The New Economy and the Exchange Rate Regime

Richard G. Harris

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The New Economy and the Exchange Rate Regime

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1. Introduction

Robert Mundell changed the intellectual landscape of international economics forever, and his receipt of the 1999 Nobel Prize in Economics was long overdue. Many of his contributions to the field were motivated by the perspective on the international economy that came from his early life and education in Canada. That perspective is one in which the ‘open economy’ is given prominence both analytically and in the policy framework. In this paper I pursue an issue that Mundell has raised at numerous times in his criticism of flexible exchange rate regimes, and Canada's exchange rate regime in particular. Mundell has argued in public debate that Canadian living standards can only achieve American levels under a permanently fixed exchange rate between Canada and the United States. This position is somewhat at odds with traditional open economy macroeconomic theory that takes productivity as exogenous relative to either the nominal exchange rate or the exchange rate regime. The productivity case became central to the debate within Canada on the causes and consequences of the significant real depreciation of the Canadian dollar over the 1990’s. Courchene and Harris (1999) and Grubel (1999), among others, have argued that the depreciation contributed to the well documented widening productivity gap between Canada and the United States. On the opposite side, including statements by the Governor of the Bank of Canada, the argument is made that Canada's flexible exchange rate served as an important buffer to external shocks, which are asymmetric relative to those in the United States. In the Bank of Canada's own review of the evidence it is argued that there is no evidence to suggest a link running from exchange rate depreciation to a widening productivity gap. Furthermore John Murray (2000), a prominent Bank of Canada economist, has argued that Canadian dollar real depreciation was an equilibrium response to the decline in the terms of trade which resulted from the decline in commodity prices which occurred in the wake of the Asian

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1 It would be impossible to cite the numerous speeches and press reports in which he has made this point. In the Canadian exchange rate debate his 1990 paper, [Mundell (1990)] subsequently published in French in 1991, made the point clearly.

2 See La France and Schembri (2000).
It is not my intent to review all these arguments here. This paper will address two issues which are central to the productivity question. First, I will argue that there are good reasons to treat productivity as endogenous within a macroeconomic framework in which the exchange rate regime is either fixed or floating. The motivation for these observations is drawn from a reading of both the new endogenous growth theory, and some of the recent evidence specific to the determinants of Canadian productivity.

Second, I will argue that the Canada-U.S. experience of the 1990's may typify a more pervasive problem with floating rates, when the economy is undergoing a major and permanent technological transition. The emerging ‘New Economy’ paradigm in the U.S. suggests that industrial economies are in the midst of a major technological transition being driven by a convergence of computer technology, the Internet, and a wide range of innovations in information technology. The acceleration in the U.S. productivity data after 1995 is the principal macro evidence supporting the hypothesis that a major new General Purpose Technology (the IT revolution of the New Economy) which has shocked economic activity in the U.S. Canada, on the other hand has lagged in these areas and this has been used to explain the poorer productivity performance in Canada. In the debate on Canadian productivity a number of observers including Fortin(1999), Treffler(1999) and Trajtenberg(2000) have pointed to indicators that suggest Canada is falling behind in the New Economy sectors. I will argue in this paper that in the face of two shocks, not one, (1) a decline in old economy or resource prices and (2) the arrival of a new global GPT, an exchange rate regime which buffers the Old Economy by an accommodating depreciation may lead to a slower rate of economic growth and a permanently lower level of real income relative to a non-buffered exchange rate path.

3 For a reasonably exhaustive discussion of these issues see Courchene and Harris(1999) and references, and the Fall 1999 issue of Canadian Business Economics.

4 Robert Gordon(1999) surveys this evidence as of mid 1999, and is a well known critic of the New Economy hypothesis. As of mid 2000 the acceleration in the growth of U.S. labour productivity remains intact.

5 For a discussion of the Canadian productivity growth and levels, in particular in comparison with the U.S. a good source and overview is the selection of papers on the Web site of the Canadian Centre for the Study of Living Standards at www.csls.ca. In particular the manufacturing data is reviewed in the conference papers on the Canada-U.S. Manufacturing Productivity Gap.
The arrival of the New Economy, the obsolescence of the Old Economy, and the exchange rate response to these developments endogenously interact to determine the growth path. In the case of Canada the response in the 1990's appears to have been a depreciation which led to a failure in 'creative destruction' and a lengthening of the process under Old Economy activities were sheltered. The Canadian situation may be typical of other smaller open economies in which a flexible' exchange rate is used as a tool for buffering macroeconomic shocks.

2. The Exchange Rate and Endogenous Productivity Growth

In the last two decades, but most notably in the 1990's, a major change in macroeconomic theory was the view promoted within endogenous growth theory that over the longer term productivity growth is endogenously determined, and affected by economic policy, including but not limited to macroeconomic policy. The open economy macro theory that is used in discussions of fixed versus flexible exchange rates, and empirical studies of exchange rates, remains largely untouched by this paradigm change. The standard textbook discussion of the link between the real exchange rate and productivity is based on the Balassa-Samuelson model which takes productivity changes as exogenous. In that model an exogenous increase in the Home country's productivity in the tradables sector holding productivity in non-tradables constant will lead to an appreciation of the real exchange rate, or a fall in the relative price of tradables relative to non-tradables. The model is silent however on the source of the productivity changes. This lack of integration of the exchange rate literature with endogenous growth theory is a serious deficiency and one that clearly needs to be addressed.

Economists when discussing exchange rate regimes, and issues such as monetary union and dollarization, will almost always assume long run separation of real from

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7 In the Canadian context the Balassa-Samuelson explanation for the real depreciation of the Canadian dollar would have to rely either a) fall productivity in Canada relative to the U.S. in tradables or b) an increase in the relative productivity of services (non-tradables) in Canada relative to the U.S.
monetary phenomena. That is they assume that for time horizons greater than the typical business cycle (the 'long run' which separates business cycle theory from growth theory) monetary and exchange rate policy does not impact on long run economic growth. There are at least three reasons this view should be viewed skeptically.

First, in the closed economy business cycle literature, the separation of the cycle from growth is of course at the heart of much of the recent literature. The 'new view' is that such a separation is infeasible. There is a substantial theoretical and empirical literature which treats productivity as subject to cyclical influences driven by either demand or supply shocks. Reorganizations, cleansing recession, and Verdoon effects are all reasons that are cited as to why cycle and productivity growth cannot be separated.\(^8\) If one accepts these arguments as valid in closed economies one certainly cannot ignore them in open economies. In the case of the open economy the movement in the real exchange rate would logically be one price which might have consequences for the determinants of productivity growth.

Second, the link between the nominal exchange rate and real variables, including the real exchange rate, remains one of the more well documented facts in international economics. The conventional assumption of the separation of long run real from monetary phenomena dictates that the real exchange rate be treated as a relative price whose value in the long run is dictated by purely real factors. On the other hand virtually any acceptable theory of the medium run macroeconomy assumes some form of nominal rigidities, either in wages or prices, which in turn provides a reason that nominal exchange rate changes can have real relative price consequences. Modern theories of exchange rate pass-through for example specifically rely on such rigidities whose time duration can be considerable. Productivity growth both accelerates and decelerates quite rapidly. The central empirical question is what are the relevant speeds of adjustment in productivity drivers and the real exchange rate. There is no evidence which either proves, or even suggests, that productivity drivers such as investment (or even outcomes

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\(^8\) Some of the recent literature includes Hall(1991), Bean(1990), Burnside and Hammour(1992), and Saint-Paul(1993).
as measured in productivity statistics) are necessarily slow to adjust relative to
movements in nominal prices and wages.

The question of causality between exchange rates and productivity growth is
crucial. There are a couple of pieces of evidence on this issue. Strauss(1999) finds in an
examination of a cross-country VAR study on real exchange rates and productivity
growth evidence of causality running from exchange rates to tradables productivity
growth, contrary to Balassa-Samuelson. Second, the extensive literature on PPP
continues to point to strong evidence of lengthy periods of misalignment but with long
term mean reversion of nominal exchange rates toward their PPP values with
convergence periods averaging around five years.9 At the same time the evidence on
wage and price rigidity indicates similar sorts of horizons at which wages and prices
adjust. Productivity growth is both highly volatile and is remarkably non-persistent. We
have numerous examples of countries which have gone from low to high rates of
productivity growth (Ireland) over the course of a few years, and vice-versa (Japan).
Putting these facts together it is at least questionable to assume that productivity changes
are inherently slow moving long term variables relative to real exchange rates, prices, or
wages. An alternative framework in which all are viewed as endogenous is equally
plausible on both theoretical and empirical grounds.

3. The Exchange Rate and Endogenous Productivity Theory

There are a large set of theories which generate endogenous productivity growth.
These run the gamut from A-K models, R&D or innovation-led growth models,
Schumpeterian theories of entry and exit dynamics, organizational failures and
reorganizations, X-inefficiency, agglomeration of economic activity in cities or regions,
and large-scale technological change induced by a general and widely used innovation
referred to as a General Purpose Technology(or GPT)10. Most of these theories have
been constructed for the purposes of explaining long run economic growth. A few have

9 Lothian(1997) is a recent example of the econometric work which has found convergence to PPP as a
robust empirical characterization of medium term exchange rate trends.

been extended to business cycle models, both real and monetary. Virtually none are in the context of an open economy framework in which the exchange rate is an important endogenous macro variable. It should be fairly straightforward for the next generation of open economy theorists to develop such models. At the partial equilibrium level in which major nominal variables such as wages are treated as fixed this is straightforward. In these models exchange rate changes are very similar to changes in tariffs and export subsidies (an exchange rate depreciation is similar to a tariff increase for an import competing industry). Moreover there is an extensive partial equilibrium literature on both hysteresis in trade and exchange rate pass through which could easily be adapted to this problem. More difficult will be a full dynamic general equilibrium treatment of the problem. These models have the usual problem of a) specifying what determines nominal exchange rates and b) specifying the nature of the nominal rigidities which translate nominal exchange rate changes into real exchange rate changes.

In either a partial or general equilibrium framework however there are certain factors which are likely to prove most interesting in the context of the exchange rate-productivity link. The Canadian productivity debate points to the following set of potential linkages between productivity and exchange rates.

A) the Costs of Innovation and Technology

One class of theories focuses on the direct factor cost effect of an exchange rate change has an impact on the profit maximizing level of productivity-improving investments. For example

- an increase in the cost of new imported capital goods reduces the rate at which new technology is installed or investments in innovation occur
- exchange rate uncertainty can increase the cost of capital by raising the option value of ‘waiting’ for an irreversible capital installation
- a temporary exchange rate depreciation may have an intertemporal substitution effect on a profit maximizing firm which reduces the return on productivity enhancing activities and raises the return on short-run output increases.
B) Industry Dynamics

There are many studies have identified firm level heterogeneity and entry and exit as a major source of productivity growth (40 to 50% of all productivity growth in some industries, as summarized for example by Foster et. al. (1998). A large and unanticipated exchange rate depreciation can have consequences for both entry and exit of firms via a variety of channels

a) It can impact the relative profitability of old versus new firms; old firms have sunk costs and an exchange rate depreciation will tend to reduce their rate of exit while at same time if it raises the cost of entry (due to investments in technology required). This can slow the overall rate of industry productivity growth.11 A major piece of evidence in this regard in the Canada/US case are the differences between the size distribution of firms in Canada and the United States, with Canada sustaining a much larger fraction of small firms.12 One possible explanation for this is that rates of exit for small firms who are typically less productive than large firms, may not have been as large in Canada as the U.S. due to exchange rate sheltering effects.

b) Grubel(1999) has noted that previously marginal entrants in contestable industries (industries with low entry costs ) may now find it profitable to enter driving down productivity growth in the industry as a whole as the output share of the low productivity group increases.

c) Entrepreneurship and the supply of human capital will respond to the depreciation. A real depreciation can reduce the returns to skilled labor via Stolper-Samuelson effects if the tradables sector is human capital intensive, and it can induce entrepreneurial and skilled labor out-migration in response to exchange rate induced real income decreases.


11 Grubel(1999) has raised this argument specifically in the case of the resource sectors in Canada.
12 See Daly et. al.(2000).
C) Managerial Theories of the Firm

There are a class of theories of the firm based on imperfect monitoring and principle agent problems that managerial discretion will lead to management utility maximization rather than profit maximization. In this case managers may be less motivated to reduce costs, innovate, and restructure if exchange rate depreciations provide cost sheltering effects. This model is very close to the 'lazy manufacturers hypothesis' which has been discussed in the Canadian debate by McCallum(1999) or the class of theories described by the X-inefficiency hypothesis.

D) Strategic Theories (Imperfect Competition) in Export and Import Markets

Strategic trade theory of the 1980's emphasized the role of international R&D competition in oligopolistic markets in a class of theories due to Brander and Spencer based on strategic preemption.\textsuperscript{13} In these models export subsidies or taxes can have an impact on the international distribution of R&D depending on the nature of the strategic competition between foreign and domestic firms. For similar reasons an exchange rate depreciation with some nominal rigidities in domestic factor costs can have similar effects. Consider for example the standard Brander-Spencer in a two firm/two country model of competition for third country export markets using R&D investments as way to build market share. If R&D investments are strategic substitutes a Home currency depreciation will cut the Home country R&D expenditure and raise Foreign R&D (the Home depreciation is equivalent to an export subsidy). In more complicated models with strategic entry deterrence one could also get an impact on the extent of entry deterring investments due to an exchange rate effect which affects a foreign and domestic firm differently. As these investments (such as spare capacity) would impact on productivity this also provides a link between the exchange rate and productivity although the qualitative nature of the result is sensitive to the specific model used.

\textsuperscript{13} These are reviewed in the survey by Brander(1997).
4. Structural Transitions and Exchange Rate Buffering

It is clear there are a number of potential theoretically sound microeconomic links running from real exchange rate change to endogenously generated productivity growth. These models however miss one important macroeconomic aspect of the exchange rate. This is the impact an exchange rate change has on relative demands across sectors and the labour market responses to the exchange rate. In traditional optimal currency area theory the interaction between asymmetric intersectoral shocks and the exchange rate response in the face of some labour market rigidities was a the core of the analysis.14 In this section I extend the traditional optimal currency area model to one in which productivity growth is endogenous and driven by the arrival of a major new technology or GPT. This can be thought of as a model of structural transition from an Old Economy to New Economy due to the arrival of a major GPT15 The Old Economy is characterized by reduced growth opportunities and labour market rigidities. The New Economy has both major growth opportunities and flexible labor markets.

The nature of this transition is critically dependent upon whether or not an exchange rate depreciation, which buffers the Old Economy, delays the arrival of the New Economy either temporarily or permanently. Buffering in effect results in a slowdown in creative destruction within the Old Economy. As noted in the introduction, a standard defense of the Canadian dollar depreciation of the 1990's was that it buffered the Canadian economy against commodity price declines. In the Canadian context the 'Old Economy' may be interpreted as the resource sectors. The general argument may of relevance to other non-resource based industrial economies where there is a concentration of employment and output in Old Economy industries. For example the Old Economy might be traditional heavy manufacturing industries in which the economy initially relatively heavily specialized. The external shock to the Old Economy in this case might

14 I use the term optimal currency area literature to refer to the generic literature on fixed versus flexible rates which emphasizes asymmetric sectoral shocks. In some cases these sectors are geographically distinguished while in other models this is less important than other sectoral differences.
15 My view of the GPT would fit with any number of definitions all of which revolve around economy-wide technological change based on a common but critical new technology. The volume edited by Helpman(1999) provides an historical and analytical overview of GPTs.
be a large scale increase in global excess capacity due to the emergence of new global competition from newly industrializing countries. In either interpretation of the Old Economy there is an underlying assumption that both shocks are truly permanent, but may mistakenly be interpreted by both markets and policy makers as temporary.

The model is one of a small open economy in which the Old and New economies produce different outputs, and have segmented or sector specific labour markets. The Old Economy (or natural resources) is indexed with R, and New Economy (or Software) is indexed with an S. Both goods are traded at fixed world prices and the sole factor of production is labour which is specific to each sector in the short run. The economy is faced with two sources of permanent structural change. It is simultaneously hit with (a) the arrival of a major new GPT which opens new opportunities for productivity growth, and (b) a price decline for the output produced in the Old Economy. It is assumed there are limited opportunities for productivity growth in the Old Economy.

Labour market rigidities are present only in the Old Economy; these are modeled as a rigid nominal wage. Labour market equilibrium occurs in the Old Economy via changes in unemployment; these rigidities also serve as the rationale for the exchange rate to buffer Old economy price declines--i.e. to prevent increases in unemployment. Nominal wages are fully flexible in the New Economy and adjust to equate labor demand to labor supply. In the short run labor supply is inelastic and specific to each sector. Over time labor is reallocated across sectors as discussed below.

What is unique to this model is the nature of the productivity dynamics, which are endogenous and reflect three basic mechanisms:

1. the presence of the new GPT creates opportunities for significant productivity increases in the New Economy sectors;
2. the existence of scale effects in the New Economy sectors such that productivity growth accelerates with larger output scales in New Economy due to learning-by-doing effects or internal spillovers;

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16 The model bears some resemblance to the old Dutch Disease models of the 70's and early 80's. In that case the 'favorable shock' was an increase in resource prices which led to a real exchange rate appreciation and a subsequent decline in manufacturing exports.
3. The direct cost effects of productivity improvements which depend on imported technology and capital; exchange rate depreciation which raises the price and thus reduces the demand for M&E investments. This in turn leads to lower productivity growth.\textsuperscript{17}

The notation used is outlined in the following Table.

\textit{Table: Model Notation:}

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>$L_i$</td>
<td>the labor force in sector i (Old economy R and New Economy S)</td>
</tr>
<tr>
<td>$L$</td>
<td>the total labor force (assumed constant)</td>
</tr>
<tr>
<td>$E_i$</td>
<td>employment in sector i</td>
</tr>
<tr>
<td>$w_i$</td>
<td>nominal wage in sector i</td>
</tr>
<tr>
<td>$A$</td>
<td>productivity level in the New Economy sector</td>
</tr>
<tr>
<td>$p^*_i$</td>
<td>the foreign currency price of output in sector i</td>
</tr>
<tr>
<td>$A^*$</td>
<td>level of productivity attainable with new GPT</td>
</tr>
<tr>
<td>$m$</td>
<td>natural employment rate in the Old economy</td>
</tr>
<tr>
<td>$F_i$</td>
<td>production functions of each sector</td>
</tr>
<tr>
<td>$E$</td>
<td>the domestic currency price of a unit of foreign exchange</td>
</tr>
</tbody>
</table>

$Y_R = F_R(E_R), Y_S = AF_S(E_S)$

The wage rate in the Old Economy, $w_R$, is treated as constant. Given the price of output and, the nominal exchange rate, and the wage rate, employment in the old economy, $E_R$ adjusts so that all firms are on the labour demand curve. The wage in the S sector adjusts so that all labour in that sector is fully employed, hence $E_S=L_S$. Hence in the short and long run labour market equilibrium implies that the following conditions hold.

\textsuperscript{17} The last assumption hinges upon a presumption that productivity investments are to a significant degree imported. For many small open economies who buy technology and capital equipment this is a reasonable assumption. La France and Schembri (2000) for example show that the Canadian dollar depreciation of the 1990’s has been coincident with a substantial increase in the relative factor price of capital to labour in Canada when compared to the same factor price trend in the United States. Also during the same period a large gap developed between the levels of investment in machinery and equipment in Canada and the United States, no doubt some of which can be explained by the difference in relative factor costs in the two countries.
Dynamics:
There are two basic dynamic equations which govern the evolution of the economy over the transition. One, the productivity dynamics which reflects the endogenous evolution of productivity in the New Economy. Two, the labour force re-allocation dynamics which describe how labour moves between the New and Old Economy sectors.

Productivity Dynamics

\[ \dot{A} = \phi(L_S, A/A^*, E) \]
\[ \phi_1 > 0, \phi_2 < 0, \phi_3 < 0 \]

New economy productivity growth is affected by the size of the labor force in the New Economy (positive), the level of current New Economy productivity relative to its ultimate potential level \( A^* \) (positive), and finally by the nominal cost of imported technology and capital as effected by the exchange rate \( E \) (negative).

Labour Market Dynamics

\[ \dot{L}_R = -\dot{L}_S = \alpha \left[ \frac{E_R}{L_R} - m \right] - \gamma \left[ w_S - w_R \right] \]

The total labor force is constant so that growth in the labor force in the New Economy equals the decline in the Old Economy labor force. There are two factors which affect the rate at which labor moves from one sector to another. First, following natural rate theory the extent to which the current employment rate (and hence unemployment rate) differs from the natural rate. A higher than natural rate of employment will tend to attract labor. Labor market rigidities are reflected in both the natural rate of employment, denoted by the parameter \( m \), with more rigid labor markets having a higher \( m \). The speed of adjustment is the parameter \( \alpha \); a lower value of \( \alpha \) which reflects the rate at which
excess unemployment induces labor to reallocate to the New Economy. I treat both parameters as constant for the purposes of this paper.\textsuperscript{18} Second labour force reallocation is affected by the wage gap between the Old and New economy. Note that in this set-up there are a set of implicit timing assumptions. The model assumes that productivity and sectoral reallocation are medium run dynamic variables. Note that productivity change and labor force dynamics are on the same time scale, while labor market rigidities in the Old Economy are on a much slower time scale. For simplicity the Old economy nominal wage is treated as constant. This last assumption is extreme but appears to capture the stylized characteristic of labor markets in declining industries. A complete treatment of asset and exchange rate markets would complicate the analysis considerably. For the purposes of this paper the nominal exchange rate will be treated as a constant over the transition period as will the prices of the output of both sectors.

The stationary loci for $L_R$ will be denoted as $bb'$ and the stationary loci for $A$ will be denoted as $aa'$. I will illustrate the model dynamics in phase-plane diagrams in $L_R$ and $A$ space.

Two possible exchange rate regimes are modeled in the face of changes in $p_R^*$ and $A^*$ as follows:

- A \textit{fixed exchange rate regime}-E constant
- A \textit{buffered exchange rate}-i.e. E is assumed to be targeted such as to keep $E_{pR}^*$ constant—the nominal exchange rate depreciates to offset the external commodity price decrease.

Obviously this is a bit of a short hand for a more complicated treatment of asset markets with exchange rate and current account dynamics. The fixed exchange rate can be thought of as resulting from some credible fixed exchange rate policy which assumes the authorities can successfully hold a nominal fix in the event of the two shocks being contemplated. A buffered exchange rate regime reflects either an active policy of targeting the exchange rate to Old Economy prices, or alternatively assumes that market

\textsuperscript{18} One could imagine either of these parameters would be affected by labor market policies, such as changes in the UI system for example.
forces result in the exchange rate tracking Old Economy prices. In either event the effect is to "buffer" employment in the Old Economy. By keeping the nominal value of the marginal product constant at the initial level of employment, the fall in Old Economy prices does not result in an increase in unemployment that would otherwise occur. Under a fixed exchange rate when $p_{R*}$ falls there is an immediate reduction in employment and increase in unemployment in the Old Economy.

A Special Case Model:
To illustrate the central workings of this model I consider a special case of the dynamics elaborated above. This assumes
1. There are no wage gap effects on sectoral reallocation dynamics-so $\gamma=0$ (hence $bb'$ vertical). In the case that $\gamma$ is small the $bb'$ locus will be negatively sloped but fairly steep.

2. Productivity growth is governed by additive spillovers and a convergence effect.

$$\dot{A} = a(L_S - L_c) + b\frac{(A^*-A)}{A^*}$$

The impact of these two assumptions is to simplify fairly starkly the dynamic effects at work on the model. In the case of the labor market only divergences from the natural rate of unemployment induce labor force re-allocations. In the case of productivity additivity in the convergence and scale effects eliminates the possibility of multiple equilibria due to strategic complementarities between the two effects. $L_c$ is a critical size parameter in the New Economy productivity dynamics such that for a labour force smaller than $L_c$ there is a tendency for productivity to fall, holding the convergence effect constant.

This model is depicted in figure 1 in A-L$_R$ space. The stationary productivity locus is downward sloping reflecting a trade off between a larger Old Economy, which reduces productivity growth in the New Economy due to scale effects, and a stronger

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19 Bill Scarth pointed out to me that the buffered exchange rate policy is in fact equivalent to price level targeting. A fully buffered exchange rate depreciation leaves the short run price level constant while a fixed exchange rate results in a one shot deflation in response to the fall in commodity prices.
convergence effect which rises with the extent to that the current level of New Economy productivity falls short of its potential given the current GPT. The arrival of a new GPT shifts the aa' locus up with an increase in A*. The stationary loci for the labour supply in the Old Economy is a vertical line for a given level of LR, which corresponds to the natural level of employment in the Old Economy. The model is globally stable in A and LR. For levels of Old economy labour supply above the 'natural level', there is an excess supply of labour in the Old Economy, and thus labor moves out of the Old Economy and into the New. For productivity levels above the aa' locus productivity tends to decline.

A fall in the price of the Old Economy output, pR* which is not buffered by a nominal exchange rate depreciation, results in a reduction in the steady state level of employment in the Old Economy, and thus a reduction in the natural level of the labor supply in the Old Economy. The economy moves from the equilibrium denoted by 1 to the new equilibrium denoted by 2. As the Old Economy contracts and New economy expands productivity begins to increase. As a result total output will also increase. The lack of buffering has cost however in terms of increased transitional unemployment. In figure 3 the buffered versus non-buffered paths with a shock at time t_o are depicted. The fully buffered shock holds employment in the Old Economy constant and thus also in the New Economy.

What makes the New Economy 'new' of course is the arrival of a new GPT which increases A*. In figure 3 the dynamics GPT shock is illustrated for a case with a small but positive wage response coefficient. The initial equilibrium is 1 and the arrival of GPT shifts aa' vertically. Productivity immediately begins to increase and employment in the New Economy expands, until a new stationary point is reached. This is all done without an exchange rate change since pR* is assumed to be constant.

We now get to the central case of interest—a structural transition with the arrival of both a New Economy GPT and an Old Economy price decline. The joint coincidence of these two events and the exchange rate response have important consequences for long term economic growth. The relevant diagram is figure 4 drawn for the case of inelastic wage response. The initial equilibrium is I. In a non-buffered case the GPT shock shifts aa' up and the Old Economy shock shifts the vertical bb' locus to the left at the new value LR_2. In the absence of buffering the new equilibrium occurs at point N. The dynamics
are an increase in productivity and a reduction in employment in the Old Economy. In this case however there is an added impetus to growth. The decline in the Old Economy boosts employment in the New economy which further increases productivity growth there. As labor is reallocated from the Old to New Economy total output increases at an accelerating rate as the New Economy expands. Moreover there is a third effect at work. Because the New economy is assumed to have flexible labor markets, as the labor force reallocates itself from the Old to the New total unemployment falls, even though the natural rate of unemployment is assumed to be unchanged in the Old Economy.

Now consider the impact of exchange rate buffering in this case. The buffering has two impact consequences. As noted previously it stabilizes employment in the Old Economy and thus total unemployment and the size of the New Economy. The long term impact on relative sectoral size will be dependent upon the sectoral wage response coefficient $\gamma$. If this value is zero there is no long run impact with buffering on sector sizes. Second, buffering is accomplished by depreciating the nominal exchange rate. In the presence of a cost of productivity improvements effect, this will tend to slow the rate at which investments in productivity improvements are made, thus shifting the aa’ locus down. It may not shift back to it’s initial position but as depicted will fall somewhere below the GPT induced shift. In figure 4 this is depicted as a transition from the initial point I to the final point N. The old economy is larger and the new economy is less productive than in the absence of buffering.

5. Implications for Fixed versus Flexible Exchange Rate Regimes

The implication of the above analysis of exchange rate buffering during structural transitions carries implications for exchange rate regime choice. As is well documented exchange rate misalignment under flexible rates tends to be persistent and defies easy generalizations as to its causes. The literature thus far has generally viewed misalignment against a backdrop of longer term trends in both economic structure and growth rates. The degree of misalignment however is endogenous in the long run as it is dependent upon the structure and circumstances an economy finds itself in. The recent decade and the current period may be relatively unique in that a period of larger scale technological change is occurring globally due to the arrival of what has become known
as the New Economy—a particular bunching of innovations in computing and communications technology which is the new General Purpose Technology. As with other GPTs creative destruction is an important feature of this process. A structural shift appears as a negative shock to the Old Economy. If under flexible rates such a shock tends to produce persistent exchange rate depreciation in small open economies which import technology this may tend to delay both technological adoption, and sectoral labour force re-allocation towards the New Economy. What thus initially appears to be a misalignment in the exchange rate endogenously becomes an equilibrium exchange rate due to reduced productivity growth the initial depreciation induces. The ‘misalignment’ is temporary but the real depreciation is permanent.

A fixed rate avoids this problem by essentially transmitting the full relative price shocks that are induced by the joint arrival of the New Economy and the decline of the Old. It does this at the cost of course of the structural adjustments induced within the economy.

Even if one agrees with this analysis, it can be argued that it does not offer a permanent indictment of flexible exchange rate regimes. The arrival of major GPT’s are relatively rare events, and thus the buffering benefits of flexible exchange rates would remain even after the new GPT had been fully adjusted to in the very long run. In the absence of other reasons to fix exchange rates the 'productivity case' based on large scale structural change appears to be a 'one-off' case. There are two responses to this argument.

First, from what we know of previous major GPT’s the period of structural change is fairly long lived—often in the range of a few decades. The case of electrification for example is often cited to have taken upwards of 30 years.20 Thus structural change occurs at frequencies often associated with Solow growth transitions, rather than business cycle shocks. Under these circumstances a misaligned exchange rate could seriously delay a transition by as much as a decade or more by providing inappropriate price signals in highly open economies. Fixed rates to the extent they would eliminate such confusion could avoid such problems.

20 The collection of papers in Helpman(1999) reviews the historical evidence on major GPTs.
Second, there is the possibility that the argument pertains to any shock which is relatively permanent. The buffering argument is based on the notion that the asymmetric shocks faced by the economy are largely temporary against the backdrop of the longer term highly persistent trends. As is well known there is considerable debate as to this empirical characterization of the growth process. An alternative view is that economies are hit by unpredictable but largely permanent shocks, or a series of overlapping structural changes. If one accepts the latter view each attempt to buffer a shock is largely in vain. This applies not only to exchange rate buffering, but to all economic policies which attempt to slow down the response to structural change. Flexible exchange rates will not work well if they produce trend movements in real exchange rates which always appear to be responding to the last shock.

Of course not all exchange rate ‘misalignments’ are undervaluations. By definition some exchange rates are overvalued if others are undervalued, however this benchmarking is done. A country which faces an overvalued exchange rate during a major GPT arrival will tend to lose competitiveness in the traditional sectors. This would imply a faster than otherwise process of creative destruction in that economy, and thus higher rates of productivity growth and faster reductions in the rate of unemployment than would occur under fixed exchange rates. This would seem to be nothing but good news on the productivity front. Exchange rate ‘misalignment’ thus essentially redistributes growth internationally in parallel with the process of creative destruction. This argument applies with equal force to large economies as it does to small. For example a persistently weak Euro against the U.S. dollar in current circumstances for example might lead to lower rates of European productivity growth relative to that of the U.S.

Misalignments of course also re-distribute export growth across countries. The traditional misalignment literature of the 1980’s was concerned with the loss of exports markets to countries with persistently overvalued exchange rates and the longer run current account adjustment this might require.21 Obviously this must be factor in a full evaluation of fixed versus flexible rates during structural transitions. In the Old-New

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21 The literature on misalignment and trade hysteresis is reviewed in Harris(1993).
Economy context the composition of exports will shift as well as the volume of exports in response to exchange rate misalignment. A country with an undervalued exchange rate will tend to reinforce its comparative advantage in the Old Economy, and conversely for countries with overvalued exchange rates. In reality the New Economy involves new goods and services whose prices are highly unpredictable. The concept of a 'terms of trade' between Old and New goods is thus fraught with uncertainty. It is conceivable that the relative prices might evolve in a manner such as to support what appeared to be initially an incorrectly valued currency.\(^{22}\) If the value of New economy exports turns out to be sufficiently large such as to produce a sustainable current account balance then what was perceived to be a misalignment may turn out to be ultimately an equilibrium exchange rate. Of course this may not occur. The exchange rate misalignment may be such as to produce an unsustainable current account deficit in the overvalued New Economy leader, with the subsequent adjustment problems. Under a fixed exchange rate regime none of this could occur.

6. Conclusion: Optimal Currency Area Theory

In line with Mundell's\(^{(1961)}\) optimal currency area theory it is natural to ask whether these arguments amend the cost-benefit calculation of optimal currency area groupings. Would it suggest for example that countries which trade a lot with each other should worry more about the exchange rate consequences of the timing of large scale structural transitions of one region relative to another? Moreover do they suggest anything about the benefits of an optimal currency area when trade volumes and factor flows are substantial? A full theoretical analysis of this needs to be worked out but I think this paper suggests an answer in the affirmative. For countries which trade a great deal with each other due to geographic proximity major structural change is likely to be both transmitted and accommodated through trade flows and factor movements. There is a large body of evidence which suggests that the international transfer of technology is

\(^{22}\) Asymmetric income effects with technological change can also lead to similar consequences. If New Economy goods have income elasticities of demand greater than unity and Old Economy goods less than unity then economies specialized in New Economy production will tend to have a higher rate of growth in external demand or equivalently improving terms of trade.
closely linked to trade flows and investment flows. During a period of major technological change the forces which both force the adoption of new technology and the obsolescence of the old will tend to be concentrated at similar times and in similar sectors for economies which are closely integrated. During these periods exchange rate misalignment between such countries could induce asymmetry in the structural adjustment pattern which would tend to bias growth against one country and in favor of the other, with the new sectors expanding at faster rates in one country, and mobile factors shifting towards those sectors from both countries. A common currency would eliminate the exchange rate misalignment problem during such a period, equalizing the growth potential across all members of the currency area. This argument would clearly not be as strong if economic integration was relatively weak.

In one sense this argument is just an extension of the 'common shock' case for currency unions. In this case a common GPT has hit both countries. With large trade volumes and substantial factor mobility between regions there is no particular case for using an exchange rate change to buffer adjustment in one country relative to another and moreover the consequences of attempting to do so could be harmful. In the Canada-U.S. context it would suggest yet another reason as to why Canada's floating rate regime should be re-examined. The asymmetry in this case clearly works against Canada which is both small and well endowed with Old Economy natural resources. This is yet another argument which supports Robert Mundell's contention that Canadian-U.S. living standards are unlikely to converge until Canada either fixes it's exchange rate against the U.S. dollar, or enters a monetary union with the United States.

Bibliography:


23 For a discussion of these issues and a review of the evidence see Harris(1999).


Robert J. Gordon (1999) "Has the “New Economy” Rendered the Productivity Slowdown Obsolete?", Northwestern University and NBER available on the web at http://faculty-web.at.nwu.edu/economics/gordon


Figure 1

Unbuffered Old Economy Price Decline
Figure 2

Unemployment Consequences of Exchange Rate Buffering
Figure 3
A GPT arrival under Fixed Exchange Rates
Figure 4

A Structural Transition

A Babies

B GPT arrival

Economy Decline

LR 2 LR 1

Figure

Depreciation

Old Economy Decline

LR

L_R^2 L_R^1 L_R
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0110 Harris, Richard G., "Is there a Case for Exchange Rate Induced Productivity Changes?", March 2001.


0042 Rajan, Ramkishen S. and Rahul Sen, "Hong Kong, Singapore and the East Asian Crisis: How Important were Trade Spillovers?", November 2000.

0041 Li Lin, Chang and Ramkishen S. Rajan, "Regional Versus Multilateral Solutions to Transboundary Environmental Problems: Insights from the Southeast Asian Haze", October 2000. (Forthcoming in *The World Economy*, 2000.)


