

Productivity, Capital Flows, and the Decline of the Canadian Dollar: An Alternate Approach

1. Introduction¹

The empirical movements of real exchange rates pose an enduring puzzle for economic theory (Stein 1995, Harvey 1996, Chen and Rogoff 2002). Standard theory proposes two distinct, albeit complementary, models of real exchange rates. The first of these is the Purchasing Power Parity (PPP) hypothesis, which posits that some appropriately defined real exchange rate will tend to be roughly constant over time (stationary)². This is a widely tested proposition, and its empirical difficulties are legion. Nonetheless, it is often used as an empirical rule which is used to judge the sustainability of the observed real exchange rate. The second hypothesis is that over the long run the term of trade (i.e. the real exchange rate in terms of export and import prices) will automatically move so as to eliminate trade imbalances³. This too has been difficult to sustain at an empirical proposition, largely because persistent trade imbalances are evident across most countries. Nonetheless, it too is used as a rule of thumb in judging the observed exchange rate.

The issue at hand is the theoretical explanation of the empirical movements of real exchange rates. In this respect, Canadian foreign trade exemplifies the general problems of standard trade theory. The long run real exchange rate is not stationary over time so that PPP does not appear to hold (Figure 1 below; and Chen and Rogoff, 2002, p. 29, Figure 2b); and trade is not balanced even over the long run (Figure 1 below), which contradicts the anticipations of comparative advantage theory (Arndt and Richardson, 1987, pp. 12-13; Dornbusch 1988, p.3). In addition, the fact that international commodity prices appear to have a significant impact on the Canadian real exchange rate creates a further problem for the standard theory (Amano and Norden 1993; Chen and Rogoff 2002, pp. 1-2).

Figure 1 here

This article seeks to analyze the Canadian real exchange rate in manner different from that of standard theory. The starting point is a Classical argument that tradable-goods real exchange rates, which are merely international relative prices, are regulated in the same manner as national relative prices. That is to say, they are determined by the relative real costs of production of the dominant producers of the corresponding products. This argument stands in sharp contrast to the conventional 'comparative cost' argument which claims that real exchange rates are regulated by the balance of trade (Shaikh 1996). As we shall see, the present analysis will have a direct bearing on the recent debate about the decline in the Canadian real exchange rate over the last decade.

The first part of this article will contrast the alternative framework to that of standard theory. This will include the consideration of both long term determinants of real exchange rates as well as shorter term factors such as

¹ I wish to thank Andrew Sharpe and Jeremy Smith for their help and comments on this paper.

² Purchasing Power Parity (PPP) theory begins from the premise that international competition links the international prices of any particular tradable good, subject to differences arising from transportation costs, tariffs, and national taxes. If we let p = the national price level of some general bundle of goods, p^* = the price level of the corresponding bundle same bundle in the foreign country, and e = the nominal exchange (foreign currency/local currency), then the bundle's international relative price (pAe/p^*) is the same thing as the domestic exchange rate deflated by national relative prices ($e/(p^*/p)$), i.e. as a the domestic real exchange rate in terms of these prices. Then, *if* the general bundle in question (GDP, consumption goods, tradables goods, etc.) happens to have the *same* composition across countries, this would ensure that the corresponding international real exchange rate (relative international price) would be roughly constant.

³ This is of course the basic operating principle behind the hypothesized 'law of comparative costs'.

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fluctuations in international capital flows. The second part will focus on the Canadian bilateral real exchange rate with respect to the US, particularly on the construction of appropriate measures of the relative real costs of Canadian tradable goods. And the third part will demonstrate that the alternative framework performs far better in explaining the observed movements of the Canadian real exchange rate. We will end with a comment on the recent decline in the Canadian dollar.

1. The theory of competition and the theory of international trade

The classical theory of competition places a great emphasis on cost-cutting. Firms whose costs are relatively low can keep their prices relatively low, and thus gain market share. To accomplish this, firms are driven to raise productivity and to keep down the growth of real wages.

From this point of view, *within any one country*, regions with a predominance of high cost firms would be at a competitive disadvantage in the national market. If open to competition, firms in the high cost region would tend to have declining shares, to have difficulty selling outside the region, and to be vulnerable to products produced in lower cost regions. In other words, under *laissez-faire*, high cost regions would tend to have declining 'exports' and rising 'imports', other things being equal. Conversely, if the higher cost regions were previously protected, then removing existing trade barriers would tend to produce job losses and real wage declines (due to both unemployment and to possible pressure from lower wage regions). The resulting re-allocation of capital and labor would wipe out some firms and jobs. If high wages were previously in effect, they would tend to be lowered towards the national average. But none of this ensures that the jobs lost would be automatically made up. *Persistent regional disparities are therefore perfectly possible.*

The preceding implications are inherent in the very notion of competition, and are common to virtually all schools of economic theory, at least at this point in the analysis. And it is here that neoclassical theory diverges from classical theory, by appending two further assumptions. First, that technology is uniform across regions; and second, that full employment is maintained at all times in all regions, at least in equilibrium. These assumptions serve ensure that competition merely distributes the benefits of technical change equally to all regions within a nation, while maintaining full employment everywhere. In this manner standard (neoclassical) theory is able to abolish all the negative consequences inherent in unrestricted competition – at least in theory.

It is not surprising that the differences between classical and neoclassical theory carry over to the theory of international trade. Neoclassical theory retains the assumption of full employment, which negates any possible threat

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of national job losses from international competition. But since trade theory does not necessarily assume that capital and labor are mobile *across* nations, there is no obvious mechanism to ensure that all nations will have the same technology and the same real wages – i.e. that all nations will be equally competitive.

It was David Ricardo who argued that in the case of international trade, the terms of trade (the relative price of exports to imports, expressed in common currency) would pick up this function. He contended that each nation's terms of trade would automatically adjust to balance its trade. This would thereby serve to *automatically make all nations equally "competitive" in international trade, regardless of how backward their technology or how high their wages* (Officer 1976:10-13; Arndt and Richardson 1987:12-13).

Neoclassical theory directly incorporates this 'principle of comparative costs' and its attendant conclusion that trade will be automatically balanced. Theoretical models often simply assume that this balance holds at any particular moment of time. But in practical work it is understood that the equilibration process may take time. Hence the basic empirical expectation of standard international trade theory is that over the long run "trade will be balanced so that the value of exports equals the value of imports" (Dernburg, 1989:29), so that nations operate *as if* they "barter" exports for imports of equal value (Dornbusch 1988:3). When this assumption of universal trade balance is combined with that of universal full employment, the potential negative consequences of international competition are theoretically abolished.

The standard theory implies that international relative prices are determined differently from national relative prices. In the national case, relative prices are regulated by real costs of production. But in the international case, relative prices are assumed to be determined by the degree of imbalance between exports and imports, and to move in such a way as to eliminate this imbalance (hence to make each nation equally competitive in international trade). As Ricardo himself noted, this means that international relative prices *cannot also* be determined by costs of production (Shaikh 1980). They cannot serve two masters at once.

The difference between classical and neoclassical theory resurfaces precisely on this point. Classical theory argues that international relative prices *are* determined in the same way as national relative prices, by the appropriate relative real costs of production. But then, although they might be affected by trade imbalances insofar as the latter affect real costs, they will not automatically move so as to balance trade. In classical theory it is a country's international competitive position, as measured by its real costs, which determines how it fares in international trade – not the other way around. As in the case of inter-regional trade within a nation, trade between nations will punish the weak and reward the strong, with no guarantee that it will provide benefits to all. Persistent trade imbalances are perfectly possible, covered by corresponding capital inflows or outflows (see section 3 below).

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The preceding discussion speaks to the differences between the classical and neoclassical explanations of the terms of trade, and hence of real exchange rates in general. Not surprisingly, these differences carry over to the question of the hypothesis of Purchasing Power Parity (PPP). Both schools emphasize that international competition links the international prices of any particular tradable good, subject to differences arising from transportation costs, tariffs, and national taxes (the Law of Correlated Prices). But, as we have seen, classical theory argues that international relative prices will be regulated by the corresponding real costs of the dominant producers. This applies equally well to any particular bundle of goods. Thus, for example, the international relative price of the tradable goods of any two countries (which is their real exchange rate in terms of tradable goods) will depend on the relative real costs of these goods. Since these relative real costs can change over time, it follows that the real exchange rate will not generally be stationary – i.e. PPP will not generally hold. The only exception would be the case in which both countries have the *same* composition of tradable goods bundles in each year. In that instance, the real costs of the two bundles would also be the same in every year, which means that their relative real costs would be constant over time. Only in this particular case would PPP hold.

Insofar as standard theory supports the hypothesis of PPP (and we will see that it is an enormously controversial one), it does so by implicitly assuming that countries not only have the same technology, but also the same aggregate bundle of some set of tradable goods⁴. Then the Law of Correlated Prices directly ensures that the real exchange rate expressed in terms of this particular set tradable goods will be stationary.

2. Trade theory and the empirical evidence

We have seen that standard theory assumes one or both of the following propositions. First, that international trade will tend to automatically eliminate any disadvantages arising from technological backwardness or high costs, because real exchange rates will always move in such a way as to make all trading partners equally competitive. Thus no country will suffer persistent trade deficits or enjoy persistent trade surpluses. And second, that PPP is likely to hold across countries, so that real exchange rates will tend to be time-stationary (i.e. will not have a trend).

The trouble is that there is considerable empirical evidence against both of these propositions. In the postwar period, for instance, neither competitive advantages, nor trade balances, nor even overall payments balances, have been the least bit random across time or across economies. On the contrary, international trade has been characterized by "persistent, marked competitive advantage for [countries such as] Japan and marked competitive disadvantage for countries [such as] the United States", coupled with "persistent, marked trade balance surpluses for Japan and deficits for the United States" (Arndt and Richardson 1987:12). A similar problem appears for the PPP hypothesis, since "tests based on aggregate price indexes overwhelmingly reject purchasing power parity as a short-run

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relationship" (Rogoff 1996, p.647). Indeed, even the 50-year span of the postwar period does not provide much support for the notion that real exchange rates are time-stationary. Perhaps the only exception to these empirical difficulties is that the (relative) PPP hypothesis does appear to hold when inflation rates are high (Froot and Rogoff 1995, p.1651). This is an important clue, because the success of relative PPP at high inflation rates, but not at low ones, is exactly what one would expect from the alternative approach developed in the next section.

Such empirical problems have led to two kinds of responses. The dominant response has been to suggest that the process in question might be "extremely slow" (Rogoff 1996, p. 647), requiring perhaps 75 or even a 100 years in order to become evident (Froot and Rogoff 1995, pp. 1657, 1662). From this point of view, the observed discrepancies between the data and "the 'fundamentals' suggested by theoretical models of the exchange rate" (Dornbusch 1988:9) might be due to short or medium run factors which might account for the discrepancies. The four competing explanations in this vein are the monetary approach, the new classical approach, the equilibrium approach, and what Dornbusch calls the macroeconomic approach (*ibid*:10). But even these short run exchange rate perform poorly at the empirical level (Dornbusch 1988, pp. 1-2; Stein 1995, p.182; Harvey 1996, p. 567).

The other main reaction to the empirical difficulties of orthodox theory has been to try to make comparative cost theory "more 'realistic'" (Dosi et al, 1990, p. 18) by resituating it within imperfect or monopolistic competition in the context of technological differences, economies of scale, differentiated products, multinational corporations, and so on. However, even here certain core assumptions concerning the behavior of maximizing agents and the automatic clearing of all markets are retained (Dosi, *op cit*, pp. 18, 23-24), although they "are difficult to accept on either theoretical or empirical grounds" (*ibid*, 24). Most importantly, the central assumption that international trade is regulated by comparative costs remains unchallenged.

Lastly, it should be noted that in spite of these well-known empirical problems, standard theory is often used as a basis for economic policy. On the assumption of comparative costs, the extent to which trade is out of balance is often taken to indicate the extent to which the real exchange rate is in disequilibrium. Alternately, on the assumption of PPP, the distance of the real exchange rate from its long term average is taken to indicate the degree of its departure from equilibrium (Isard, 1995, pp. 59, 70-72; Frenkel and Khan, 1993). A similar role is played by the assumption of full employment, as was illustrated in the debate about the potential effects of the North American Free Trade Association (NAFTA). For example, in October 1993 the White House issued a statement to the effect that "19 of 20 comprehensive studies" the Joint Economic Committee (JEC) of the United States had concluded that NAFTA would benefit the United States (JEC 1993, pp. v, xv). But closer examination of these studies demonstrated that they had ruled out any potential job loss by assuming that labor would always remain fully employed, at least in the US (JEC 1993, pp. 12; Stanford 1993, pp. 98-100). Studies that did not make this

⁴ The Law of Correlated Prices (Law of 'One' Price) need not apply to goods that are not capable of being traded

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assumption predicted substantially different and more negative outcomes (JEC 1993, pp. 34; Stanford 1993, pp. 104).

3. A classical framework for the analysis of real exchange rates

The starting point of an alternate approach is the recognition that international terms of trade are international relative prices, which just like national relative prices, are driven by the relative costs of the *best-practice (regulating) producers*. The second step is to note that these relative costs can in turn be well approximated by vertically integrated unit labor costs. As a matter of accounting, we can decompose any unit price into its unit labor costs, its unit gross profits, and its unit materials costs. But the unit materials cost is itself simply the price of some bundle of commodities, and can itself be similarly decomposed, as can the materials costs of the materials costs, and so on. The upshot is that the price of a product can be decomposed into direct and indirect unit (vertically integrated) labor costs, multiplied by an average (vertically-integrated) gross profit margin. The relative price of any two commodities therefore depends on the ratios of these same two terms. But precisely because each vertically integrated profit margin is a weighted average of the regulating producer's own profit margin *and* of the profit margins of all the industries which enter directly or indirectly into its production, it is not surprising to find that the dispersion of relative vertically integrated profit margins is quite small. Thus it turns out that the relative vertically integrated unit labor costs of the regulating producers provide an excellent approximation to relative prices within a nation (Shaikh 1984; Ochoa 1988; Bienenfeld 1988; Milberg and Elmlie 1992)⁵.

If we let p denote unit price, and v denote the unit vertically integrated labor cost of the *regulating* producer, then for any two industries within a single nation we may write the approximate relation

$$1) \quad p_i / p_j \approx v_i / v_j$$

To extend this same principle to an international scale, we need only modify it to take into account the distinction between national currencies. Hence the relative *common-currency* prices of any two goods in the world market will be regulated by the total real unit labor costs of the best-practice producers of these products. Let e be the nominal exchange rate (foreign currency/domestic currency), p and p^* the prices of domestic and foreign tradable goods, respectively. Then pAe/p^* is the common-currency relative price of these two sets of tradable goods. Corresponding to this will be v', v^* , the best-practice vertically integrated unit labor costs of these same bundles of tradable goods, expressed in common-currency. Since the best-practice producers of the tradable goods of a given country may be spread out over several countries, many exchange rates may be implicit in the common-currency measures of these

across nations because of sufficiently high transport costs. Services have often fallen into this category.

⁵ National studies based on input-output analysis can only estimate the costs of the average producer, because of the nature of the data available.

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costs. International competition will then imply that the international relative price of tradable goods, i.e. the real exchange rate (er) in terms of tradable-goods prices, is given by

$$2) \quad er \equiv pAe/p^* \approx v'/v^*$$

Now suppose that there was some bundle of *tradable* consumer goods whose international prices pc_T, pc_T^* (adjusted for transportation costs, etc.) are roughly equalized across the two countries. Then

$$3) \quad (pc_T)Ae \approx pc_T^*$$

Let pc, pc^* be the general prices of consumer goods in the two countries, comprising both tradables and nontradables. Then if we write *real* best-practice vertically unit labor costs as $vr = v/p_c$, and let $\tau = pc / pc_T$, we may combine equations 2 and 3 to yield the basic proposition

$$4) \quad er \approx ruc^* \quad (\text{over the long run})$$

where $er \equiv pAe/p^*$ and $ruc^* \equiv (vr/vr^*)A(\tau/\tau^*)$

Equation 4 implies that the relative international price of tradable goods in the two countries -- *which is the tradable-goods real exchange rate (er) between them* -- will be regulated by the real labor costs of the regulating capitals of those commodity bundles (ruc^*), adjusted for the tradable/nontradable content (the openness) of the consumption bundle. This core relation can then easily be extended to measures of real exchange rate in terms of other price indexes such as CPI's or GDP price deflators.

Several practical implications can be derived from equation 4.

- First, it allows us to derive a practical policy rule-of-thumb for the movements of the (real and nominal) exchange rate: the sustainable real exchange rate is that which corresponds to the relative competitive position of a nation, as measured by its relative real unit labor costs (ruc^*).
- Second, it tells us that since the real exchange rate is pinned (through competition) by real unit costs and other factors, it is not free to adjust in such a way as to eliminate trade imbalances. Indeed, such imbalances will be persistent, and will have to be covered by corresponding direct payments and/or capital inflows. It follows that a currency devaluation will not, in itself, eliminate trade deficits. Rather, it would be successful only to the extent that it affect the real unit costs (via the real wage) and/or the tradables/nontradables price ratio of consumer goods (Shaikh 1996, p.72). And that depends on the ability of workers and consumers to resist such effects.

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- Third, it tells us that the real exchange rate of a country is likely to *depreciate* when a country's relative competitive position *improves*, other things being equal. Just as in the case of competition within a country, in which an industry with relatively falling costs will be able to lower prices, so too in international competition will a country's export prices fall relatively, in common-currency, when the corresponding relative real costs of production fall. It should be added that just as a cost-based fall in a commodity price is very different from the fall in its price due to distress in the industry, so too is the competitive depreciation of a currency quite distinct from its depreciation due to a crisis.
- Fourth, it tells that the real exchange rate between two countries will be stationary only when their relative competitive positions and relative degrees of openness remain unchanged over the interval examined. In the absence of these special conditions, the real exchange rate will be nonstationary, which implies that in general PPP will not hold (Figure 1 above).
- Finally, because relative real unit labor costs can only change modestly in a given year, the same is likely to apply to the long run trend of real exchange rates (shorter run factors are discussed later). For example, if relative real unit labor costs of a country happened to rise by 3% over some interval, then from equation 4 a relative inflation rate of 40% would imply a nominal depreciation of about 37%. In this way, (relative) PPP would appear to work well in the case of high inflation countries. We noted at the end of the previous section that this is the one case in which PPP *does* appear to work empirically.

The preceding discussion has focused on the central tendencies of the real exchange rate, as expressed in equation 4. This is sufficient for a direct comparison of the observed real exchange rate with its hypothesized center of gravity. But it is important to recognize that since the real exchange rate is pinned by relative real costs, trade imbalances will tend to be persistent unless the real underlying factors are changed. In the absence of state intervention, the outflow of funds in a country with a persistent trade deficit will tend to raise domestic interest rates and hence attract foreign capital inflows until the overall balance of payments is in equilibrium. The current account will thus drive the capital account, other things being equal. This in turn implies that exogenous fluctuations in capital flows (due say to changes in domestic or foreign economic environments) can easily drive the balance of payments out of equilibrium and induce fluctuations in nominal and real exchange rates -- at least until the latter adjust back toward their long term trend.

4. The empirical application of the alternate framework

A previous application of this framework to the US and Japanese effective exchange rates is available in Shaikh and Antonopoulos (1997). In the present article, we will apply equation 4 to the case of the bilateral real exchange rate between Canada and the United States, from 1971-2000. On the left hand side of this equation we have the nominal

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bilateral real exchange rate $er \equiv pAe/p^*$, where p and p^* stand for Canadian and US producer price indexes representing the respective national prices of tradable goods.

On the right hand side, the theory requires vertically integrated unit labor costs. In order to properly estimate vertically integrated costs, one would need input-output tables for both countries, over a sufficient time span to permit the creation of an adequate time series. Since such data is not readily available, we use direct unit labor costs instead. Because US exports are largely composed of manufacturing goods, we use manufacturing unit labor costs on the US side. This implicitly assumes that the US is a regulating producer of most of its tradable goods. But since primary commodities comprise a substantial portion of Canadian exports, we use a weighted average of manufacturing unit labor costs and of a proxy for the regulating costs of the primary sector⁶. Lastly, the variable $\tau = pc / pc_T$, which represents the ratio of the price all consumption goods relative to tradable consumption goods, was proxied by the ratio of the consumer price index to the producer price index in each country.

Figure 2 displays the fundamental relationship between the Canadian/US bilateral real exchange rate (in terms of producer prices) and the corresponding relative real unit labor costs. As one can see, the two move in substantially similar ways, both in short term fluctuations and long term trends.

[Figure 2 here](#)

It is useful to note that the classical approach provides an empirical alternative to the PPP hypothesis. The latter assumes that the real exchange rate $er \equiv pAe/p^*$ is stationary. But the former, as expressed in equation 4, implies that the *ratio* of the real exchange rate to the corresponding real unit labor costs ($er/rule^*$) will be stationary. Figure 3 displays this ratio along with its long run average (the dotted line), which is indeed stationary over the long run

⁶ Let u = unit labor costs and $ur = u/pc$ = real unit labor costs, where pc = the consumer price index in the country. Using the subscripts m and p to denote manufacturing and primary sectors respectively, and x_m and x_p to denote the shares of manufacturing and primary goods in Canadian tradables, the right hand side of equation 4 can be approximated by $ur_{can} / ur_{us} = [(ur_{can})_m A x_m + (ur_{can})_p A x_p] / (ur_{us})_m = (ur_{can} / ur_{us})_m A x_m + [(ur_{can})_p / (ur_{us})_m] A x_p$. The first term in final expression on the right hand side is the relative real unit labor costs in manufacturing, weighted by the share of manufacturing in total non-fuel exports. The second term is the real unit labor costs of (the regulating capitals of) Canadian primary goods relative to that of US manufacturing, weighted by the share of primary goods in total non-fuel exports. Since this second unit labor cost term is not directly observable, it is proxied by the relative price of Canadian non-fuel primary goods with respect to the US producer price index. Fuels were excluded because the two oil shocks of 1973 and 1979 would introduce serious distortions into any attempt to approximate relative costs via relative prices. For this same reason, the shares x_m and x_p were estimated as the shares of manufacturing and non-fuel primary commodities in total non-fuel exports of Canada. All Canadian data is from Statistics Canada. All US data is from the US Bureau of Labor Statistics (BLS), except for interpolated series for US manufacturing from 1960-1977, which is derived from US Bureau of Economic Analysis (BEA), as explained in the data appendix of Shaikh and Antonopoulos 1997.

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(fluctuating only about $\pm 10\%$). From this point of view, the decline in the Canadian real exchange rate since the mid-1990's does not appear to be driven by changes in productivity, since these are already accounted for in the measure of real unit labor costs. One possibility is that it is driven instead by the systematic capital outflow from Canada induced by the change in regulations since the mid-1990's. This perspective is supported by regression results (not displayed here) of the real exchange rate on real unit labor costs and the Canadian-US short term interest rate differential, which provide quite a good fit for the real exchange rate except after the mid-1990's.

Figure 3 here

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Figure 1: Canadian Export/Import Ratio and Bilateral Real Exchange Rate

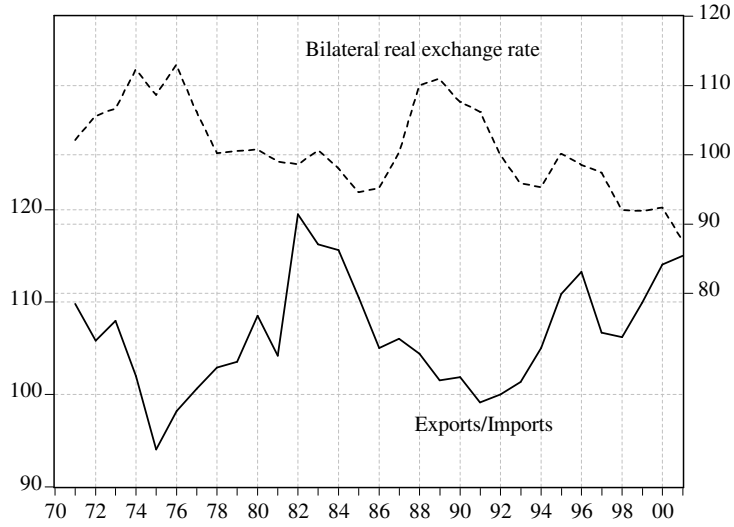
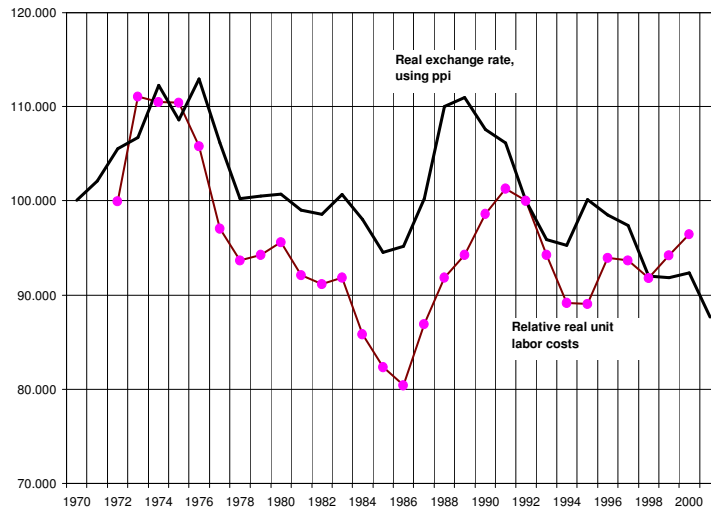


Figure 2: Canada/US Bilateral Real Exchange Rate and Real Unit Labor Costs



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Figure 3: The ratio of the Canadian real exchange rate (er) to its fundamentals (rulc*)

