



Deriving competitive advantage from real exchange rate changes

Jacques A. Schnabel

*School of Business and Economics,
Wilfrid Laurier University, Waterloo, Canada*

Abstract

Purpose – This paper seeks to argue that any competitive advantage realized by a firm that produces domestically and exports to a foreign market due to a real depreciation (appreciation) of the domestic (foreign) currency is purely transitory and thus not sustainable. Diversification of manufacturing operations across a number of countries and appropriate production rescheduling in light of real exchange rate changes are required to transform the character of this competitive advantage from merely transitory to sustainable.

Design/methodology/approach – Analytic proof is provided of the dependence of an exporting firm's real profit margin on the real exchange rate. A simple contemporaneous and one-period lagged model of the current account balance is then posited to argue that real exchange rates exhibit mean-reversionary behavior.

Findings – The Marshall-Lerner condition, which is a mainstay of balance-of-payments models is shown to imply that real exchange rates exhibit mean-reversionary behavior. Extensive empirical evidence is cited that accords with this theoretical conclusion. Thus, any gain in competitive advantage due to a change in real exchange rates that accrues to a firm with a single manufacturing operation is merely transitory and not sustainable.

Practical implications – To position itself to achieve sustainable competitive advantage from changes in real exchange rates, a firm must maintain a global supply chain diversified across many countries. With the flexibility provided by such disparate plant locations, production schedules can be adjusted in response to real exchange rate changes, to wit, increased (reduced) manufacturing should be programmed in countries whose currencies have experienced real depreciations (appreciations). Owing to oscillating real exchange rates, these requisite production schedule adjustments are expected to be perpetual.

Originality/value – The algebraic formulation of the firm's inflation-adjusted profit margin's dependency on the real exchange rate and the analytical proof that the Marshall-Lerner condition implies mean-reversionary behavior in real exchange rates are both novel. The implications with regard to competitive advantage are likewise original.

Keywords Exchange rates, Competitive advantage, Supply chain management, Mean, Imports, Exports

Paper type Research paper



1. Introduction

Over the past few decades, the production of goods in one country, which is henceforth referred to here as the domestic country, for export to a second or foreign country has become more the norm rather the exception. The ongoing and ever intensifying processes of globalization and off-shoring (the practice of out-sourcing parts of the value/supply chain to entities domiciled off-shore) are manifestations of this development. Because multiple currencies are involved, i.e. the currencies in which costs are incurred and in which revenues are generated differ, the question of how exchange rate changes impact the competitive position of the firm comes to the fore. The simple thesis of this paper is that although real exchange rate changes provide a source of competitive advantage,

that competitive advantage is merely transitory rather than sustainable absent adequate flexibility in the firm's global supply chain. Only if the firm's international manufacturing operations are sufficiently adaptable, can real exchange rate changes be exploited to provide a foundation of sustainable competitive advantage.

In the textbook treatment of this topic, as exemplified by Shapiro (2006), specific numerical examples are presented to demonstrate the following: if the currency of costs or domestic currency experiences a real depreciation, or equivalently, if the currency of revenues or foreign currency experiences a real appreciation, then the firm's competitive position is enhanced. The latter conclusion means that the inflation-adjusted or real value of the firm's profit margin increases. Missing in the usual presentation of the topic is a generalized analytical proof of the assertion. This deficiency is rectified in Section 2 of this paper, which establishes the algebraic nexus between the real exchange rate and competitive advantage.

The subsequent section then argues that the competitive advantage realized by the firm whose currency of cost depreciates in real terms is not sustainable but merely transitory. It is argued that real values of currencies exhibit mean-reversionary behavior, i.e. real depreciations are followed by real appreciations and vice versa in a permanently oscillating pattern. A simple model of the domestic country's current account balance is posited where the components of the trade balance depend on contemporaneous and one-period lagged real domestic currency values. The Marshall-Lerner condition, which is a standard feature of most macroeconomic models, is then invoked to show that real exchange rates oscillate in the following way. Real depreciations are followed by real appreciations and vice versa. Thus, episodes when competitive advantage is realized are followed by episodes when competitive advantage is impaired and vice versa.

How can a firm configure its production operations to derive sustainable competitive advantage from permanently oscillating real exchange rates? That is the question addressed in the penultimate section of this paper. It is argued that, by locating production facilities in various countries, the firm would have the requisite manufacturing flexibility to derive competitive advantage from the vicissitudes of real exchange rate changes. Facilities in a country with a currency that experiences a real depreciation (appreciation) should be more (less) intensely utilized. Empirical evidence consistent with this policy prescription from the literature on outsourcing is cited to buttress this conclusion. Section 5 contains summarizing and concluding comments.

2. The real exchange rate/competitive advantage nexus

Consider a firm that manufactures a product domestically for export to a foreign country, with sales denominated in the foreign currency. The notational convention that subscripts denote the time period and asterisks denote quantities that pertain to the foreign country is adopted here. Let s_t denote the nominal spot rate, quoted as the number of domestic currency units per unit of the foreign currency, and q_t denote the real exchange rate, i.e. $q_t = s_t(p_t^*)/(p_t)$ where p_t^* is the foreign price level and p_t is the domestic price level.

The domestic currency value of the profit margin on the product is denoted PM_t and it equals the quantity $PP_t^*s_t - CP_t$, where PP_t^* is the product price denominated in the foreign currency and CP_t is the product cost denominated in the domestic currency. Define i_t and i_t^* as the domestic and foreign inflation rates, respectively, i.e. $1 + i_t = (p_t)/(p_{t-1})$ and $1 + i_t^* = (p_t^*)/(p_{t-1}^*)$. The real or inflation-adjusted value of the profit margin is given by the following expression:

$$\frac{PM_t}{(1+i_t)} = \frac{PP_{t-1}^* (1+i_t^*) s_t - CP_{t-1} (1+i_t)}{(1+i_t)} \quad (1)$$

It is easy to show that the following alternative expression for the real value of the profit margin holds:

$$\frac{PM_t}{(1+i_t)} = PP_{t-1}^* \frac{p_t^*}{p_t} s_t \frac{p_{t-1}}{p_{t-1}^*} - CP_{t-1} \quad (2)$$

The firm gains competitive advantage from a change in the real value of the domestic currency if the real value of the profit margin at time t exceeds the value of the profit margin in the previous time period, i.e. if the right-hand side of equation (2) exceeds $PM_{t-1} = PP_{t-1}^* s_{t-1} - CP_{t-1}$. It is easy to show that the latter inequality holds if and only if $q_t > q_{t-1}$, which means that the foreign currency appreciates in real terms, or equivalently that $q_t^{-1} < q_{t-1}^{-1}$, which means that the domestic currency depreciates in real terms.

The intuition that underlies this conclusion is clear. If the currency in which revenues are denominated, i.e. the foreign currency, appreciates in real terms or if the currency in which costs are incurred, i.e. the domestic currency, depreciates in real terms, the firm gains competitive advantage.

3. Mean-reversionary real exchange rates

Notwithstanding the conclusion derived in the previous section, this section emphasizes, however, that any gain in competitive advantage due to real exchange rate changes is merely ephemeral and not long-lasting as real exchange rate changes are mean-reversionary. Real appreciations are followed by real depreciations so that periods of competitive advantage gain are soon followed by periods when competitive advantage is lost. A theoretical argument is articulated to demonstrate this point and empirical evidence is cited that buttresses this conclusion.

Following the mathematical development in Rivera-Batiz and Rivera-Batiz (1994) and Krugman and Obstfeld (2003) define $CA_t = EX_t - IM_t$ as the domestic economy's current account balance that equals the difference between exports and imports, both of which are denominated in the domestic currency. As domestic imports may be viewed alternatively as the foreign country's exports in the bilateral model assumed both here as well as in the two cited references, $IM_t = q_t EX_t^*$, where EX_t^* denotes the foreign country's exports to the domestic country that are denominated in the foreign currency.

Define Y_t and Y_t^* as the domestic and foreign gross national product (GNP), respectively. The following functional forms for domestic and foreign exports are posited, where the a_i and b_i parameters are all assumed to be positive:

$$EX_t = a_0 Y_t^{a_1} q_t^{a_2} q_{t-1}^{a_3} \quad (3)$$

$$EX_t^* = b_0 Y_t^{b_1} q_t^{-b_2} q_{t-1}^{-b_3} \quad (4)$$

These equations assume that real exchange rates affect exports both contemporaneously as well as with a one-period lag. The rationale for hypothesizing a one-period lag is the

well-known sluggish reaction of importers to changes in the exchange rate, i.e. domestic prices of imports are not instantaneously and completely revised to reflect the current exchange rate. The costs of revising price schedules, which are classified under the general rubric of so-called menu costs, prevent purely instantaneous price changes. Thus, a real change in the value of a currency induces both a contemporaneous as well as a one-period lagged reaction in exports and imports.

The parameters a_1 , a_2 , and a_3 are the elasticities of exports *vis-à-vis* the foreign GNP and the contemporaneous as well as the one-period lagged real values of the foreign currency, respectively. Similarly, the parameters b_1 , b_2 , and b_3 are the elasticities of the foreign country's exports *vis-à-vis* the domestic GNP and the contemporaneous as well as the one-period lagged real values of the domestic currency, respectively.

In the long-run, the real exchange rate equilibrates the current account, i.e. international financial markets adjust the real exchange rate so as to render the current account balance equal to zero. Imposing this equilibrium requirement, $CA_t = EX_t - q_t EX_t^* = 0$. Substituting equations (3) and (4) into the latter requirement results in the following equation:

$$a_0 Y_t^{a_1} q_t^{a_2} q_{t-1}^{a_3} = b_0 Y_t^{b_1} q_t^{1-b_3} q_{t-1}^{-b_3} \quad (5)$$

Taking the natural logarithm of both sides of equation (5) and then simplifying, results in the following difference equation in the real exchange rate.

$$\ln q_t = \left[\frac{a_3 + b_3}{1 - (a_2 + b_2)} \right] \ln q_{t-1} + \left[\frac{\ln b_0 + b_1 \ln Y_t - \ln a_0 - a_1 \ln Y_t^*}{(a_2 + b_2) - 1} \right] \quad (6)$$

Consider the coefficient of the logarithm of the one-period lagged real exchange rate in equation (6). It will now be argued that this coefficient is negative. This implies that an initial real depreciation of the currency will be followed by a real appreciation of the same currency, i.e. real exchange rates exhibit reversals.

The Marshall-Lerner condition is a staple of macroeconomic models, which ensures stability of the foreign exchange market, i.e. that an increase (decrease) in the real value of the currency reduces (increases) the excess demand for that currency. The latter requirement may likewise be expressed as ensuring that a real depreciation (appreciation) of the domestic currency increases (decreases) the country's current account surplus or reduces (increases) the current account deficit. In terms of the contemporaneous export elasticities with respect to the real exchange rate defined earlier, the Marshall-Lerner condition states that $a_2 + b_2 > 1$. The latter inequality results in the coefficient of the logarithm of the one-period lagged real exchange rate in equation (6) being negative. Thus, stability of foreign exchange markets implies that real exchange rates are mean-reverting processes.

The empirical evidence supportive of real exchange rate mean-reversionary behavior is voluminous. Examples of such research are Cheung and Lai (1994), Jorion and Sweeney (1996), Sarno and Taylor (1998), and Gil-Alana (2000).

4. From transitory to sustainable competitive advantage

The implication of the foregoing is that an initial period when the domestic currency's real depreciation results in the firm gaining competitive advantage will be followed by a second period when the domestic currency's real appreciation causes the firm to lose competitive advantage. As the competitive advantage attained in the first period is

merely transitory, it does not satisfy the critical requirement of being sustainable or long term, as Besanko *et al.* (2007) and Porter (1985) have emphasized.

This conclusion naturally raises the question of how the firm can position itself to realize sustainable competitive advantage in the presence of permanently oscillating real exchange rate behavior. The answer lies in diversifying its manufacturing facilities across a number of countries. Alternatively, the firm can outsource manufacturing to off-shore enterprises in disparate countries. With the production flexibility afforded by this configuration, the firm can increase (reduce) the amount of manufacturing in countries with depreciating (appreciating) real currencies. By continually adjusting its production or outsourcing schedules in this manner, the firm can transform the real exchange rate-derived improvement in competitive advantage from being merely fleeting to being more permanent. This source of competitive advantage can be made sustainable and thus redound to the firm's long-term success. Empirical evidence on outsourcing practices provided in Feenstra (1998), and Swenson (2000) is consistent with this policy prescription.

5. Conclusion

This paper has examined the competitive position of a firm that incurs costs in one currency, which is referred to as the domestic currency, and generates revenues in a second currency, which is referred to as the foreign currency. It is shown that a real depreciation of the domestic currency or, equivalently, a real appreciation of the foreign currency, redounds to the benefit of the firm in the sense that the firm's competitive position is thereby enhanced. However, a theoretical argument is then articulated that asserts that such real exchange rates are mean-reversionary, i.e. depreciations are followed by appreciations and vice versa. The assumptions that generate this result are, first, a simple model of the domestic country's current account balance whose components react to both contemporaneous and one-period lagged values of the real exchange rate, and second, the well-known Marshall-Lerner condition that most macroeconomic models satisfy. Empirical evidence supportive of such oscillatory behavior in the real exchange rate was cited. Thus, if a firm adopts a passive stance regarding its production operations, e.g. if it confines production to the domestic country, any real depreciation of the domestic currency would yield only a temporary improvement in the firm's competitive position. Any gain in competitive advantage is not sustainable. The inexorable future real appreciation of the same currency would negate the initial improvement in the firm's competitive position. An active rather than a passive stance with regard to the firm's production scheduling must be adopted to derive long-term or sustainable competitive advantage from continual and permanent real exchange rate reversions. This involves two facets: first, manufacturing facilities must be diversified across several countries and second, the firm must react quickly to real exchange rate changes by shifting production to countries whose currencies are experiencing real depreciations. In short, the firm's global supply chain must be configured with sufficient flexibility to allow for these production-rescheduling adjustments in the face of real exchange rate changes.

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Further reading

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Corresponding author

Jacques A. Schnabel can be contacted at: jschnabel@wlu.ca

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