argued that dollarization promotes trade among dollar-zone countries which would not be viable in other cases. Dollarization is claimed to help eliminate trade controls. Also, when it is required to balance the deficit, it can be done through higher taxes instead of issuing central bank money through inflationary financing. Dollarization could also help foster financial integration, which contributes to a higher rate of capital inflow to a dollarized nation through investment. Hence, it is claimed to stimulate economic growth (Salvatore, 2001). An example to the existence of this argument is identified by McCallum (1995), who states that the Canadian provinces tend to have 20 times higher the volume of trade between each other than with the United States.

According to advocates of dollarization, the main reason for this is the existence of a common currency between the Canadian provinces. Using a common currency is associated with a lower transaction cost and trade, which could explain the higher rate of trade between Canadian provinces. Furthermore, exchange rate movements have an effect on prices of non-tradable goods and result in a difference in prices across countries. In this context, Mussa (1986) has made the same argument that the adoption of dollarization would promote a higher rate of trade and integration between the United States and Canada. Moreover, it is argued that dollarization would improve the integration of financial markets. Since currency risk is the main reason for causing volatility in financial markets, by the elimination of currency risk, the financial market may become a more stable system.

Supporters have claimed that dollarization improves the current account balance and maintains economic stability. However, it has to be taken into account that all these arguments are based on a very limited empirical and historical analysis. Supporters of this system use Panama's¹⁸ success with dollarization as an example to indicate dollarization's correlation with a low interest rate, high economic stability and low inflation (see Moreno-Villalaz, 1999; Bogetic, 2000). In fact, Edwards's (2001) studies on the economic performance of 11 dollarized countries, including Panama, showed that, except for the inflation rate which was obviously lower in dollarized countries, other findings reject the proponents' argument. In his studies, dollarized countries had a significantly lower GDP growth than other countries. Moreover, there was no significant difference in the current account balance among these countries. Indeed, although Panama achieved a higher rate of growth than other dollarized countries, it was not fundamentally different compared to non-dollarized countries (Edwards, 2001). Additionally, Panama has been highly dependent on IMF programs and has implemented nearly 17 programs since 1973. The main factor behind the IMF program was Panama's inability to control its public finance because of a high rate

¹⁸ Panama's full dollarized experience (1970 - 97)

of fiscal deficit (Edwards, 2001). Moreover, advocates of dollarization claimed that a country under the fixed exchange rate regime can eliminate the exchange rate risk which results in a lower capital cost in international market. However, observations indicate that the cost of capital in the international market was not as low as expected in Latin American countries (Edwards, 2001).

Finally, the last benefit, claimed by those who argue in favor of dollarization, is its ability to eliminate exchange rate fluctuations, which could lead to more stable capital flows in the global market. It has been argued that if they achieve more stable level results of capital movements, investors would have a higher level of confidence associated with increased investment and growth (Berg & Borenstein, 2000; Dornbusch, 2001; Rose, 2000; Rose & Van Wincoop, 2001). In contrast, as stated by Eichengreen (2001), there is no evidence indicating that any exchange rate regime would be a fundamental factor in supporting a higher rate of growth. Therefore, arguments presented by supporters of dollarization who refer to its ability to foster economic growth by any means are not reliable.

With regards to the benefits associated with the choice of dollarization, its proponents have been claiming that it is possible to estimate how much a country has benefited after abandoning its currency and converting to a dollarized country (Salvatore, 2001). However, there is no direct way to measure the complete benefits gained by adopting dollarization (Eichengreen, 2001).

Indeed there are serious negative implications associated with dollarization. Loss of seigniorage is one of many disadvantages of dollarization (Berg & Borensztin, 2000). Therefore, a dollarized country could experience a potential loss of seigniorage. Seigniorage is the revenue that a government raises by issuing its own currency and it can be thought of as an interest free loan. Monetary authorities use seigniorage to finance debt or to engage in the purchase of foreign assets. A dollarized country loses its seigniorage to the United States. In general, there are two types of seigniorage loss associated with dollarization: First, there is the cost of purchasing back the domestic currency in circulation which is known as “stock” cost. Some countries may not have enough foreign reserves to buy their domestic currency and dollarize; consequently, these

countries would experience further indirect costs. If a country cannot borrow reserves in order to buy its local currency in circulation, that country has to run a current account surplus to collect enough reserves to dollarize, which is associated with lower investment. However, countries that are able to borrow the required amount of reserves can accumulate a higher governmental debt, which itself could lead to a debt crisis. The second type of loss is when a dollarized country loses its seigniorage revenue. Countries earn seigniorage from issuing domestic currency. Therefore, under dollarization arrangements, countries that become officially dollarized abandon the seigniorage. Furthermore, countries that engage in dollarization lose control over their domestic monetary and exchange rate policy and their central bank would thus no longer be able to issue its own currency which is detrimental to a country's economy since it could prevent the conduct of a desired macroeconomic policy (Berg & Borensztein, 2000).

Monetary Sovereignty is the foundation of economics. In fact, countries that have monetary sovereignty are able to limit the risk of bankruptcy. These countries have the potential to issue their own currency and pay off their debt without having the need to tax or borrow. There are few exceptions to this. In fact, for countries with a high rate of inflation, such as Latin American countries, choosing dollarization might assist in giving credibility to a policy of monetary stabilization. Since Canada has a lower inflation rate than the United States, converting to dollarization may not be an appropriate option (McCallum, 2000). However, Eichengreen (2001) claims that dollarization is not even a good option for countries with a high rate of inflation and disorganized economies.

“ Countries with screwed up banking systems, budgets, and labor markets will perform miserably when the exchange rate is collapsing and inflation is running out of control, but they will perform just as miserably if the national currency is replaced by the dollar and these other problems remain unsolved.”
(Eichengreen, 2001, p. 269)

According to Edwards (2001, p. 13), “...recent push for dollarization is a typical case of misleading advertisement. Most dollarization supporters have either ignored the record or have embellished it. The reality is that the historical record is very limited and concentrated on tiny countries.”

Hence, as it is widely discussed in macroeconomic literature, the exchange rate adjustments are necessary during the cyclical process of an economy. At a point in time when exchange rate depreciation is required in a country, the fixed exchange rate regime along with price and wage rigidities, could lead to unemployment and slower growth (Dornbusch, 1980).

Considering both the disadvantages and benefits associated with dollarization, and note that all the benefits that are claimed are theories which are not often supported by empirical incidence, most economists in Canada would argue that dollarization is not an appropriate choice of monetary system for Canada. Concrete evidence for this claim is derived from examining how dollarized countries adapted to this regime. Even if countries under dollarization were more successful than others in terms of long-run growth, this would still not encourage supporters of greater monetary integration to promote the elimination of the Canadian dollar from circulation.

2.3.4 The Currency Board versus the Central Bank

Another alternative option, discussed among opponents of the current status quo regime, is the adoption of a currency board arrangement. The currency board is a country's monetary authority, which pegs the exchange rate of the local currency to a foreign currency and issues currency based on predefined foreign currency entry (Seccareccia, 2002). A key issue in the debate over dollarization and currency board is monetary sovereignty. Any attempt to replace the central bank will reduce monetary sovereignty, which will in turn trigger the loss of political sovereignty. This possible outcome is assumed to be acceptable and this issue has not received the expected attention it deserves. For instance, James Tobin (1998, p. 7) illustrates that, “While globalization

of financial marketshas contributed importantly to the economic progress of developing and emerging economies and can continue to do so, these trends also threaten the monetary sovereignty of these countries”. Tobin and others¹⁹ never defined the meaning of sovereignty. For many countries, a reduction in monetary sovereignty may bring more economic progress (Schuler, 2003). Following this, Mundell (1997) defined monetary sovereignty as follow:

“Monetary sovereignty can be broken into three parts: a) the right to determine what constitutes the unit of account —the commodity or token in which price lists are specified; b) the right to determine the means of payment—legal tender for purposes of the discharge of debt; and c) the right to produce money—or else determine the conditions under which it is produced by others.” Robert Mundell (1997, p. 14)

Therefore, countries that adopt a currency board forgo active monetary policy. In a currency board arrangement, a monetary authority is not able to act as a lender of last resort because a currency board minimizes the discretion for monetary authorities to control the money supply. However, when compared with dollarization, Canada would still be able to use its domestic currency and acquire seigniorage revenue that is somewhat lower under currency boards than under sovereign central banks. Under a currency board arrangement, the domestic currency in circulation is backed by foreign currency reserves. The interest rate on foreign reserves is the key factor in determining the benefits gained under a currency board regime. Under a currency board, the central bank is not able to expand domestic currency. Instead, that growth rate is dictated by its net foreign reserves. Argentina and Hong Kong are most prominent examples of a currency board (McCallum, 2000; Seccareccia, 2002).

Typically, countries that suffer from hyperinflation have often considered currency board adoption even though the currency board penalizes them; Argentina’s severe recessions over the

¹⁹ See Aliber, 1968 and Clark and Grubel 1972

1990s serves as a fitting example. Some have argued that implementing a currency board is not a proper choice for Canada since the Bank of Canada would not be able to act as a lender of last resort and the government would be subjected to the whims of the financial markets because of its inability to conduct monetary policy (McCallum, 2000; Seccareccia, 2002).

“ Those who favor this set up in Argentina believe, among other things, that under their currency board system, they have already borne most of the cost of dollarization, but they are not yet enjoying dollarization’s full benefits” (Summers, 2000, p. 231)

2.3.5 North American Monetary Union (NAMU); A misleading solution to a crisis

In line with arguments in favor of an alternative exchange rate regime, some push the argument that Canada has to negotiate a monetary union with the U.S. and its other NAFTA partner, Mexico. The North American Monetary Union (NAMU) is the name given to the concept of a shared currency arrangement between Canada, the United States, and Mexico. It has to be pointed out here that one of the disadvantages associated with the choice of monetary integration is that Canada would probably lose monetary independence because of its incapacity to conduct monetary policy and loss of seigniorage revenue (Seccareccia, 2002).

In this context, advocates of a greater monetary union, namely NAMU, argue that under this monetary regime each NAFTA partner would have an equal voice to support their own ideas. This is similar to the European Central Bank in which each government has the opportunity to have an equal voice. Courchene and Harris (1999) explain:

“While a NAMU is not on the immediate horizon, there is nonetheless an urgent need to place the currency union issue on the public policy agenda. Policy developments within the NAFTA and elsewhere in the Americas appear to be moving quickly in the direction of dollarization. Since widespread

dollarization could preclude the emergence of a NAMU by reducing the advantages the United States would garner from it and since...a NAMU would be preferable to dollarization from a Canadian perspective, Canada must become engaged on this issue with its NAFTA and hemispheric partners—and sooner rather than later.” (Courchene & Harris, 1999, pp. 3-4)

However, this is not easily achieved and having a seat would not guarantee that Canadians would be able to speak for themselves and gain support for their interests since America is a nation that prefers unilateralism in its conduct of policy. In light of this argument, McCallum (2000) and Clarkson (2000) further explain:

“The European Union model, in which independent states share decision-making and sovereignty, is alien to American thinking and American history.”
(McCallum, 2000, p. 2)

and,

“American politicians’ tenacious determination to retain every possible speck of national sovereignty would make it very hard to sell the idea that Canada... should be granted membership in a continentalized Federal Reserve Board.”
(Clarkson, 2000, pp. 155-156)

This idea regarding a greater monetary union was first initiated as a result of both the Free Trade Agreement (FTA) between Canada and the U.S. and the North American Free Trade Agreement (NAFTA), when Mexico joined in 1994. In part, the North American Monetary Union, as proposed by its advocates, would be modeled based on the European Union (Grubel, 1999; Seccareccia, 2002).

“The successful launch of the euro at the beginning of 1999, the prospect of official dollarization in Argentina and Mexico, and the poor performance of the Canadian economy in recent years have prompted a growing interest in monetary union in North America.” (Grubel, 1999, p. 318)

Grubel (1999) who has been one of the leading proponents of a greater monetary union explains that a new currency would be created and replaced on the national currencies of these three countries. The North American Central bank would be established and operate in a similar manner as the European Central Bank. Grubel (1999) in “the case for Amero”, introduced the idea of the North American Monetary Union as follows:

“On the day the North American Monetary Union is created—perhaps on January 1, 2010—Canada, the United States, and Mexico will replace their national currencies with the Amero ...In all three countries, the prices of goods and services, wages, assets, and liabilities will be simultaneously converted into Ameros at the rates at which currency notes are exchanged. At the same time, the national central banks of the three countries will be replaced by the North American Central Bank. The operations of that bank will be governed by a constitution like that of the European Central Bank, which makes it responsible solely to maintain price stability. It is not required to pursue full employment or maintain exchange rates. Its personnel policies would be free from political influences, in particular those arising out of partisan national politics in member countries. ... As in Europe, membership in the union will require that countries do not incur persistent budget deficits. The Amero notes and coins will have in common abstract designs on one side. Notes and coins will be produced in each of the three countries according to their own demand and show national symbols on the other side...” (Grubel, 1999, p. 5)

Courchene and Harris' argument for a monetary union relies on the notion that a flexible exchange rate has not performed well for the Canadian economy. There has been much attention surrounding NAMU and its advantages presumed by its defenders. The claimed benefits associated with this monetary union are briefly outlined as follows: Firstly, interest rate differentials could be lower under the common currency rather than flexible exchange rate and therefore, Canada would gain substantially more under the common currency union. Grubel (1999) argued that one of the reasons Canada should embrace NAMU is to strengthen economic ties with the U.S., thereby leading to a greater economic performance for Canada. It has been extensively noted by proponents of this policy that the U.S. is Canada's main trading partner and approximately 80% of total Canadian trade is with the U.S. Furthermore, Courchene and Harris (1999) stated that no such trading relationship exists among European countries. Therefore, due to this high volume of trade between Canada and the U.S., Courchene and Harris suggest that Canada opt for a common currency. Moreover, as noted by its advocates, under NAMU, Canadian firms would not experience hedging costs. Should there no longer be two currencies, those who hedge exchange rate risk would no longer find it necessary to do so, and costs associated with providing necessary information on the price of currencies would no longer be necessary. Borrowing costs would be lower as a result of interest rate reduction. Unlike dollarization, under NAMU, the Bank of Canada could persist. However, Canada would have to adjust to shocks differently because the exchange rate would no longer be used as a monetary policy in order to absorb shocks hitting the economy. Therefore, Canada has to respond to a shock via changes in prices and wages.

As mentioned before, under NAMU, the Canadian dollar would be replaced by a new common currency. Assuming that all benefits claimed are true, the replacement operation alone would be more costly in comparison to the recent economic issues. However, advocates estimated the cost of converting the currency to be approximately 0.5% of GDP (Courchene & Harris, 1999). However, advocates of a greater monetary union, have been promoting NAMU by focusing on its

advantages. In order to determine whether NAMU is the best alternative monetary union, its characteristics need to be examined in more detail.

As claimed by its advocates, NAMU has the potential to decrease the risk associated with trades in foreign exchange rates. A third party is necessary to buy and sell foreign exchange among North American countries for trading purposes. There are some financial derivatives that use speculation for future contracts in order to minimize the risk associated with exchange rate variability. But under the monetary union, these future contracts would no longer be necessary. The savings which would result from this elimination is difficult to estimate. European Union savings were estimated by the Delors Commission Report based on a special survey of banks and some private agents.²⁰ This report suggests savings, for the average European country, to be approximately half a percent of their national income. Given the trade and financial flows between Canada and the United States, some have estimated the savings to be a little less than half of one percent of the country's annual spending (Grubel, 1999).

As mentioned earlier, defenders of a greater monetary union propose that a monetary union with the United States would lead to lower interest rates for Canada. This is primarily because it would eliminate exchange rate risk (Grubel, 1999). In this case, Clinton (1998), an economist for the Bank of Canada, links the interest rate gap between the U.S. and Canada to the risk of currency depreciation. Grubel (1999) claims that a common currency would eliminate the interest rate gap between Canada and the U.S. which is due to the currency risk. For this reason, a lower interest rate in both countries increases investment and leads to a higher productivity rate and standard of living (Grubel, 1999).

Additionally, a greater monetary union is assumed to provide lower transaction costs which could have the same effect of a decrease in tariffs and transportation costs. In this regard, there are some mixed opinions that are established in economic theories. As stated in traditional economic

²⁰ The original estimate is reported in "Delors Commission Report" (1989).

theories, reductions in transaction costs do not have a great influence on trade level. However new theories in international trade counter traditional theories. A lower transaction cost may increase the trade for specific products which in turn would trigger the production of that specific product (Grubel, 1999). Harris and Cox (1983) studied the impact of free trade on an economy and found that a country would gain 5 to 10 percent of its national income under the free trade condition. Consequently, those in favor of NAMU believe that a similar gain would be expected by joining a monetary union.

Furthermore, that monetary union may have an impact on the labor market. The Delors Commission Report (1999, p. 47) illustrates that a monetary union is able to increase labor-market efficiency. This result stems from the fact that, by having the fixed exchange rate, firms have to accept higher wages along with productivity or face the prospect of a higher rate of unemployment for its workers. Conversely, under the flexible exchange rate regime, high wages are usually offset by currency depreciation to prevent existing firms from failing and create unemployment. The exchange rate depreciation, resulting from a fall in commodity prices, increases the firms' profits, which could itself trigger higher wages (Grubel, 1999).

Opponents of the Common Monetary Union argue that problems such as inflation, unemployment and reduction in growth are the result of the application of Keynesian theory. This theory advocates that great spending together with higher inflation could be utilized in order to lower the rate of unemployment. Should Canada create the North American Monetary Union, it would not be responsible for unemployment and its main task is to maintain price stability, as exemplified with the states of the European Central Bank. Therefore the Canadian economy would be less tempted to experiment with active macroeconomic policies (Grubel, 1999).

After outlining the benefits associated with a greater monetary, it is necessary to review its positive features to examine whether the North Monetary Union is a viable option for the Canadian economy. The best evidence of such features is provided by examining how European countries function under the European Monetary Union (EMU).

Although the exchange rate could act as a shock absorber in terms of making adjustments, naturally, this mechanism would be eliminated under the Monetary Union. In Keynesian literature on OCAs²¹, the macroeconomic costs of a monetary union are associated with a shift in demand and lower exports. It has been observed that the United States could respond to the decline and adjust easily. This is due to the U.S. workers ability to migrate in addition to the large central government transfers. However, labour mobility does not play as important a role for European countries since workers do not migrate between regions as much. Using the flexible exchange rate as a buffer could benefit Europeans by allowing them to adjust to the decline since European countries have a lower mobility rate despite being part of a greater union (Bayoumi & Eichengreen, 1994). Hence, for this reason it has been predicted that the European Monetary Union will not survive (Bayoumi & Eichengreen, 1994), mainly because the same interest rate cannot satisfy the needs of each European country. On the other hand, there are optimists who defend the EMU. Mundell (1998) argues that the macroeconomic loss of EMU is diminutive. The Delors Commission Report stated that:

“The fixing of exchange rate within the community represents, at worst, only a very limited loss”. (Commission of European Communities, 1999, p. 136)

Despite all of the hype NAMU has received, the presumed benefits of a greater monetary integration are highly problematic, both logically and empirically²² (Seccareccia & Lequain, 2006). For instance under both the EMU and the EMS real interest rates tend to be higher than the U.S. rates, which contributed to a slower economic growth along with a higher rate of unemployment throughout the period of integration since 1980s. Furthermore, monetary policies would not have an effective role under a common currency union. Thereby, from a macroeconomic point of view, fiscal policies would remain as the only option. However, history

²¹ Optimum cyrrency area

²² See the full discussion in Seccareccia, CCPA 2002.

and experiences of the European monetary system show that fiscal policy has played a destabilizing role. Interestingly, advocates for the common monetary union argue that a given country would experience a higher rate of trade by joining a greater monetary union; however, data over the past decades disproves this argument claimed by supporters of a greater monetary union. Seccareccia and Lequain (2006) compared the shares of exports to imports for a number of different European countries after the EMU formation and found that although Britain's share of exports to imports increased significantly, it declined for other EMU members. Therefore, the argument made by proponents of NAMU that being under a greater monetary union could foster trade between union members is not well supported empirically based on the experience of other countries, such as the Euro-zone.

Moreover, it has been argued, in a North American context, that any two countries with a high integration, are great candidates to form a greater monetary union. However, it should be noted that this is by no means a sufficient condition. While the two countries are highly integrated in terms of trade, they have vastly different economic structures. For instance, Canada is more prone to external shocks than the U.S. and its terms of trade improves in response to an appreciation of commodity prices (see Roger, 1991). Conversely, the U.S. terms of trade weaken in response to an appreciation of commodity prices. Although Canada has become less dependent on commodity production after the post war period, commodities have formed more than 10 percent of its GDP and 35 percent of its exports. For this reason, Canada's terms of trade move in an opposite direction to that of the U.S. in response to commodity price shocks (Murray, 2000).

Econometric studies establish strong evidence that the U.S. and Canada are prone to asymmetric shocks, and therefore, it is unlikely that they could form a common currency union. Structural Vector Auto Regression (VARs) and variance decomposition techniques have been applied to both Canada and the U.S. by several researchers notably Bayoumi and Eichengreen

(1994), and the Bank of Canada Economists, Chamie, DeSerres, and Lalonde (1994).²³ The VAR study has been applied to other countries and regions and the results concluded that:

- The structure shocks hitting Canada, the U.S. and Mexico have very few common characteristics and the results suggest that each country has to respond separately and in different manners. This indicates that the flexible exchange rate would be helpful for the adjustment process.
- The structural shocks hitting 9 regions of the U.S. are very similar
- The structural shocks in 6 region of Canada share strong common characteristics and their correlation with the U.S. is small.
- The structural shocks hitting many countries in the EMU have little in common amongst each other (even less than the 6 regions in Canada).

Therefore, as a result of asymmetric shocks hitting Canada and the U.S., forming a common currency area would not be a proper choice for both countries. Moreover, opponents of a common currency union have been modeling the NAMU based on the Europeans Monetary Union (EMU). However, the EMU itself is not an optimal currency area.

Despite the fact that benefits of a greater monetary integration are highly problematic, its supporters still insist that the current status quo has some potential problems which hurt the economy. Therefore, the choice of a common currency union, such as, NAMU would serve the Canadian economy more properly. Some have argued that proponents have unrealistic expectations regarding a greater monetary union and there is no evidence to support any of those presumed benefits. Hence, opponents of the current status quo have been emphasizing the supposed disadvantages associated with the floating exchange rate that threaten the Canadian economy (Seccareccia, 2002).

²³ See also Lalonde and St-Amant (1995), Dupasquier, Lalonde, and St-Amant (1997).

It has been argued that the flexible exchange rate is subject to high volatility and its movements are driven by speculators whose resources help them push the exchange rate upward or downward in response to market forces. After the breakdown of the Bretton Woods system, the international financial market tends to be set by foreign exchange rate dealers rather than trade or investment (Schulmeister, 1988). Thus, exchange rate movements respond to those activities made by agents as a result of future expectation. Hence, if agents expect the exchange rate to increase, their expectation causes a higher demand which contributes to exchange rate appreciation (Harvey, 1993).

Furthermore, those who are opposed to flexible exchange rate regimes argue that it would create loose fiscal policies since an inefficient government, under such a regime, could easily create new money in order to finance its spending and also let the exchange rate depreciate in order to maintain competitiveness in international markets (Grubel, 1999; Murray, 2000). By examining the history and the way that Latin American and European countries have operated under the fixed exchange rate regimes, it indicates that those countries have not been capable of managing loose fiscal policies and furthermore, have also accumulated a high ratio of debt to GDP (Murray, 2000).

A fundamental claim has been that exchange rate fluctuations create uncertainty, which discourages trade and investment. However, the empirical evidence reported to date has not been able to prove the relationship between exchange rate volatility and the volume of trade (see Cote, 1994). Even though the evidence on investment is limited, it carries the same conclusion.

According to the opponents, the most serious concern associated with the exchange rate is its negative impact on productivity. It has been argued that Canadian firms do not invest enough in technology and they have no motivation to exit from declining industries such as natural resources and move into more profitable ones such as computers. Hence, the Canadian standard of living has declined both in real terms and relative to the U.S. It is important to stress that the exchange rate depreciation does not always offset all the impacts of declining commodity prices. As a

consequence, capital and labor could still move across industries. Interestingly, the main problem with the productivity argument is that those who advocate for common currencies presume that, by joining the common currency union, suddenly the Canadian firms would become more productive (Murray, 2000). Some have argued that the gap between Canada and the U.S. productivity might be the result of other factors, i.e. taxes and governmental regulations (Murray, 2000). Although, in some empirical cases, a positive correlation has been found between lagged movement of Canadian productivity relative to the U.S. and the exchange rate; however this result does not imply causation (McCallum, 1998).

The main conclusion derived from this, is that the floating exchange rate regime is reasonable for both the U.S. and Canada and the attempts to create North American currency similar to the one in the Euro-zone may contribute to serious problems (Murray, 2000; Seccareccia, 2002). In this framework, it has to be taken into account that the main objective behind Europe's monetary integration was political rather than OCA criteria. Therefore, the same would apply to Canada's case to join a greater monetary union (Seccareccia, 2002; Seccareccia & Lequain, 2006). Also, it must be mentioned here that most supporters of NAMU have been imposing their arguments based on the assumption that the U.S. is willing to join a greater monetary union, along with its NAFTA partners, which indeed is not the case.

A rising issue is whether there is any empirical evidence confirming the negative impact of floating exchange rate on the economy, specifically lower productivity growth, which is the main concern in today's economy. In the following sections, the relationship between productivity and exchange rate will be reviewed and examined to see whether there is any proof of a significant linkage between them. Of course, there are some potentially negative aspects associated with the choice of flexible exchange rate. However, these are not as critical as claimed by opponents of this exchange rate. After comparing costs and benefits associated with each alternative monetary union with the current exchange rate regime and examining the characteristics of the Canadian economy,

it is generally agreed that a flexible exchange rate is a far better option (for Canada's economy) than any other monetary union.

2.4 Forces governing exchange rate movements

In the complex debates surrounding an alternative exchange rate regime among scholars in the field, the Canadian exchange rate is portrayed as having victim-like qualities and, at the same time, as the “root” cause for some of the current Canadian economic problems, i.e. low productivity growth. Moreover, the Canadian dollar is accused of causing harm to the economy broadly. In order to analyze this argument and determine its validity, it is useful to first start by thoroughly examining the concept of exchange rate, as well as which factors influence this exchange rate and in which direction the movements are directed. A country’s exchange rate is typically affected by the supply and demand for that country’s currency in international exchange markets. Exchange rate determinants explain the fluctuations of exchange rates in a floating exchange rate regime. There are different existing models explaining the evolution of the exchange rate based on macroeconomic fundamentals such as movements in prices, interest rates, terms of trade, productivity and net foreign assets.

There is an extensive amount of literature presenting the exchange rate determination based on macro fundamentals and micro based models. It is crucial for policy makers to know which factors are derived from exchange rate movements because different factors require different responses by means of monetary policy. For instance, should the Canadian exchange rate increase as a result of higher commodity prices, which contributes to higher aggregate demand, this would only require minimal monetary policy in order to respond to resource reallocations. However, when the Canadian exchange rate appreciates as a result of a lower U.S. dollar, it is necessary to conduct an appropriate monetary policy in order to counter balance the negative impact of a high Canadian dollar on the manufacturing sector (Bailliu & King, 2005).

2.4.1 Macroeconomic fundamentals

The bilateral exchange rate referred to as the macroeconomic fundamentals model is defined as the relative price of the currency in the two countries under investigation. There is a broad range of models linking the exchange rate to different sets of variables such as prices, interest rate, productivity, government debt, terms of trade and net foreign assets (Bailliu & King, 2005).

There are different approaches explaining the exchange rate's evolution.²⁴ The first model that was developed in the 1970s, namely the so-called monetary approach, proposed the exchange rate as the relative price of currencies in two countries in terms of relative supply and demand for those currencies. There are several assumptions in this model such as: 1) prices are not sticky; 2) domestic and foreign assets could be substituted perfectly; 3) absolute PPP automatically holds in every time period ; 4) uncovered interest rate parity (UIRP) continually holds and therefore makes adjustments based on the relative returns of foreign and domestic investment (Bailliu & King, 2005). However, Dornbusch (1976) demonstrated that the PPP only holds over a long period of time and, because prices are sticky, the exchange rate would overshoot before reaching an equilibrium.²⁵ The second approach explaining the exchange rate evolution is the portfolio balance model which is an extension of the monetary approach (by modifying foreign and domestic assets to no longer be perfect substitutes).

This modification would result in determination of the exchange rate by resorting to supply and demand for all foreign and domestic assets.²⁶ The new open-economy macroeconomics (NOEM) model is the third approach that determines the exchange rate based on micro-foundations and nominal rigidities. The main disadvantage associated with this model is its high sensitivity to micro foundations (Bailliu & King, 2005).²⁷ The final approach is based on the work

²⁴ See (Fong, 2006).

²⁵ See Frenkel (1979) and Mussa (1976).

²⁶ See Branson & Henderson (1985).

²⁷ See Stockman (1980), Lucas (1982) & Obstfeld and Rogoff (1995).

of Balassa (1964) and Samuelson (1964) in which a bilateral exchange rate is the relative price of goods in two countries. According to Balassa and Samuelson, the productivity differential could be used to explain the movements of the exchange rate. Chinn (1999) found strong evidence to show productivity differentials as a key determinant to explain real exchange rate movements. Whether this refined model is appropriate for the Canadian economy is controversial. To explain the exchange rate, some argue that macroeconomic fundamental models do not explain the exchange rate evolution efficiently and therefore, are not reliable (Obstfeld & Rogoff, 2000). Despite the fact that macroeconomic-based models have not been successful in explaining the behavior of the real exchange rate, researchers at the Bank of Canada have developed an exchange rate model which is able to explain and track the movements of the exchange rate over the past few decades (Murray, Zelmer, & Antia, 2000). This equation will be notified and examined in the following sections.

2.4.2 Microeconomic based model of exchange rate

Although microeconomic based models have been successful in explaining the exchange rate movements in the short run, these models cannot forecast or provide an appropriate explanation of the exchange rate's behaviour over a longer period of time. In this respect, it has been argued that there are normally three factors which could influence Canadian exchange rate fluctuations: the current account balance, inflation rate and commodity prices (Fong, 2006).

In this sense, it will be explained how changes in each of these factors would cause fluctuations in exchange rate movements. Furthermore, each of these theories is followed by some empirical studies to ascertain whether or not these factors are capable of explaining exchange rate movements.

2.4.2.1 Is the inflation rate the root cause of exchange rate movements?

In purchasing power parity (PPP) theory, there is reference to a link between the exchange rate and inflation (Fong, 2006). The PPP theory states that the exchange rate between one currency and another country's currency is the ratio of domestic prices. To simplify, a specific amount of money domestically should have the same purchasing power in a foreign country (Taylor & Taylor, 2004). In other words, when two countries have differing rates of inflation, the prices of goods in the two economies change relatively. According to PPP, a country with a high inflation rate experiences a decline in the value of its currency. Therefore, having equivalent purchasing power parity at the same rate as the exchange rate between two countries determines the equilibrium exchange rate (Fong, 2006). However, this does not imply that the exchange rate is a rigid function of price levels in a country. Over an extended period of time, different prices between countries are not sustainable since an individual could gain an arbitrage profit. Therefore, in this case, international arbitrage would act as dampener when there is a difference in prices across countries (Fong, 2006; Taylor & Taylor, 2004).

The PPP theory could be used to compare the cost of living in different countries. There are three types of PPP based on concepts of absolute parity, relative parity and interest rate parity. The first, known as, 'the law of one price' is based on PPP and stipulates that it is required that a good in the domestic country has the same price as in a foreign country. The second type of PPP, which is known as absolute PPP, is slightly different as it considers more than a single good as a determinant for the exchange rate. Therefore, in the absolute PPP, the ratio of all goods between two countries justifies the exchange rate. Finally, there is the Relative PPP which describes differences in the rates of inflation between two countries. Specifically, purchasing power parity requires a basket of goods to be the same price in each country. This implies that the percentage change in the value of a currency should then be equal to the difference in the inflation rates between the two countries (Fong, 2006; Rogoff, 1996). When there is a divergence in price of the same goods between two economies, the arbitrage transaction would generate a risk free profit since it contributes to having identical prices for the same good between the two countries by the

elimination of the difference in prices. However, over an extended period of time, the price of a specific good between two countries could differ. Indeed, after converting into a single currency, the law of one price would not remove the divergence in prices. Simply put, the transaction and transport costs and official trade barriers are assumed to be zero on the law of one price while in reality there are some restrictions in imports and exports such as tariffs, and transaction cost. These costs add up the price of importing and exporting certain products. Therefore, the difference in prices would persist and the law of one price would be completely ineffective in reality (Fong, 2006; Taylor & Taylor, 2004). In this regard, there are some studies done to explain whether or not there is a link between PPP and exchange rate movements. For instance, Engels and Rogers (1996) found a positive correlation between prices and distance by using data for Canadian and U.S. cities. Hence, the exchange rate does not converge in the long run by corresponding to the way the law of one price predicts. Unfortunately, it is difficult to establish whether the absolute PPP is an accurate determinant of the exchange rate. The main problem with absolute PPP is that it is often difficult to determine whether the same basket of goods is available in two different countries and people in different countries consume very different sets of goods (Fong, 2006). For these reasons, the idea behind the influential effect of absolute PPP on exchange rate fluctuations will continue only as a theoretical possibility with little significant support at the empirical level.

To remark on whether or not there is any evidence to support the linkage between relative PPP and exchange rate movements, Taylor and Taylor (2004) studied the relative PPP for the UK and the U.S. and found that over the short term, exchange rate changes do not offset official measures of inflation rates between the two countries. However, exchange rate movements offset inflation differentials in the long term. Hence, according to Taylor and Taylor (2004), it could be concluded that PPP holds only over the long term. Consequently, relative PPP holds better, but it is not a sufficient indicator of exchange rate movements because it can only hold in the long run.

In another study, Fortin (1999) studied the Relative PPP for Canada and the U.S. by applying the same method of calculation as Rogoff (1996). By analyzing monthly and yearly

inflation rates and monthly nominal exchange rates for both countries, Fortin's (1999) findings were in line with Taylor and Taylor (2004) who showed that the PPP only holds in the long run in the case of Canada and the U.S. Thus, this study does not explain short-term exchange rate movements.

Clearly, PPP is not an appropriate indicator for explaining exchange rate movements. As discussed previously, the hypothesis behind the law of one price is somewhat equivocal, since it is not applicable in the real world because the prices of goods will not remain unchanged across countries. Similarly, the absolute PPP is completely ineffective due to its strict conditions. Among these three PPP concepts, the relative PPP is the sole concept which has the potential to explain exchange rate movements at some levels, i.e. over the long term.

2.4.2.2 Brief analysis of the current account and exchange rate linkage

There are several different aggregate measures of trade balance. The current account balance is one of the most important measures which reflects all payments between countries for goods and services. The terms of trade fluctuate in line with changes in export and import prices. Therefore, any changes in those measurements are reflected in the current account balance. In addition to the terms of trade, there are other components included in the current account balance, i.e. net factor payments and net transfers. However, these elements are relatively small and the current account balance is not going to be substantially influenced by their changes. Hence, we could rely on the terms of trade as the main factor influencing the current account balance. Particularly since Canada and the U.S. are each other's main trading partner, the fluctuations in exchange rate may be subjected to the changes between the two country's terms of trade (Fong, 2006).

The relationship between the current account balance and exchange rate movements can be explained in the following manner. When a company decides to import goods and services, it has

to be in foreign currency and conversely, exports require domestic currency. Therefore, an appreciation in the level of exports results in a higher demand for domestic currency which indeed contributes to exchange rate appreciation. In contrast, during the period when a given country experiences a lower exchange rate, as a result of higher imports, foreign currency becomes more desirable rather than domestic currency. In this regard, many studies attempt to explain the relationship between the current account balance and exchange rate fluctuations empirically. However, results are somewhat mixed. For instance, Rodriguez (1980) studied the linkage between the terms of trade and the exchange rate and found evidence that exchange rate fluctuations are directly influenced by changes in the current account balance. The main theory which supports his argument is that there is an optimal weight for foreign and domestic currency in each agent portfolio at a specific point in time which is highly dependent on the agent's perspective regarding the value of domestic and foreign currency. Consequently, when the domestic economy is hit by an exogenous demand shock and is leading to exchange rate appreciation, domestic prices increase. Therefore, the prices of goods produced domestically would rise, leading to a lower foreign demand for these goods. Thus, the domestic economy would experience a current account deficit, which indicates that the country is spending more on foreign trade than it is earning and that the country requires more foreign currency leading to the expectation that demand for foreign currency will increase. Hence, the result would be a higher demand for foreign money which contributes to exchange rate depreciation. In another attempt to examine the casual relationship between the exchange rate and the current account balance, studies made by Dornbusch and Fischer (1980), established a non-monetary model to study the linkage between the current account and the exchange rate through saving and investment rather than via the demand for foreign currency. However, they found the same results as Rodriguez (1980) who showed that changes in the current account have a direct impact on exchange rate movements. In contrast, Fortin (1999) produced an opposite result. Fortin (1999) studied the relationship between Canada and the U.S. exchange rates and the trade balance from 1997 to 2004 and found that the

current account balance is not a significant factor in explaining exchange rate fluctuations since it had little or no effect during the period under investigation. Hence, he argued that the small impact of the current account on the exchange rate may be due to the offsetting effect of other exchange rate determinants since, the current account is not the only determinant of the exchange rate behavior.

Thus, it can be concluded that, from an empirical point of view, there is not always a clear link between the current account balance and exchange rate movements.

2.4.2.3 Commodity prices and the exchange rate: Is there a correlation?

It has been argued that fluctuations in world commodity prices are responsible for exchange rate movements. This position can be applied to countries where commodities form a large share of their exports, such as Canada, where more than a third of its exports correspond to oil and non oil commodities (Djoudad et al., 2000). Therefore commodity prices would mostly affect the exchange rate in commodity exporting countries (Cashin, Céspedes, & Sahay, 2004).

The implementation of the Canada-US Free Trade Agreement and the North American Free Trade Agreement (NAFTA) led Canada to become a significant energy net exporter. Since the early 1990s, total oil production has increased by approximately 33% while natural gas production has increased by over 20%. The steady progression of such economic changes has led to a situation where crude petroleum and natural gas currently represents approximately 80% percent of Canada's energy exports since the mid 1990s (Issa et al., 2008). Hence, an increase in energy prices could lead to Canadian dollar appreciation due to a higher demand for the Canadian dollar. However, this positive relationship cannot be applied to the whole period that Canada had been exporting energy products. To assert that energy prices and the exchange rate were moving in opposite directions is not an exaggerated claim. Before the time Canada had become a major energy exporter (pre-1990's era), an increase in energy prices decelerated the world economy and

thus, resulted in a lower demand for Canadian exports, contributing to a lower value of the Canadian currency. The reason for this shift from a negative to a positive effect on the exchange is related to Canada's increasing share of energy exports (Blecker & Seccareccia, 2008).

Consequently, oil prices have an impact on the economy through both supply and demand side channels (Jin, 2008). According to the supply-side, an increase in oil prices tends to raise costs which leads to a lower level of production as a result of the higher production costs and the lower profit margin; while, for the demand-side, for oil importing countries, an increase in oil prices, could lead to a lower disposable income and investment. Therefore, oil importing countries are not able to spend the same amount of spending on discretionary items, which indeed may increase the chances of a nation-wide recession (Usman & Aliyu, 2009).

Therefore, oil importing countries would be affected negatively by an increase in oil prices, while conversely, oil exporting countries would benefit due to oil price appreciation. However, a more extensive study on the link between oil prices and exchange rates could be helpful to better manage the effects of exchange rate movements on the economy as a result of oil price volatility to ensure macroeconomic stability and economic growth for oil producing countries (Medas & Zakharova, 2009). Despite the positive effects of commodity prices and the Canadian short term interest rate on the Canadian dollar, the role of energy prices in influencing the Canadian dollar has changed over time. Although it seems that an increase in the energy price index leads to Canadian dollar appreciation, a recent study by the Bank of Canada shows that for the pre-1990s era the Canadian dollar experienced depreciation as the energy price index increased. The reason for this shift from negative to positive was Canada's increasing share of energy exports (Issa et al., 2008; Blecker & Seccareccia, 2008).

In this regard, many studies are done to examine the link between the Canadian dollar and the commodity price index. Some studies are conducted specifically on Canada, where the latter is the only country under investigation, and some, instead, are cross-country studies. Although, there

is strong evidences linking the energy price index to the movements of the Canadian dollar, there are different arguments regarding this relationship.

Firstly, Cashin et al. (2004) came to the conclusion that movements in energy commodity prices lead to exchange rate fluctuations in countries that have a large share of commodity exports. Additionally, for a commodity (include energy) based economy, their exchange rate movements would not hold for the PPP even over the long term. Instead, it is strongly tied to the changes in commodity prices. For example, following their empirical results, Cashin et al. (2004) showed that a 10% increase in energy commodity prices could lead to a 4.2% percent appreciation of the exchange rate. While Cashin et al. (2004) postulated their finding for all commodity-based economies, it remains questionable whether their analysis can be applicable to Canada.

Correspondingly, Amano and van Norden (1995) and Chen and Rogoff (2003) linked the value of the Canadian exchange rate to the export prices of commodities. Both groups found evidence that an increase in the price of oil increases the value of the Canadian dollar. Those studies took different approaches but reached the same conclusion. In Amano and Van Norden's (1995) study, they used monthly data on commodity prices from 1973q1 to 1992q2 using an error correction model. They came to the conclusion that an increase in commodity prices leads to a real exchange rate appreciation, while the effect of oil prices on the Canadian dollar follows an opposite trend. Chen and Rogoff (2003) revisited the relationship between exchange rate and commodity prices using quarterly data from 1973q1 to 2001q1. They found the relationship between the exchange rate and the commodity price index was statistically significant. They also examined the same relationship for Australia and New Zealand and the results for those latter countries are more robust than those for Canada.

In another attempt to examine whether or not energy prices would influence exchange rate fluctuations, Daw et al. (2000) stated that changes in commodity prices is a key explanatory variable, explaining the behavior of the exchange rate for Canada and Mexico. According to their study, there is strong evidence that commodity prices have a significant effect on the exchange

rate. Moreover, there is a small probability that speculation could lead to exchange rate overshooting in the short-term. However, the effect of destabilizing speculation on exchange rate volatility is small. For the implementation of their exchange rate model, Djoudad et al. (2000) proposed a regime-switching model indicating that fundamentals, rather than noise trades, are responsible for the behavior of the exchange rate.

However, studies on the linkage between exchange rate and energy prices are not always in line with strong positive statements. On the contrary, some have obtained different outcomes. For instance, Coulombe et al. (2009) challenged the exchange rate equation linking the CAD/USD exchange rate to the price of oil and natural resources by Amano and Van Norden (1995). According to Coulombe et al. (2009), 45% of the CAD/USD exchange rate appreciation during the 2002-2008 period is driven by the appreciation of CAD and the rest is subjected to the sharp depreciation of the USD during the same period. Hence, both the CAD appreciation and USD depreciation are responsible for the decline of the Canadian manufacturing sector.

In cross-country studies, the results are slightly different from the studies done specifically on Canada. For instance, Cashin, Céspedes, and Sahay (2009) explored the linkage between the exchange rate and commodity prices for 58 commodity exporting countries from 1980 to 2002. They created monthly commodity indices based on the ratio of the world price of commodities (with regards to the share of commodity exports for each country) relative to the world price of tradable goods. Consequently, for countries with a large share of commodity exports, the relative price of commodities is more likely to reflect the terms of trade shocks (Chen & Rogoff, 2003). The study concluded that only in one third of the commodity exporting countries, prices of commodities and the exchange rate move together over time. Moreover, they found evidence regarding the existence of, as well as the direction of, causality from commodity prices to the exchange rate. However, in Canada's case, they found no evidence supporting the co-integration between commodities and the exchange rate.

Bayoumi and Mühleisen (2006) argued that commodities could influence the exchange rate through terms of trades. Therefore a country with higher commodity prices would experience an improvement in its terms of trade while having trade deficit for other products. Consequently, this leads to a higher import and a decline in export of manufacturing goods as the price of tradable goods increases, making Canadian manufacturing less competitive. Similar to Coulombe's argument²⁸, Bayoumi and Mühleisen (2006) claimed that most of the recent increase in the Canadian exchange rate could be explained by the weakness of the U.S. dollar and a higher commodities production in the Alberta oil sands.

Additionally, Helliwell et al. (2005) proposed a model called NEMO (Nominal Exchange rate MOdel) and argued that this model could track all the movements of the Canadian exchange rate since 1975. The model consisted of two long-term fundamentals which are the real non-energy commodity prices and the Canada-U.S. labor productivity differential. Moreover, there are three short run dynamics included to capture the movements of the exchange rate during the short-term, which consists of: Canada-US short-term interest rate, the evolution of the U.S. dollar to other currencies and the risk perception in the international market. The main results of their study were that:

- A higher non commodity price contributes to strengthening the Canadian dollar
- When productivity in Canada rises at a faster pace relative to the U.S., this induces exchange rate depreciation.²⁹ This procedure occurs, however, through the supply side channel. A country with a greater productivity growth will experience an increase in supply regardless of the change in demand. This is required to reduce the price of domestically produced goods in order to increase sales abroad.

²⁸ See Serge Coulombe's speech, the Public Policy Forum Conference, January 30, 2008, Toronto.

²⁹ However, this approach is in conflict with the traditional view that higher labor productivity leads to an appreciation of the real exchange rate.

NEMO was able to explain the appreciation of the Canadian dollar during the 2003-2004 period. Based on NEMO, the main factors that triggered the exchange rate appreciation during the 2003-2004 period were the rising price of commodities, a lower international risk premium and the decline in the U.S. dollar against other currencies. Moreover, according to NEMO, a lower price of commodities was responsible for the depreciation of the Canadian dollar during the 1975-2004 period.

In contrast, Laidler and Aba (2001) argued that energy prices had a limited capacity in explaining the exchange rate behavior since the 1970s. Additionally, they claimed that the original Bank of Canada equation is unable to show the appreciation of the Canadian exchange rate after 2003 and the equation fails to estimate the behavior of the Canadian dollar over the 1975-99 period. In light of this broad analysis, Laidler and Aba (2001) clarified the linkage between commodity prices and the Canada-US exchange rate as follow:

“...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 & Laidler, 2001, p. 2)

After taking a brief look at various studies done by economists, it can be confidently stated that the energy price index has a strong correlation with the Canadian exchange rate movements. Therefore, some scholars in the field have dubbed the Canadian dollar a petro-currency which refers to its corresponding movements with energy prices (Blecker & Seccareccia, 2008). Besides relying on theoretical arguments, statistical data over the last two decades has shown the positive correlation between energy prices and the Canadian exchange rate movement. In this paper, we will represent this empirically to give a ‘stamp of approval’ to the claim that the energy price index has a positive influence on the Canadian dollar.

It is obvious that higher energy prices are not solely beneficial for an energy exporter country. Indeed, this issue is more complex. There is vast literature surrounding this theory that exchange rate appreciation, induced by higher energy prices, will influence the domestic economy negatively. These issues surrounding the high value of the Canadian dollar are the main concerns of those who believe that a floating rate is not an appropriate exchange rate regime for Canada. It has been claimed that by eliminating the Canadian dollar and replacing it with exchange rate fixity, which could be through dollarization or a greater monetary union, is the best solution to remove all alarming signs threatening the Canadian economy. Before making any declarations regarding these issues, i.e. the Dutch Disease and low productivity growth, this paper will first address key concepts surrounding these latter issues.

2.5 The Dutch Disease and real appreciation: Does it pose a severe threat to the Canadian economy?

The rise in energy prices during the 1970s resulted in a substantial increase in the wealth of oil exporting countries. Similar windfalls occurred in countries that discovered new major natural resources. The aid flow to resource boom countries, followed by a higher oil prices or resource discoveries have an impact on resource reallocation. As a result of a higher wealth, the domestic demand increases and therefore shifts the economy's resources from the tradable sector to the non-tradable sector. The squeeze of the tradable sector is known as the Dutch Disease which has become the subject of many studies (Blecker & Seccareccia, 2008; Bruno & Sachs, 1982).

The Dutch Disease³⁰ refers to the case where a resource boom in an economy leads to a real exchange rate appreciation and contraction of the tradable sector (Krugman, 1987). As it has been discussed previously, after the formation of the NAFTA agreement, Canada has become a major net energy exporter. Since then, variations of energy commodity price trends have influenced the

³⁰ The term "Dutch Disease" originated in the Netherlands during the 1960s, when the high revenue generated by its natural gas discovery led to a sharp decline in the competitiveness of its other, non-booming tradable sector.

Canadian currency in different ways. The recent boom in primary commodity prices has once more stimulated interest in the issue of the Dutch Disease, leading to the argument that Canadian industry is suffering from this latter phenomenon (Blecker & Seccareccia, 2008).

There is vast literature on the Dutch Disease phenomenon. The classic economic model describing the Dutch Disease was developed by Corden (1982) who developed a model where an economy consists of two sectors.³¹ He simply explained that a natural resource discovery would increase capital inflow, therefore leading to a higher exchange rate. It has been argued that resource discoveries contribute to exchange rate appreciation through two main channels (Corden, 1981). The first is a higher capital inflow and a higher national income which triggers a higher demand for non-tradable goods in the economy. Secondly, there are the expectations by agents which could further reinforce exchange rate appreciation (Corden, 1981). For instance, during a resource boom, Canada will experience a higher demand for its domestic currency which appreciates the value of the Canadian dollar. However, the progress toward a higher valued currency does not stop here. It should not be forgotten that agents' behaviour plays a major role in macroeconomic outcomes. Agents speculate on oil prices to rise. This will be followed by a greater demand for the Canadian dollar which will indeed have multiple effects on the appreciation of the Canadian exchange rate. The exchange rate appreciation will induce resources to shift from tradables to the natural resource sector and non-tradables. Consequently, when nominal wages are sticky, the economy will then experience a higher rate of unemployment.

The basic model of the Dutch Disease by Corden and Neary (1982) identifies channels through which natural resources wealth affects the economy; it focuses on its potential negative effect on productivity and volatility. Researchers usually consider an economy with three sectors: the natural resource sector, the non-tradable sector and the tradable sector. Prices of non-tradables are set in the domestic economy while prices for both natural resources and the non resource

³¹ Early contributions include Corden and Neary (1982), Corden (1981, 1984), Van Wijnbergen (1984), Edwards and Aoki (1983) and Habberger (1983).

tradable sector are set in the world market. Generally, there are two types of effects leading to the Dutch Disease and real exchange rate appreciation, as phrased by Corden and Neary (1982):

- The spending effect occurs when an increased domestic income from the booming natural resource sector leads to a higher aggregate demand and spending by the public and private sectors. An increased demand for non-tradables results in higher prices and output in the non tradable sector. Consequently, wages in the economy tend to rise; this squeezes profits in the manufacturing sector, and further hinders the traded sector's competitiveness.
- The resource movement effect takes place when a boom in the natural resource sector draws skilled labor from other parts of the economy.

In addition to this, an increase in the demand for a domestic currency contributes to exchange rate appreciation. Although Corden and Neary (1982) claimed that both effects result in a fall in the output share of tradables relative to non-tradables, some have argued that the evidence regarding the shrinkage of manufacturing in response to terms of trade shocks and real appreciation is somewhat mixed (Sala-i- Martin & Subramanian, 2003).

There are a great number of studies related to the Dutch Disease and this paper concentrates on a selection of these works. The main goal in these studies is to create economic models describing the Dutch Disease and examine its effect on the economy.

Edwards and Aoki (1983) modeled a small open economy, which is impacted by a Dutch Disease shock. For instance, through the higher price of oil, the price of tradables increases relative to non-tradables and the natural resource sector, thus forcing factor inputs to move into the non-tradables and resource sectors. Furthermore, Edwards and Aoki claimed that the Dutch Disease is not always a disease if the exchange rate appreciation is permanent and lasts long term as it may correspond to a shift to a new long-run equilibrium.

In another attempt to model the Dutch Disease and its effect on the economy, Hartwick and Hamilton (2009) developed a model of a small open economy that uses oil export revenues to finance the purchases of its capital input imported from abroad. In this case, a windfall from oil exports increases the inflow of foreign exchange, which induces a contraction of the manufacturing sector, while concurrently leading to an expansion in the non-tradable sector. Accordingly, Hartwick and Hamilton's (2009) study mainly focused on revenues that a country would gain from oil exports rather than changes in oil prices. In line with the above contributions, Krugman (1987) established a dynamic economies of scale model based on a standard trade model to show the consequences of oil discoveries for industrial competitiveness. He argued that the Dutch Disease is considered as a disease, leading to de-industrialization only when its related symptoms are serious enough or last long enough to cause irreversible damage to the economy.

Bruno and Sachs (1982) claimed that the analyses on the Dutch Disease to date had been incomplete since most models of the Dutch Disease are static while the impact of a higher wealth on the tradable and non-tradable sectors is dynamic. A rise in natural wealth leads to an increase in demand for normal goods both tradable and non-tradable. The demands for non-tradable goods can be satisfied domestically while the demand for tradable goods is going to be satisfied only through higher levels of imports. As demand rises for both types of goods, the relative price of non-traded goods has to increase to preserve home market equilibrium. Production factors will be drawn into the non-tradable sector. Some parts of the increased demand for non-tradables will be satisfied by a higher production while the rest will be eliminated by the increase of prices. An increased demand for non-tradable goods will be met by higher net imports (Bruno & Sachs, 1982). Their models approved earlier findings on the Dutch Disease. This means that the net effect of the energy sector would influence the tradable sector by reducing long-term production and improving the overall economy's terms of trade.

Ismail (2010), who studied the impact of oil price shocks on manufacturing, concludes that the Dutch Disease depends on the capital intensity of the manufacturing sector and the economy's

openness to capital flows. He showed that a 10 percent increase in oil windfall is associated with a 3.4 percent decrease in value added across the manufacturing sector. Such factors have a more dramatic effect in economies that are more open to capital flows and have relatively less capital intensity in their manufacturing sectors. Ismail claimed that an increase in wealth resulting from a natural resource discovery or a rise in oil prices is considered as a positive development since it contributes to a higher national income and increases consumption of tradables and non-tradables goods. However, as stated in traditional economic literature, a great amount of aid flows, due to higher oil prices, comes at the expense of long-term growth as well as the sustainability of the manufacturing sector. Furthermore, resource based revenues have influence on the movement of production factors, from the tradable to the non-tradable sector. Thereby, in such a case, the economy would struggle to rebuild the resources for manufacturing.

For this reason, Rajan and Subramanian (2005) argued that the adverse effect of foreign aid on competitiveness of the recipient country's exports could explain the negative correlation between aid and growth. The reason for this is that the share of labor intensive activities and tradable industry's decline as foreign aid increases. This is consistent with the Dutch Disease theory, which affirms that the exchange rate overvaluation hurts the manufacturing sector and overall productivity growth. After elaborating on the main theories and supporting details of some key research studies, this paper will examine the Canadian economic situation with regards to the Dutch Disease.

In retrospect, signs of the existence of the Dutch Disease are noticeably apparent when examining Canada's economic history. Specifically, these symptoms have become apparent during the last decade. As the more severe symptoms emerge, it has attracted more attention towards this disconcerting topic of whether Canada is suffering from this problem.

The structure of the Canadian economy has radically changed over the last two decades. This industrial conversion has not improved the economic structure, which is by leading to greater diversification, instead of relying more heavily on the export of primary products. By examining

Canada's history, this lack of diversification was not always the case. For instance, in 1999, Canada was highly engaged in the export of finished goods for approximately 60 percent of its exports. However, recent data has shown a drastic change. In 2011, around two thirds of Canadian exports have consisted of raw form resources. By changing towards a more manufacturing based economy, the country could benefit from attaining higher revenues which in turn would reinforce innovation and productivity growth.

Unfortunately, manufacturing output has strongly decreased over the last few years partly confirming the Dutch Disease phenomenon. Clearly, decline in manufacturing activities has resulted in an unemployment surge. More dramatically, for instance, according to Stanford (2012, p. 2), approximately 600,000 Canadian manufacturing jobs have completely vanished. Due to the expansion of resource based industries, a great number of jobs have been created. However, also according to Stanford (2012) they were only able to cover around 3% of job losses caused by the deterioration of the manufacturing sectors.

Another important symptom of the Dutch Disease that has become visible in the Canadian economy is the slow rate of productivity growth, i.e. having zero cumulative productivity growth since 2006 along with being approximately 70% productive when compared to the U.S. business sectors. The productivity gap issue will be discussed more thoroughly in the following section. Having low productivity growth and contraction of manufacturing sectors are not the only symptoms that a country that is being caught in the Dutch Disease experiences. There are many other symptoms related to the Dutch Disease phenomenon that have been explained in seminal papers (Stanford, 2012).

These negative signs surrounding the Canadian economy have been claimed to correspond to the high value of the Canadian dollar. Economists and policy makers have proposed a number of solutions to cure the Dutch Disease and help the industries affected from such a situation. For instance, a set of policy measures have been identified to remedy this situation through tax cuts or direct transfers to the manufacturing sector to encourage new investments funded by the oil tax.

Another solution, which has garnered attention, is to control the Canadian dollar to prevent it from rising sharply. This could be implemented by opting for a fixed exchange rate regime (Stanford, 2012).

To answer the question of whether or not the Canadian dollar is struggling with the Dutch Disease is not yet clear. Evidently, the symptoms related to the Dutch Disease have become visible in the Canadian economy. However, it is important to stress that showing Dutch Disease symptoms does not necessarily mean that the appreciation of the Canadian dollar –known as the main cause of the Dutch disease– is the leading factor creating these negative effects on the Canadian economy. To make this clear, this research will further discuss productivity in Canada in the following section, which is then followed by an examination of whether or not there is a causal relationship between the exchange rate and productivity.

2.6 Low productivity growth: A long-lasting challenge for the Canadian economy

Productivity growth is key to economic development, and thus to overall living standards as well. As stated by Krugman (1992, p. 9), “Productivity is not everything but in the long run is almost everything. A country's ability to improve its standard of living over time depends almost entirely on its ability to raise its output per worker”.³² Therefore, being able to maintain productivity growth is considered to be a key factor in reaching high economic performance, higher national income and growth.

Generally, labor productivity is defined as either output per worker or output per hours worked (Lafrance & Schembri, 1999–2000). Productivity measurement can be calculated in different ways. Labor productivity calculation based on the amount of hours worked provides a more accurate measure of labor input since it avoids the difficult task of calculating the total hours worked per week. However, it must be taken into account that labor effort is not the only factor

³² See Krugman (1992, p. 9).

affecting labor productivity. There are many other factors that can induce productivity growth. For instance, technological innovation is another key factor responsible for accomplishing higher productivity and more precisely, total factor productivity. Total factor productivity³³ (TFP) is a variable which accounts for effects on the total output resulting from technological improvement and increased capital accumulation (Lafrance & Schembri, 1999–2000).

There have been many studies dedicated to the subject of productivity, which attempt to explain its trends and behavior. These studies explain productivity interactions with other determinant factors in the economy and how productivity will influence or be influenced by forces in the economy. There exists extensive theories that explain the main causes behind low productivity growth. However, along with arguments made to define the root causes behind low productivity, economists and policy makers have defined a series of strategies and solutions that claim to improve this situation.

The interest and concerns surrounding productivity stems from the fact that productivity is a key factor in determining standard of living, as well as, possibly, interest rates, inflation and many other components that an economy requires to maintain its well being and growth. A wage is compensation for paid labour and it has a high correlation with productivity. Therefore, a lower productivity growth can only lead to a substantial fall in labor income, reducing the ability to consume goods and services and, thereby, experiencing lower living standards (Lynch & Sheikh, 2011). Conversely, an increase in productivity will result in producing a higher level of output

³³ There is criticism of the concept and measure for total factor productivity. It has been argued that TFP cannot be measured directly. The TFP equation is represented in Cobb–Douglas form where total output (Y) is a function of total-factor productivity (A), capital input (K), labor input (L), and α and β are the capital input and labor input share for K and L. $Y = A \times K^\alpha \times L^\beta$

Numerous economist of the non-neoclassical tradition have question the relevance of these aggregate productions upon which is based the concept of total factor productivity. See, for instance, T.K Rymes (1971) and Felipe and McCombie (2010).

with the same input which contributes to lower production cost, and thus lowers prices. Hence, productivity is one of the most important factors determining economic production.

The Canadian economy has been experiencing a low rate of productivity growth over the last two decades. With regards to the crucial role productivity plays in maintaining a high standard of living, a wide range of attempts have been made to improve Canada's low productivity growth. Despite testing many possible solutions, the productivity gap is 'looking worse than ever'.³⁴ Canada's productivity trend matched the U.S.'s during the 1970s. However, productivity has started to slightly lag behind the U.S. since the mid 1980s. Since then, the productivity gap between Canada and the U.S. has been widening enormously (Sharpe, 2003). After 2000, the situation has become worse as the productivity gap between Canada and the U.S. started to increase substantially as a result of economic distortions which triggered lower levels of investment (Cotis, 2006). Moreover, as reported by Statistics Canada, Canadian productivity reached 89 percent relative to the U.S. since 2000 (Statistics Canada, 2007).

Despite having a highly educated labor force and acceptable level of development of R&D (Research and Development) expenditure, Canada is ranked in the bottom half among OECD countries (Public Policy Forum, 2011). Strangely, Canada has one of the most generous tax regimes and tax rates on new business investment and these tax rates in recent years have been reduced considerably (Public Policy Forum, 2011; Lynch & Sheikh, 2011).

Being caught in a productivity trap has raised concern regarding this issue among economists and policy makers who are motivated to identify the root causes of this problem and, thereby, help restore productivity growth. In fact, high productivity growth is essential for Canada to regain its competitiveness and sustain a greater level of output over the long run.

Among the factors responsible for having a slow rate of productivity growth, the Canadian dollar is one of the most controversial variables which has been widely examined through a range

³⁴ See the article written by Tim Shufelt in the *Financial Post*, May 29, 2012.

of economic inquiries.³⁵ There are a whole series of arguments on whether there is a causal relationship between the exchange rate and productivity. In addition to the Canadian exchange rate, there are other factors claimed to influence productivity. The main theory behind the relationship between the exchange rate and productivity, as claimed by its supporters, can be explained as follows:

It has been claimed that the Canadian dollar is responsible for slow productivity growth since the second half of the 1990s (Courchene & Harris, 1999; Grubel, 1999). However, Canadian productivity improved slightly during the late 1990s which claimed to be the result of increased economic activity rather than productivity growth (Sharpe, 2002; Hanel, 2007).

In general, this period (second half of the 1990s up to now) can be divided into 2 different sub periods. The main difference between these two periods is the value of the Canadian dollar. During the second half of the 1990s, the world economy was not stable. As economic activities slowed down in the first half of the 1990s, this negatively influenced the demand for energy resources. Meanwhile, Canada had become a major net energy exporter since the NAFTA agreement was implemented in 1994 and lower energy prices influenced the Canadian economy intensely (Blecker & Seccareccia, 2008). It is important to note that Canada imports approximately 80% of its machinery and equipment from the U.S. During the recession, Canadian manufactures were not able to gain a considerable level of capital accumulation, i.e. machinery and equipment (M&E), due to depreciation of the Canadian dollar (Gu & Ho, 2000). For instance, it has been argued that although Canadian investment in M&E was at a comparable level with the U.S. during the 1980s, it fell substantially during the 1990s which resulted in a 40 percent gap in Canadian-U.S. investments. As a result of this, Canadian firms were forced to replace labor for capital as it was more cost effective. It has been claimed that these circumstances contributed to having Canadian productivity fall behind the U.S. However, it has been argued that exchange rate

³⁵ For instance, see Courchene and Harris (1999).

depreciation was not the only factor triggering lower productivity growth. The 1990s was also a time of major transition technologies in the U.S., which further caused the Canadian firms to fall behind the U.S., as they were not able to afford modern technology (Harris, 2000).

Furthermore, the depreciation of the Canadian dollar forced firms toward output expansion rather than productivity enhancement, which is known as the “lazy manufacturing” hypothesis. This signifies that, as a result of exchange rate depreciation during the 1990s, Canadian products became more competitive in international markets. Therefore, there was no need for the Canadian manufacturers to enhance their productivity as they were able to gain more revenues. This helped Canadian firms to increase their share market without making any improvement on productivity (Saint Paul, 1993).

In addition to exchange rate depreciation, productivity slow growth, to some extent, has been related to the TFP gap between Canada and the U.S. (Sharpe, 1999; Gu & Ho, 2000; Lee & Tang, 1999). Economic theories, supported by strong evidence, indicate that investment in machinery and equipment has a triggering effect on TFP growth (see De Long & Summers, 1991). Therefore, this leads to the claim that a persistent TFP gap between Canada and the U.S. during the 1990s could be explained by a lower investment in M&E relative to the U.S. (Rao, Ahmad, & Kaptein-Russel, 2000). Taking into consideration the research and studies done thus far, some claim to have found the root cause of the Canada-US productivity gap. It had been asserted that depreciation leads to lower growth, while overvalued exchange rate contributes to productivity growth as productivity increases in tradable sectors (Porter, 1990).

Beginning in 2002, the Canadian dollar began to gain rapidly in value against the U.S. Despite the appreciation of the Canadian dollar, the productivity gap between Canada and the U.S. widened. Concerns over the slow path of productivity growth became the subject of heated debate. This is understandable as Canada has not been experiencing enough productivity growth to contribute to an efficient economy over the last 30 years. The annual growth of output per hour in Canadian business sectors has been estimated at 0.7% for the past decade. This is equal to \$300-

billion loss of output for Canadian firms each year. More importantly, it is expected to only gain 1% of real growth due to this low level of productivity growth (Shufelt, 2012). Of course, having low productivity growth influences different facets of the economy. Canada would experience a \$7,500 higher disposable income if the domestic productivity moved at the same pace as the U.S. during the last 25 years (Shufelt, 2012). In general, there are two factors responsible for GDP growth; i.e. labor force and productivity growth (Shufelt, 2012). For instance, during 2008-2009 (which was a time of financial crisis), Canada relied on labor force expansion to reach output growth. This helped the economy recover from the crisis and avoid greater unemployment (Shufelt, 2012). It is important to note that, in the long term, productivity growth is the key factor in achieving economic growth.

Despite the high value of the Canadian exchange rate over the last decade, it was interestingly again referred to as the culprit who was keeping the country's productivity growth at a lower level, however, in this case for its high value relative to the U.S. dollar. The view that the Canadian dollar has a negative influence on productivity is a claim which is in line with the argument stated above, even though it is slightly different. A higher Canadian dollar would reduce the cost of these imported capital goods from the U.S. while leaving the cost of labor unaffected. Hence, when the relative price of capital is lower than labor, this encourages firms to substitute capital in place of labor which results in a higher productivity. However, the capability of Canadian firms to compete in the international market declines dramatically as the domestic currency strengthens against the U.S. dollar by hitting new highs. Therefore, the high value of the Canadian dollar negatively influences business and firm performance. Consequently, foreigner's demand for Canadian goods declines and therefore, domestic manufactures export less products to foreign countries which dampens the performance of Canadian business sectors. The result is reductions in the revenue of the firms, as firms become dominated by high cost and deteriorate financially.

Although it is expected that Canadian firms may eventually reach for a higher level of capital accumulation and take the advantage of the high-valued domestic currency, having not enough investment in fixed capital since 2000 is identified as another factor widening the Canada-US productivity gap (Hanel, 2007; Cotis, 2006; Rao, Sharpe, & Smith, 2005).

For instance, Table.1 compares the labor productivity for Canada and the U.S. and indicates that the labor productivity in Canada in 2007 was 72.1 per capita relative to that of the U.S. business sector. Furthermore, the Canadian business sector has 25 percent less capital accumulation in terms of machinery and equipment while in terms of information, technology and communication (ICT) the results are claimed to be more dramatic as the Canadian business sectors employ less than 50 percent ICT relative to the U.S. Therefore, another reason adding to Canada's slow rate of productivity growth has been identified as having a relatively poor R&D and innovation performance in Canadian firms.³⁶

Innovation is often measured as the amount business sectors invest in R&D. It has been claimed that Canadian firms spend as little as 1 percent of GDP on R&D, which is half of what is spent by the U.S. and below the average of 1.6 percent for OECD countries. This places Canadian firms 15th among OECD countries based on the R&D ratio to GDP (Lynch & Sheikh, 2011). Investment in M&E is not limited to accumulating more capital in terms of machinery and equipments. It does have other components, which are capable of enhancing the quality of capital inputs, i.e. investment in specific technologies (IST). In general, IST can be demonstrated by technological advancement, which is embedded in new M&E such as innovation in information and technologies.³⁷

Furthermore, the level of investment in machinery and equipment along with R&D are essential to TFP growth. Therefore, lacking equipment affects TFP growth simultaneously.

³⁶ See OECD (1998), Treffer (1999) and Fortin (1999).

³⁷ See Carlaw and Kosempel (2000).

Additionally, this generated the view that lower total factor productivity could account for 90% percent of the productivity gap since 2000 (Rao, Tang, & Wang, 2006).

TABLE 1. CANADA-US LABOUR PRODUCTIVITY AND SELECTED CAPITAL INTENSITY COMPARISONS, 2000-07 (US = 100)

	Labour productivity	Machinery and equipment ¹	ICT
	2007	2000-07 average	2000-07 average
Goods sector			
Agriculture, forestry, fishing and hunting	86.4	70.5	79.1
Mining	88.0	80.0	31.2
Mining, except oil and gas industry	47.3	57.0	35.1
Oil and gas extraction industry	81.6	100.5	25.6
Utilities	62.7	51.0	73.6
Construction	192.5	79.2	14.7
Manufacturing	73.2	91.1	36.6
Services sectors			
Wholesale trade industries	90.0	29.9	45.6
Retail trade industries	75.6	70.4	72.1
Transportation and warehousing industries	108.1	86.8	19.7
Information and cultural industries	46.6	82.8	98.5
FIRE ² and management of companies industries	72.1	105.4	72.2
Professional, scientific and technical services industries	38.6	45.7	42.3
Administrative and waste management industries	107.6	39.9	49.9
Education, health care and social assistance industries	95.9	34.2	17.8
Arts, entertainment and recreation industries	39.0	39.3	128.7
Accommodation and food services industries	72.2	28.3	47.1
Average for all sectors and industries	72.1	74.5	47.9

Source: *State of the Nation 2010* report by the Science, Technology and Innovation Council.

Another factor that is associated with the Canada-US productivity gap is related to the structure of the Canadian economy.³⁸ Canada has a different structure of industries based on small size firms, which accounts for a larger share of output by small firms when compared to the U.S. Therefore, small-sized firms have less desire for innovation (Baldwin, 1997) because a substantial

³⁸ See Daly, Helfinger, & Sharwood (2000) and Harris (1999).

size of Canadian firms fall below the threshold required for R&D engagement and subsequently, small sized Canadian firms do not take part in R&D investment (Hanel, 2007; McFetridge, 2006).

The role of firm size in explaining international differences in various measures of innovation has been investigated by a number of economists. For instance, Baldwin and Sabourin (1998, p. 27) explored how the structure of two economies could influence innovation in those economies. Subsequently, they found, that Canadian small size firms trigger slower innovation by preventing Canadian firms from engaging in more advanced technological improvements. Following the same argument, in a different study, it is concluded that the innovation process for Canadian firms could increase as Canadian firms become larger (Hanel, 2007; Baldwin & Gu, 2004, table 4).

The share of small Canadian firms in productivity is relatively small as the substantial part of the productivity is associated with large size industries which have higher capital intensity (Hanel, 2007; Globerman, Ries, & Vetinsky, 1994). These large sized firms are mostly owned by residents of foreign countries, mainly the U.S. Hence large size firms, which are under the control of foreigners, are more likely to have innovation by increasing the capital intensity rather than smaller domestic Canadian firms (Baldwin & Gu, 2004). Correspondingly, those firms are more productive than small size firms controlled by Canadians as large foreign firms are more R&D intensive (Baldwin & Sabourin, 1997; Baldwin, Rama, & Sabourin, 1999; Baldwin & Hanel (2003), table 10.15). Hence, the innovation gap between Canadian firms and other OECD firms, “reflects the poor innovation performance of domestically oriented firms in Canada.”(Baldwin & Gu, 2004, p. 16).

The Canadian dollar is the main factor blamed for inducing low productivity growth. In this regard, many studies explored the link between the exchange rate and productivity. The main argument made until now is that exchange rate movements influence productivity. However, there is a basic theory stated in traditional economic literature that productivity changes influence exchange rate movements which lies in an opposite realm of what has been discussed so far. The

simplistic theory behind the “Balassa-Samuelson” effect³⁹, is that an appreciation of the real exchange rate occurs as a result of faster relative productivity gains in the tradable goods sector. During the development process, the domestic country would experience a technological improvement while at the same time, the foreign country remains unaffected. This technological progress tends to increase more quickly in the tradable goods sector than in the non-tradable goods sector. As the prices of tradable products are set in the world market, an increase in the marginal product of labor would put upward pressure on wages in the tradable goods sector. Given the assumption that the labor force is mobile across the economy, wages in non-tradable goods sector tend to rise. This is simply because higher wages prevent reallocation of the labor force. Higher wages spread across the economy, and consequently, there is a rise in relative prices of the non-tradable goods sector, where productivity has remained unchanged. Hence, a higher rate of productivity growth in the tradable goods sector leads to an increase in the national price level, which would entail an appreciation of the real exchange rate.

It has been argued that the Balassa Samuelson hypothesis was mildly effective as the lower productivity during 1979-1996 contributed to a depreciation of the Canadian exchange rate over 1981-98. However, it has to be mentioned that the Canadian exchange rate depreciated more than what was anticipated by this theory. Indeed, the depreciation of the Canadian dollar was explained by lower commodity prices during the same period (Antia & Murray, 1999). Therefore, there is no substantial evidence that proves the existence of a significant relationship between changes in productivity and movements in the Canadian exchange rate (Djoudad & Tessier, 1999). With respect to the question of whether real exchange rate volatility can have a significant impact on productivity, there are different conclusions regarding this issue provided by empirical studies.

In this sense, Harris (2000) proposed a convergence productivity growth equation. This is based on an endogenous growth model which indicates that productivity growth is related to

³⁹ Formulated by Balassa (1964) and Samuelson (1964).

convergence terms, openness and investment where the exchange rate misalignment is defined by PPP. He found that real exchange rate affects productivity both in the short term and long term. In the short term, the result is consistent with the competitiveness hypothesis which indicates that exchange rate depreciation increases productivity growth in the short term. However, there is evidence that exchange rate depreciation could result in lower productivity over the long term.

In another study, Baggs et al. (2009) explored the impact of the exchange rate on firm level productivity and were not able to examine its impact. However, it is claimed that scale effects are likely to influence firm productivity. Following the Baggs et al. (2009) study, given the scale effect, Baggs, Beaulieu and Fung (2011) argued that a higher Canadian dollar would have an impact on productivity growth in two opposite ways. For instance, a higher exchange rate increases the productivity level within the industry by forcing less productive firms to exit. On the other hand, as a result of a higher exchange rate, firms would experience a lower level of output and productivity.

Along with past studies, Yan (2002) stated that exchange rate movements have influenced changes in productivity growth between Canada and the U.S. Hence, it is suggested that there might be a linkage deriving from exchange rate movement into productivity growth (Baggs, Beaulieu, & Fung, 2011).

John McCallum, who is one of the advocates for the floating exchange rate, illustrates his “lazy manufacturing hypothesis” which is consistent with the ongoing argument regarding the influence of the weak Canadian dollar and productivity:

“The idea that a weak currency induces “laziness” on the part of the manufacturing sector is not one that appeals to this author, but it seems to be broadly consistent with the data, which suggest a double dip in Canada’s relative manufacturing productivity in the first half of the 1980s and then in the period 1994-97. Both of these periods correspond roughly to times of weak

currency. Indeed there is a positive and significant correlation ($R=.45$) between the Canada-minus-U.S. productivity growth gap and the lagged value of the Canadian unit labor costs in manufacturing relative to the United States (expressed in the same currency). So it may be that a weak currency has been a cause rather than consequence of poor productivity growth in our manufacturing sector.”(1988, pp. 3-4)

Also, McCallum (1999) quantified the linkage between the low Canadian dollar and productivity by illustrating that a 10 percent reduction of the Canadian dollar after two years contributes to a 7 percent reduction in the ratio of the Canada-US productivity (Harris, 1999, p. 8).

In another attempt to study the causal relationship between the Canadian dollar and lagging productivity growth, Lafrance and Schembri (2000) claimed that there is no evidence suggesting a link between an exchange rate appreciation and the widening gap between Canada and the U.S. productivity; however, they suggest that the Balassa-Samuelson hypothesis may be evident.

Despite the fact that there are mixed conclusions regarding the effect of exchange rate on productivity, the concept that the widening Canada-US productivity gap is caused by exchange rate appreciation is attracting further attention.

In light of these arguments, a variety of remedies have been applied over the past years to the economy to improve the slow pace of productivity. For instance, the elimination of tariffs on machinery and equipment is due to its essential role for enhancing productivity. This makes Canada a tariff-free zone and benefits Canadian manufacturers by giving them the advantage of importing a higher level of necessary equipment.⁴⁰ In addition to free trade policy and tax reduction, keeping interest rates and inflation rate at a low level are other remedies implemented by the Canadian government (Shufelt, 2012). Despite the application of these corrective measures, the Canadian government was not successful in significantly inducing productivity growth in a

⁴⁰ Budget 2010, by James M. Flaherty, Minister of Finance, March 4, 2010, p. 9.

positive direction. As stated by Lavoie and Seccareccia (2012), "low inflation has delivered neither solid economic growth nor strong productivity growth".⁴¹ In fact, the gap between Canada and the U.S. has been getting extensively wider.

As asserted in the previous section, the Canadian economy has started to show symptoms related to the Dutch Disease. This consequently leads to the theory that Canada's slow productivity corresponds to the high value of the domestic currency. The slow productivity growth appears to be a persistent issue for the Canadian economy, leading to concerns on whether it could improve.

In the following section, the linkage between exchange rate and productivity will be discussed empirically. However, it is important to note that finding significant evidence supporting the effect of exchange rate on productivity growth does not prove that eliminating the exchange rate would be the solution for the Canadian economy; and, upon the disappearance of the Canadian dollar, the economy would experience a massive jump in its productivity growth rates. Eliminating the Canadian dollar could very well hinder the economy. From the evidence reviewed, adverse outcomes are more extensive under dollarization and a greater monetary union than the current exchange rate regime, which may have contributed to the slow productivity growth.

⁴¹ See the article written by Marc Lavoie and Mario Seccareccia in the *Globe & Mail*, October 12, 2012.

3. Empirical Analysis

3.1 From the oil price index to the exchange rate: An empirical investigation

After the oil shocks which occurred during the 1970s, many economists started to explore the effect of oil prices on the economy and specifically on how they would affect the real exchange rate. Therefore, a number of studies were produced whereby the researchers considered commodity prices as a determinant to explain exchange rate behavior.

In this regard, one of the most reliable studies was done by the Bank of Canada. In this study, there are three main factors that have been proposed for the Canadian dollar fluctuations: primary commodity price index, an energy price index, and a measure of the Canada short-term interest rate differential. The linkages between the Canada-US exchange rate and those determinants have been examined through structural models, reduced form structural VAR models, and single equation models (Issa et al., 2008).

There are two types of arguments regarding the avenue through which a short-term interest rate would influence the Canadian dollar. Although there is some evidence that the changes in the current account balance would result in exchange rate fluctuations, the capital account balance is the main avenue through which short-term interest rates influences the Canadian dollar. High interest rates in Canada would result in greater capital inflow as the higher rates attract foreign financial capital. This occurs simply because foreign investors would receive a higher return on Canadian bonds.

According to the Bank of Canada study by Amano and van Norden (1995), where the exchange rate equation is explained via an error correction model (ECM) over the 1973-1993 period, the commodity price movements have a negative effect on exchange rate. However, since the NAFTA agreement, Canada has become a major energy exporter. Therefore the effect of

energy prices on the Canadian dollar has changed over time and became positive in the early 1990s.

This research employs an exchange rate equation with similar variables to the study done by the Bank of Canada by using a longer and richer data set to examine whether or not this relationship still persists given the growth of Canada's energy exports:

$$\text{Log } rfx = \alpha + \beta_{\text{rfx}} \log rfx_{t-1} + \beta_{\text{com}} \log com_{t-1} + \beta_{\text{ene}} \log ene_{t-1} + \beta_{\text{int}} \log int_{t-1} + \varepsilon$$

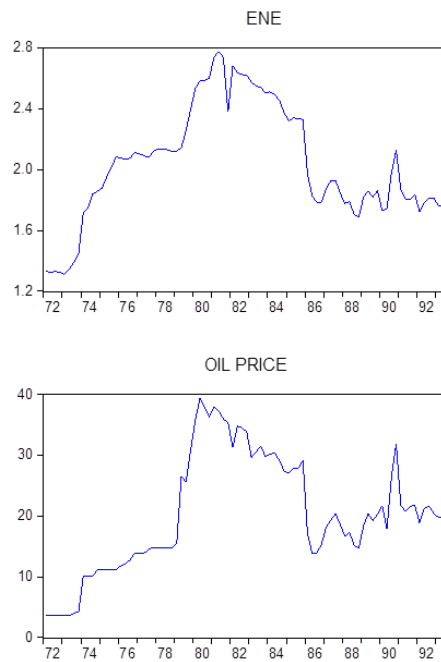
Where *rfx* is the real U.S. dollar in Canadian funds, *com* is a real commodity price index excluding energy, *ene* is a real energy price index, *oil-price* is the spot oil price of West Texas Intermediate (Dollars per barrel) and *int* is the Canada-US 90-day commercial paper rate differential. All variables are expressed in logarithms, except for *int*. The aim of this paper is to estimate the equation and examine the effect of energy prices on the real exchange rate from 1972 to 2012.

In the latest study by researchers from the Bank of Canada, 1993Q3 was identified as representing a structural break in the times series relation. Consequently, the original equation was redesigned by adding a dummy variable which took the value of unity to capture the behavior of the real exchange rate for the period after 1993Q3 (Issa et al., 2008).

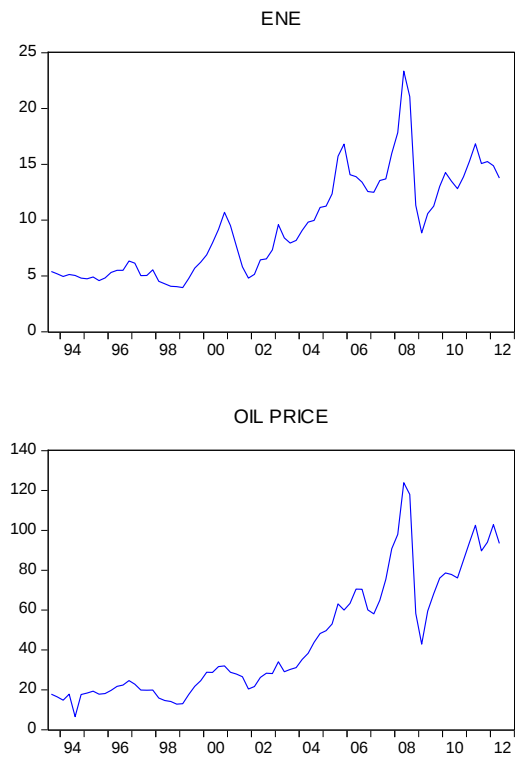
However, this paper considers a simpler method. Instead of using dummy variables, the sample under investigation is divided into two sub-samples (i.e., 1972Q1-1993Q3 and 1993Q3-2012Q2) to explore the interaction of the energy price index and the exchange rate over time.

The reason for considering both the energy price and oil price is that the energy price index and the price of oil is that these series may deviate from each other, thereby making one of them a better indicator than the other in capturing the impact of energy prices on the exchange rate. Therefore, the exchange rate equation is estimated twice for each sub period, by considering each of these variables separately. This approach reduces the likelihood of getting inaccurate results regarding the effect of the oil price movements on the value of the Canadian dollar.

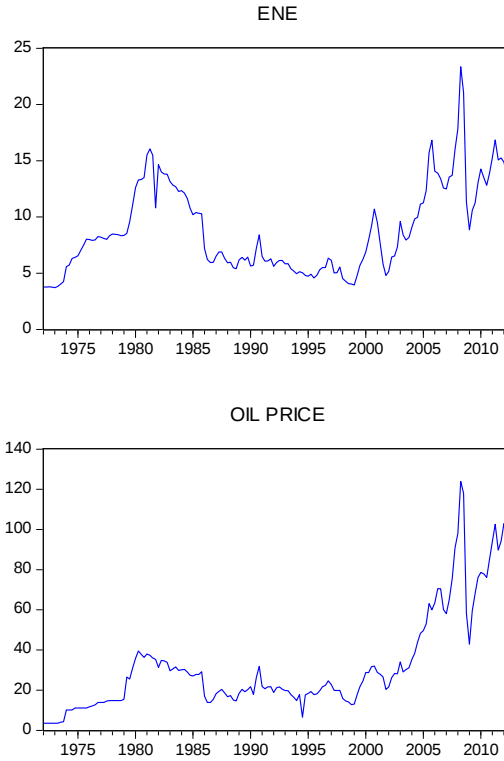
Graph 1: energy price index and oil price (1972Q1-1993Q3)



Graph 2: energy price index and oil price (1993Q3-2012Q2)



Graph 3: energy price index and oil price (1972Q1-2012Q2)



The Augmented Dickey-Fuller test has been applied to confirm the presence of the unit root for each sub-period. Broadly speaking, the application of this test to the various time series supports the hypothesis that these variables were not stationary series. Notably, the augmented Dickey-Fuller test suggests that, for the 1972Q1-1993Q3 sub-period, all the variables are $I(1)$ except for Canada-US interest rate differential which is $I(0)$. Therefore, *ene*, *com*, *rfx*, and *oil-price* were transformed into first difference. Similarly, for the second sub-period (1993Q3-2012Q2), all the variables were non-stationary, except the interest rate differential. Consequently, to obtain meaningful results from econometric modeling of such series, all *ene*, *com*, *rfx* and *oil-price* are transformed into stationary series. In this case, the first difference of these time series are stationary as the variables are integrated of order 1 or $I(1)$.

As previously stated, in order to obtain meaningful econometric results when working with time series data, we have applied the standard test of stationarity, the ADF test, whose purpose

was to deal with the underlying trend in the series. The stationarity of a variable is essential for standard econometric theory, as it is not possible to obtain consistent and unbiased estimators without the stationarity condition. However, for the sake of completeness, we have estimated the series without such routine adjustments, with the empirical results being displayed in Table 2. All the variables are defined in logarithm. Moreover, this model includes lagged values of the explanatory variables as regressors. In this case, all variables are found to be significant and consistent as per the previous estimates made by the Bank of Canada. Even after addressing the significant autocorrelation, the energy price variable remains statistically significant.

As a further way of examining the relation between the exchange rate and the energy price index, stationary time series regressors were estimated using OLS.⁴² The equation contains lagged explanatory variables where all regressors were expressed in logarithm, just like the original Bank of Canada's equation. The results for the estimated equations do not quite confirm the previous studies done by the Bank of Canada. In the first approach, where the energy price index is considered as a proxy to reflect the energy price fluctuations, it appears that the coefficient of the energy price index has a negative impact on the Canadian dollar (see positive sign), albeit insignificant, for the first sub-period being analyzed. Moreover, the commodity price index is found to be significant. Likewise, based on the alternative approach to the assessment of the exchange rate equation, the coefficient of the oil price is found to be positive and insignificant while the commodity price index tends to be statistically significant (see Table 3).⁴³

However, for the years 1993-2012, the coefficients of the energy price index and oil price tend to have a positive effect (see negative sign) but insignificant (see Table 4). In fact, the results are in contrast to what has been presented in the previous estimates using non-stationary

⁴² All the variables are expressed in logarithm along with the lag value of independent variables.

⁴³ Both models are tested for heteroscedasticity. The results were obtained by applying the Breusch-Pagan-Godfrey test (in E-Views), which indicate that there is no heteroscedasticity.

series,⁴⁴ (when estimating the crude series using the previous model specification), all the variables were found to be significant and more consistent with previous estimates made by Bank of Canada. The change from positive to negative may be attributed to a growing share of energy exports since the NAFTA agreement at the beginning of the 1990s.

However for the sake of completeness the previous model is estimated once more. In this case current explanatory variables are employed to examine the behavior of the Canadian exchange rate. This approach differs from the original model where lagged terms were assigned to define the relationship between the exchange rate and its explanatory variables. The idea behind this approach relies on the fact that exchange rates values are heavily sensitive to market forces. Consequently, exchange rates can be very volatile and are likely to change daily. In this regard, lagged quarterly values of the explanatory variables may not be the most appropriate observations to capture the exchange rate behavior. Interestingly enough, the coefficients of the energy price and the oil price have become positive and significant when no lagged values of explanatory variables have been retained in the regressions.⁴⁵ Given the statistically significant results coming from the regression model, the current value of explanatory variables could prove to be a more potent indicator for the exchange rate movements. Consequently, an increase in energy prices generates upward pressure on the Canadian dollar. This phenomenon has eventually been recognized as the Dutch Disease. Therefore, taking the significant and positive link between the energy price index and the Canadian currency value into consideration, it can be concluded that the value of the Canadian dollar is now more firmly tied to energy price movements (see Table 5). Moreover, the estimated equation was adjusted for first-order autocorrelation (in the case of the energy price index). In fact, the results coming from this estimation are somewhat in line with the

⁴⁴ See Table 2.

⁴⁵ All the variables are expressed in logarithm.

Bank of Canada studies and provide support for the hypothesized positive relationship between the energy price index and the Canadian dollar.⁴⁶

rfx: Real Canadian per U.S. dollar exchange rate.

Quarterly average of the daily spot rate recorded by the Bank of Canada at 12:00 p.m. E.S.T., multiplied by the ratio of US to Canada implicit GDP deflator.

com: Real commodity price index excluding energy.

Quarterly average of the daily non-energy commodity price index (V36383). Deflated by the US implicit GDP deflator from 1.

ene: Real energy price index.

Quarterly average of the daily energy commodity price index (V36384). Deflated by the US implicit GDP deflator from 1.

int: Canada–U.S. nominal interest rate differential (V122141, V122491).

oil-price: Spot oil price of West Texas Intermediate (Dollars per barrel)

⁴⁶ All the cases have been tested for heteroskedasticity using the Breusch-Pagan-Godfrey test.

Table 2: Real exchange rate equation (non-stationary series)
(1990Q1-2012Q2)

Variables	1990Q1-2012Q2	1990Q1-2012Q2
C	3.016228 (7.080830)* ⁴⁷	0.780227 (1.669139)**
COM	-0.399317 (-4.259573)*	0.023498 0.310702
ENE	-0.095557 (-3.588940)*	-0.115876 (-3.727467)*
INT	-0.054572 (-7.582984)*	-0.004472 -0.553566
AR(1)		1.117390 (9.577815)*
MA(1)		-0.169326 (-1.460902)***
Adjusted R-squared	0.580265	0.649547
Durbin - Watson	0.286509	1.669139

- * significant at 1% confidence level
- ** significant at 5 % confidence level
- *** significant at 10% confidence level

⁴⁷ t- statistic.

Table 3: Real exchange rate equations (lagged explanatory variables)
(1972Q1-1993Q3)

Variables	1972Q1-1993Q3	Variables	1972Q1-1993Q3
C	0.002816 0.946068	C	0.002977 1.005175
COM	-0.083324 (-1.889590)***	COM	-0.086010 (-1.958113)**
ENE	0.013962 0.737730	OIL-PRICE	0.006941 0.576613
INT	-0.001460 0.2782	INT	-0.001593 0.2283
Adjusted R-squared	0.208158	Adjusted R-squared	0.206070
Durbin - Watson	2.040046	Durbin - Watson	2.048554

- * significant at 1% confidence level
- ** significant at 5 % confidence level
- *** significant at 10% confidence level

Table 4: Real exchange rate equations (lagged explanatory variables)
(1993Q3-2012Q2)

Variables	1993Q3-2012Q2	Variables	1993Q3-2012Q2
C	-0.001531	C	0.001099
	-0.366370		(2.475460)*
COM	-0.011663	COM	-0.002431
	-0.143476		-0.281269
ENE	-0.018651	OIL-PRICE	0.000462
	-0.487627		0.204771
INT	-0.001081	INT	0.000511
	-0.273445		1.222713
Adjusted R-squared	0.074918	Adjusted R-squared	0.072391
Durbin - Watson	1.778417	Durbin - Watson	1.805608

- * significant at 1% confidence level
- ** significant at 5 % confidence level
- *** significant at 10% confidence level

Table 5: Real exchange rate equations (current explanatory variables)
(1993Q3-2012Q2)

Variables	1993Q3-2012Q2	1993Q3-2012Q2	1993Q3-2012Q2	Variables	1993Q3-2012Q2	1993Q3-2012Q2
C	-0.000214	-0.000298	-0.000462	C	-0.000574	-0.001202
	-0.067993	-0.081784	-0.115699		-0.163897	-0.258556
COM	-0.193239	-0.183734	-0.188752	COM	-0.253125	-0.270227
	(-3.069104)*	(-2.918818)*	(-3.000419)*		(-3.709847)*	(-4.028446)*
ENE	-0.128612	-0.132495	-0.132796	OIL-PRICE	-0.049674	-0.036834
	(-5.226540)*	(-5.199974)*	(-5.113333)*		(-2.916782)*	(-2.558239)*
INT	0.000414	0.000500	0.000702	INT	0.001770	0.002256
	0.135184	0.143862	0.186486		0.522616	0.517176
AR(1)		0.137313				
		(0.777060)**				
MA(1)			0.286619			0.334806
			(1.757884)**			(1.910917)***
Adjusted R-squared	0.472726	0.473149	0.485629	Adjusted R-squared	0.347988	0.351860
Durbin -Watson	1.725214	1.876465	2.060132	Durbin -Watson	1.862912	2.090551

- * significant at 1% confidence level
- ** significant at 5 % confidence level
- *** significant at 10% confidence level

Pursuing this further, this dissertation attempts to replicate the Bank of Canada's analysis via an error correction model (ECM). Although all the independent variables are non stationary at level term (except the interest rate differential which is stationary at levels, $I(0)$,⁴⁸ for the pre 1993s era), the crude value of the Can-US real exchange rate, the commodity price index, the energy price index and the oil price are estimated (note that the energy price index and the oil price are not regressed at the same time). Afterwards, the residual of those variables have been tested for unit root test.⁴⁹ The $I(1)$ series of *rfx*, *com*, *oil-price* and *ene* are said to be cointegrated if the residual series, are stationary in levels, i.e., $I(0)$. Finally, the exchange rate equation is estimated where $rfx-rfx(-1)$ ⁵⁰ is the dependent variable and the lagged residual and the Can-US interest rate differential are employed as independent variables.

For the first period under investigation, (1972Q1-1993Q3), logarithmic and non-stationary series (stationary at first difference) of *rfx*, *ene* and *com* are estimated (see Table 6). Given the results of this estimation, the coefficient of the energy price index has a positive and significant sign (it influences the Canadian dollar negatively). The residual of these independent variables are generated where $ecm = rfx + 0.046149* ene - 0.142908* com - 0.181657$. At this level, ADF unit root tests are performed to test the null hypothesis of no cointegration among *rfx*, *ene* and *com*. Subsequently, the test statistic is compared with the correct critical values for cointegration test (Engle-Granger approach)⁵¹ generated by Davidson and MacKinnon (1993). The test statistic (-7.247591) is lower than the 0.05 critical value (Davidson and MacKinnon, 1993, for $m = 3$, and with constant), -3.745. Therefore, the null hypothesis of no cointegration among *rfx*, *ene* and *com* can be rejected. This implies long-term cointegration among the value of the Canadian dollar, the energy price index and the commodity price index for the period 1972Q1-1993Q3. Consequently,

⁴⁸ Interest rate differential is not included since it is assumed to have a short-term influence on the Canadian dollar.

⁴⁹ Engle-Granger (1987) – Residual based approach.

⁵⁰ The ADF test has been applied and *rfx-rfx(-1)* is found to be a first difference stationary.

⁵¹ In this case (multivariate model), the results coming from the Engle-Granger cointegration test may not be consistent with those of the Johansen cointegration test.

the coefficients of these variables, that were originally estimated, are in fact long term coefficients. Finally, after including the interest rate differential, the whole model is estimated and the results are presented in Table 6. The positive and significant sign of the error correction term (suggesting a negative impact on the exchange rate) confirms the existence of the long run relationship among the variables. Similar to the Bank of Canada study, this dissertation was successful in finding the significant link between the energy price index and the Canadian dollar fluctuations.

As previously explained, each period has been examined twice to investigate the effect of both the energy price index and the oil price movements on the value of the Canadian dollar. Following the same argument, the logarithm of the oil price that is non-stationary (first-order stationary) is taken into account as an independent variable. The estimated results are found to be somewhat different to those found in the previous case. The coefficient of the oil-price is positive (negative effect on the Canadian dollar), but statistically insignificant. Despite the fact that the oil-price shows the “expected sign”, no evidence has been found on the correlation between the Canadian dollar and oil price (see Table 6).

However, It is important to mention that for the pre 1993s era when the non logarithm variables were estimated (in the case when the energy price index is considered as a proxy) the coefficient of the energy price is found to have negative effect (see positive sign) and significantly similar to the Bank of Canada study. Similarly, in the case of the oil price, its coefficient tends to be positive and statistically significant (see Table 7).

These procedures are applied for both the energy price index and the oil price over the 1993Q3-2012Q2.⁵² The coefficient of the energy price index is negative (positive effect on the Canadian dollar) and statistically significant (for both cases when the regressors are estimated with or without logarithm). The error correction terms are however insignificant, indicating no long-term cointegration between the value of the Canadian dollar, the energy price index and the

⁵² See Table 8.

commodity price index. Similar results are accomplished using the oil-price for both cases when the regressors are estimated with or without logarithm (see Table 8 and Table 9).

Table 6: Real exchange rate equations via ECM (logarithmic expression)

1972Q1-1993Q3

Variables	1972Q1-1993Q3	Variables	1972Q1-1993Q3
C	0.181657 (3.376914)*	C	0.227568 (3.381257)*
COM	-0.142908 (-4.646231)*	COM	-0.130530 (-3.734337)*
ENE	0.046149 (2.702581)*	OIL-PRICE	0.011240 0.945676
Adjusted R-squared	0.240570	Adjusted R-squared	0.183232
Durbin - Watson	0.108246	Durbin - Watson	0.093637

Variables	1972Q1-1993Q3	Variables	1972Q1-1993Q3
C	0.005948 (1.756162)*	C	0.005766 (1.695653)***
ECM	-0.125090 (-3.246844)*	ECM	-0.113105 (-3.082571)*
INT	-0.003081 (-2.023700)**	INT	-0.002881 (-1.905484)**
Adjusted R-squared	0.093782	Adjusted R-squared	0.085053
Durbin - Watson	2.588174	Durbin - Watson	2.555203

- * significant at 1% confidence level
- ** significant at 5 % confidence level
- *** significant at 10% confidence level

Table 7: Real exchange rate equations via ECM (non-logarithmic expression)

1972Q1-1993Q3

Variables	1972Q1-1993Q3	Variables	1972Q1-1993Q3
C	1.201497 (31.27670)*	C	1.202897 (26.96142)*
COM	-0.042154 (-4.837553)*	COM	-0.036531 (-3.834065)*
ENE	0.006469 (2.941243)*	OIL-PRICE	0.001525 (1.906003)***
Adjusted R-squared	0.263049	Adjusted R-squared	0.220849
Durbin - Watson	0.108082	Durbin - Watson	0.101320

Variables	1972Q1-1993Q3	1972Q1-1993Q3	Variables	1972Q1-1993Q3	1972Q1-1993Q3
C	-1.072397 (-159.7843)*	-1.097097 (-57.29111)*	C	0.001498 (6.701083)*	-1.082409 (-64.89095)*
ECM	-1.227580 (-17.69367)*	-1.368224 (-12.39279)*	ECM	-0.007289 (-3.254121)*	-1.418462 (-15.09590)*
INT	-0.013018 (-4.343323)*	-0.001192 -0.532249	INT	-0.000199 (-2.002069)**	-0.009205 (-4.935544)*
AR(1)		0.879235 (16.46188)*			0.884120 (16.43856)*
Adjusted R-squared	0.795471	0.934657	Adjusted R-squared	0.094947	0.954629
Durbin - Watson	0.470475	2.334927	Durbin - Watson	0.923860	2.233759

- * significant at 1% confidence level
- ** significant at 5 % confidence level
- *** significant at 10% confidence level

Table 8: Real exchange rate equations via ECM (logarithmic expression)

1993Q3-2012Q2

Variables	1993Q3-2012Q2	Variables	1993Q3-2012Q2
C	1.184273 (29.04104)*	C	1.222509 (29.51984)*
COM	-0.612791 (-14.05681)*	COM	-0.559069 (-12.24544)*
ENE	-0.185040 (-14.25876)*	OIL-PRICE	-0.136739 (-14.19781)*
Adjusted R-squared	0.910029	Adjusted R-squared	0.909461
Durbin - Watson	0.589980	Durbin Watson	0.705741

Variables	1993Q3-2012Q2	Variables	1993Q3-2012Q2
C	-0.000441 -0.087601	C	-0.000307 -0.061284
ECM	-0.024770 -0.224782	ECM	-0.091392 -0.842524
INT	0.001309 0.258330	INT	0.000500 0.099864
Adjusted R-squared	0.002305	Adjusted R-squared	0.011352
Durbin - Watson	2.288173	Durbin - Watson	2.272807

- * significant at 1% confidence level
- ** significant at 5 % confidence level
- *** significant at 10% confidence level

Table 9: Real exchange rate equations via ECM (non-logarithmic expression)

1993Q3-2012Q2

Variables	1993Q3-2012Q2	Variables	1993Q3-2012Q2
C	2.032657 (36.86212)*	C	1.852936 (30.67772)*
COM	-0.227669 (-10.31316)*	COM	-0.177505 (-7.338263)*
ENE	-0.021504 (-10.82874)*	OIL-PRICE	-0.003744 (-11.27691)*
Adjusted R-squared	0.872155	Adjusted R-squared	0.878482
Durbin - Watson	0.586622	Durbin - Watson	0.475606

Variables	1993Q3-2012Q2	Variables	1993Q3-2012Q2
C	-0.000549 -0.097970	C	-0.000520 -0.092811
ECM	-0.022376 -0.257884	ECM	-0.003396 -0.038244
INT	0.001378	INT	0.001246 0.230801
Adjusted R-squared	0.001657	Adjusted R-squared	0.000755
Durbin - Watson	2.316438	Durbin - Watson	2.310489

- * significant at 1% confidence level
- ** significant at 5 % confidence level
- *** significant at 10% confidence level

Clearly, the results vary considerably among the methods. The positive (negative effect on the Canadian dollar) and insignificant coefficient of the energy price index and oil price for the pre 1993s can be explained by the small share of energy exports. However, the relationship is rather weak to be able to derive any important conclusion about the role of energy prices in the exchange rate. However, based on other regression analysis, there is strong evidence that, for the post 1993s era, the energy price index and the price of oil is an important indicator to explain the movement of the Canadian dollar. Consequently, the Canadian dollar has become increasingly viewed as a “petro-currency” as it is now highly correlated with the price of oil. According to the estimated results by this research, there is certainly a link between high oil prices and oil exports and the Canadian dollar. Therefore, there is a possibility that the Canadian economy has succumbed to the Dutch Disease. However, the relatively high value of the Canadian dollar over the past decade may not be entirely related to high energy prices. In fact, there are some more important factors that may be responsible for the Canadian currency appreciation over the past decade. One such factor is that the U.S. dollar has depreciated broadly against most currencies.⁵³

As much as these results are of interest, these estimated equations are not very robust empirically and show only weak support for the role played by these traditional variables in explaining the fluctuations of the exchange rate in Canada. It is well known that exchange rate movements are not easy to model and often display a lot of noise empirically that cannot be attributed to certain economic “fundamentals” that have been traditionally highlighted by the Bank of Canada. As pointed out by writers such as Harvey (1993), this is because the exchange rate is highly sensitive to expectations, which are sometimes guided by what may seem to be irrational behavior. For this reason, econometric evidence is often not very robust, as shown by the ability of the previous equation of the Bank of Canada in being able to predict the movement of the Canadian dollar over time.

⁵³ According to the Bank of Canada governor, Mark Carney (2012b, p. 8), 40 percent of the Canadian dollar appreciation since 2002, can be explained by the depreciation of the U.S. dollar.

The results from the estimated equation confirm the positive correlation between the Canadian dollar and energy prices since 1993s. Therefore, the significant and positive link between the energy price index and the Canadian currency value can be interpreted as evidence for Dutch Disease. Notably, to examine the exchange rate behavior, quarterly data, which is employed in this dissertation may not be the most appropriate choice. As a matter of fact, for the purpose of this investigation, any type of data greater than, say, the daily observations could be considered as somewhat inferior. Exchange rate tends to be extremely sensitive to market forces derived by agents' speculation. Consequently data that has been averaged over the time period of a quarter may not pick up the various spikes and discontinuous jumps that might occur from day to day. Unfortunately, the exchange rate equation could not be estimated on a daily basis since, with the possible exception of oil prices internationally, such data is non-existent. Although the time scale of the observations may be considered a hindrance, especially when using lagged values, the limited available evidence does raise some questions about the robustness of the Bank of Canada exchange rate equation, but it does support the significance of the Dutch Disease for the post-1990 period.

3.2 The Path to Productivity: An empirical inquiry

Regarding the slow growth of productivity witnessed in the Canadian economy over the past decades, an hypothesis emerged that the domestic currency is the main factor behind the drastic fall in productivity growth, which reinforced the widening gap in living standards between Canada and the U.S.

The link between the exchange rate and productivity has been discussed in the literature through an analysis of both the supply and demand side. This research aims to consider the demand point of view. This is somewhat similar to the study that was done by Verdoorn (1949). The main idea behind Verdoorn's law is that the average cost of production reduces as output

increases in the manufacturing sector where he found a positive correlation between the size of output and labor productivity growth. To conclude, Verdoorn states, “One would have expected a priori to find a correlation between labor productivity and output given the division of labor only comes about through increases in the volume of production; therefore the expansion of production creates the possibility of further rationalization which has the same effect as mechanization” (Verdoorn, 1949, p. 3).

Verdoorn’s law has been the subject of a vast variety of empirical studies over the past decades. Additionally, the results regarding the significance of Verdoorn’s law are somewhat mixed. For instance, McCombie et al. (2002) studied the relationship between the growth of industrial productivity and output in North America and Europe and their results confirmed Verdoorn’s law.

In another attempt made by Marinho et al. (2002) to prove the significance of Verdoorn’s law on Latin American countries, the outcome was not entirely in favor of Verdoorn’s law. Taking six East Asian countries under investigation, Mamgain (1999) found evidence in favor of Verdoorn’s law only in one country. However, Thirlwall and Wells (2003) demonstrated a significant link between productivity and output levels in forty-five African countries.

However, to capture the demand side effect on productivity, this paper opts for the capacity utilization rather than the output level as explanatory variable. Capacity utilization (CU) is a cyclical indicator which measures the rate of productive capacity. The CU is capable of capturing how much potential productive capacity of the economy is in use for a given period and the overall demand. Subsequently, CU can be employed as an appropriate measure for making adjustments to the level of productivity (Morrison, 1985). As stated by Greenwood, Hercowitz and W. Huffman, (1988), how labor productivity gets influenced by investment can be tracked through changes in capacity utilization. In this context, CU has been employed in different research studies to adjust productivity measures (see, for instance, Denison, 1969, 1972; Jorgenson & Griliches, 1972).

Capacity utilization in manufacturing could explain the overall output in manufacturing because most of the fluctuations in output result from changes in the demand for goods while, at the same time, the demand for services have no impact on the overall output because the final demand for services remains relatively stable (Corrado & Matthey, 1997). The rate of output growth is an important determinant of labor productivity growth based on Verdoorn's law. In the short term, there is a high correlation between the changes in the rate of output per worker and changes in the output. As changes in output move closely in line with changes in capacity utilization, hence, capacity utilization could be a determinant for productivity growth (Weisskopf, 1987).

Besides exchange rate and capacity utilization, labor cost is the other variable which is used to estimate the productivity equation. Generally, a unit labor cost is defined as the cost of worker compensation and benefits per unit of output. Since unit labor cost itself has an essential role to determine prices, it could be used to measure competitiveness.

At a theoretical level, it has been argued that having higher productivity contributes to lower production costs. However, this concept is more complex. For instance, when two countries are compared, it cannot be concluded that the one which has a lower wage is necessarily more competitive. A country with a higher labor costs is able to challenge a lower wage economy due to its higher productivity. Hence, the wage rate relative to labor productivity is the best measure to compare the level of competitiveness (Felipe, 2005).

Additionally, this concept was analyzed by Kaldor (Kaldor, 1978). Based on Kaldors' examination of the post war period, a higher labor cost could actually lead to a higher productivity rate and competitiveness. Thus, those countries that have a higher labor cost become more competitive by experiencing a greater market share. Following this, Kaldor found no evidence to support the argument that a lower level of wages improves productivity and growth.

However, as stated by Felipe and Kumar (2011) any attempts to find evidence for this paradoxical relationship between the wage rate and productivity is not helpful since over the past

decades, researchers have indicated that a higher rate of growth in terms of export and GDP contributes to a greater unit labor cost. In general, at the firm level, an economy is considered as competitive when experiencing a lower unit labor cost. However, examining economies deemed as the most competitive gives an opposite perception.

Indeed, a country with a higher labor cost may not necessarily experience a lower competitiveness. Kalecki (Osiatynski, 1991) proposed a model where the level of national income could be negatively influenced by the profit share and positively influenced by a rising share of labour (Blecker, 1999). Similarly, as stated by Goodwin (1972), the relationship between unit labor cost and growth is more complex than the standard view that asserts that a lower unit cost contributes to a higher rate of growth.

This dissertation examined the effect of exchange rate on productivity through labor productivity and total factor productivity. Both equations have identical variables which are expressed in logarithms. The equations are as follows:

$$\Delta LP = \alpha + \beta_{\text{exr}} EXR + \beta_{\text{cu}} CU + \beta_{\text{lc}} LC + \beta_{\text{m\&e}} M\&E + \varepsilon$$

$$\Delta TFP = \alpha + \beta_{\text{exr}} EXR + \beta_{\text{cu}} CU + \beta_{\text{lc}} LC + \beta_{\text{m\&e}} M\&E + \varepsilon$$

Where, *LP* is labor productivity, *TFP* is total factor productivity, *EXR* is the real U.S. dollar in Canadian funds, *CU* is capacity utilization, *M&E* is investment in machinery and equipments and *LC* is labor cost.⁵⁴ This empirical analysis makes use of annually based data from Statistics Canada for the 1989-2010 period. All series are retrieved from CANSIM.

The Augmented Dickey-Fuller test has been applied to test the presence of unit root for both equations. Based on the augmented Dickey-Fuller statistic and p-value, all the variables are stationary at first difference, i.e., *I*(1).⁵⁵ Both equations are estimated for the period of 1989-2010.

⁵⁴ *LP-LP(-1)* and *TFP-TFP(-1)* are the dependent variables.

⁵⁵ This includes explanatory and dependent variables.

The regression results for estimated labor productivity equation are shown in Table 10. Interestingly, the results regarding the influential effect of the exchange rate on productivity is in line with presumed expectation. That is, finding no evidence that the high value of the Canadian dollar over the last 10 years has been hurting the economy by keeping productivity growth at a slow pace and stimulating the gap between Canada and the U.S. Moreover, higher wages can lead to higher productivity because of the positive effect that the former could have on overall demand in the economy. As a consumption-led recovery feeds into higher investment, the effect of this higher capital accumulation will be to stimulate productivity growth (Naastepad and Storm, 2007). For instance, it has been observed that as much as 90 per cent of the Dutch productivity growth slowdown after 1982 could be related to a decline in real wage growth (Naastepad 2006).

Due to the correlation between variables, the equations is adjusted to improve the Durbin - Watson and concluded in Table 10. The results regarding the adjusted model provide us with similar results. Therefore, the widening gap of productivity between Canada and the U.S. cannot be blamed on the high value of the domestic currency. Consequently, the cause behind the slow path of productivity, especially over the last two decades, is more likely the reflection of an alternative cause which appears to accompany the Canadian economy in the long term.

In addition to this, the estimated results for total factor productivity display a similar pattern (see Table 11). This signifies that there is no evidence to support the theory that exchange rate appreciation triggers TFP growth.

By examining the coefficients, investment in machinery and equipment is found to have a positive and significant effect on Canada's productivity growth. Consequently, as there is no significant link between the exchange rate and productivity, the claims provided by those who have been arguing in favour of this explanation for Canada's weak productivity growth caused by the current exchange rate regime are not basing their arguments on sound empirical evidence. There is probably some other root cause behind this economic phenomenon which is much deeper and cannot be resolved merely by tinkering with the exchange rate regime. Indeed, the U.S. is the

main trading partner for Canada, and cyclical changes in the U.S. economy certainly affect the domestic economy. Since 2008, simultaneous to the financial crisis, the U.S. economy slowed down and this, without a doubt, has severely affected the Canadian economy. Leaving the high value of the Canadian dollar aside, Canadian firms have been experiencing a sharp decline in demand for domestic goods.

It is important to note that Canada's labor productivity increased by 1.4% over 2011 which appears to be moderate. However, concerns rise when this gets compared to U.S. values, which was 3.8% growth (Shufelt, 2012). The bottom line is that Canada and the U.S. have different economic structures and they cannot easily be compared with each other.

The view that investment in machinery and equipment stimulates productivity growth is supported by the empirical evidence presented in this dissertation. As the Canadian dollar stays high, firms have the advantage to import productivity enhancing equipment at a lower cost. However, as long as the global economy remains stuck in a period of slow growth, Canadian firms are not investing in machinery and equipment. It seems that, even with the high value of the Canadian dollar and low interest rates, there is not enough demand for Canadian goods to encourage domestic firms to invest significantly to sustain somewhat productivity growth.

LP: labor productivity.

TFP: total factor productivity.

EXR: the real U.S. dollar in Canadian funds.

CU: capacity utilization.

M&E: investment in machinery and equipments.

LC: labor cost.

Table 10: Labor productivity equation
1989-2010

Variables	1989-2010	Variables	1989-2010
C	0.015596 (4.107306)*	C	0.015636 (2.957219)*
CU	0.007853 0.090911	CU	0.030960 -0.414529
M&E	0.063314 (1.924188)***	M&E	0.083444 (2.357890)**
LC	0.281904 (2.013474)**	LC	0.351769 (2.222370)**
EXR	0.009446 0.278002	EXR	0.015177 0.480264
		AR(1)	0.506189 (2.177982)**
Adjusted R-squared	0.353384	Adjusted R-squared	0.462220
Durbin - Watson	1.115321	Durbin - Watson	1.962761

- * significant at 1% confidence level
- ** significant at 5 % confidence level
- *** significant at 10% confidence level

Table 11: Total factor productivity equation
1989-2010

Variables	1989-2010	Variables	1989-2010
C	0.003064	C	0.002422
	1.113144		0.541733
CU	0.153703	CU	0.132172
	(2.454617)**		(3.073472)*
M&E	0.048934	M&E	0.061532
	(2.051545)**		(3.062461)*
LC	0.275089	LC	0.289025
	(2.710441)*		(2.935564)*
EXR	-0.007900	EXR	0.014764
	-0.320763		0.808939
		AR(1)	0.679704
			(3.347360)*
Adjusted R-squared	0.658946	Adjusted R-squared	0.76836
Durbin - Watson	0.851521	Durbin - Watson	1.829709

- * significant at 1% confidence level
- ** significant at 5 % confidence level

4. Conclusion

The question on whether the floating exchange rate regime is more appropriate for Canada rather than the fixed exchange rate system has been the center of debate over the last two decades. Those who argue against the current exchange rate regime believe that high volatility of the exchange rate would cost the Canadian economy in many different ways. The main argument is that the high value of the Canadian dollar over the past years, as a result of fluctuations in energy prices, has led to lower growth in productivity and living standards. The link between exchange rate and energy prices has been examined over the 1972-2011 period. The empirical results provide support for the previous findings by the Bank of Canada and indicate that the coefficient of energy prices has changed over the years from negative to positive as Canada became a significant energy exporter. Taken all together, although energy price index seem to play an essential role nowadays in determining the movements of the Canadian exchange rate, it has to be noted that the correlation between energy prices and the movements of the Canadian dollar may actually be the result of the agent's perceptions of oil price changes rather than the actual energy prices themselves.

According to the opponents of the flexible exchange rate regime, the high value of the Canadian dollar has been negatively influencing the Canadian economy through different avenues. For instance, through the deterioration of Canada's overall trade balance and shift toward non-tradable sectors as well as through the loss of manufacturing jobs which have all contributed to the slowing productivity growth and the widening gap between Canada and the U.S. to the most severe point. These symptoms have all been associated with the so called "Dutch Disease" issue. The question on whether the Canadian economy suffers from the Dutch Disease due to the apparent symptoms, is a debate for itself. Yet, the answer to this question is not completely clear but given the symptoms that the Canadian economy has been struggling with, the chances of it being affected by the Dutch Disease is highly feasible.

However, this does not necessarily confirm the theory that those symptoms, that the economy is currently struggling with, are triggered by the high value of the exchange rate. In this context, it has been argued that the low productivity growth is the result of the current exchange rate regime. As claimed by its supporters, during the 1970s a low Canadian dollar contributed to the productivity gap between Canada and the U.S. In addition to the exchange rate depreciation, Canadian manufactures had the opportunity to become artificially competitive without having any incentive to improve their level of productivity. Moreover, the import of capital equipment tended to be more costly and since, Canadian firms import more than 80 percent of their equipment from U.S., the importing of machinery and equipment declined dramatically. Based on this argument, it is expected that a higher value of the Canadian dollar will stimulate output expansion as import of capital equipment becomes less costly. However, despite the sharp increase in the Canadian currency compared to the U.S. dollar, the productivity gap between Canada and the U.S. has been significantly widening.

Some politicians, albeit very few, have in the past asserted that the high value of the Canadian dollar is the root cause of this long lasting issue. Some have gone so far as to propose the elimination of the Canadian dollar as the optimal solution for the economy to relieve itself from disadvantages associated with the fluctuating currency.

However, according to the empirical results provided by this research, there is no significant link between the exchange rate appreciation and a slower productivity growth for both labor productivity and total factor productivity over the 1989-2010 period. Furthermore, a higher capacity utilization, labor cost and investment in machinery and equipment stimulate productivity growth to some degree.

However, the Canadian firms' engagement in capital accumulation during the period of high valued currency is not as much as expected. In fact, the U.S. is the main trading partner for Canada and consequently, the Canadian economy is strongly tied to the U.S. Therefore, the slow pace of productivity growth that the economy has been experiencing could be related to the cyclical

changes that have been in part influenced by the performance of the US economy. Although Canada's productivity improvement over the last year was not at its worst level, it became a matter of concern when compared with the U.S. Both countries have different economic structures and comparison between the two may not always be appropriate. Despite the fact that a variety of corrective measures have been applied to the economy to enhance its productivity, the Canadian economy was not fortunate enough to experience an improvement. Productivity may have started to improve; however, this is not apparent as productivity is dominated by the cyclical trend of the economy. Consequently, the status quo perhaps is the best solution in order to pass through the current period of visible slowdown in global economic activity.

Further studies are required to confirm the findings presented in this paper, and to investigate the possible link between the exchange rate and productivity through other possible indirect channels.

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