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The Effect of Balassa-Samuelson in South-East Asia

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Abstract

High growth in the South-East Asian countries for the past three decades should imply high increases in productivity to reveal the Balassa-Samuelson (BS) effect of high growth accompanied by real exchange rate (RER) appreciation. This paper examines the effects of productivity increases by developing a robust unrestricted error correction model (UECM) of RER based on a class of theories of time-varying equilibrium exchange rates as opposed to the conventional PPP-based theory. An empirical study was carried out on four selected Southeast Asian countries: Indonesia, Malaysia, Singapore, and Thailand. This work suggests that the effects of productivity increases may be more complicated than what the theory suggests and points to the possibility that the Balassa-Samuelson is affected by the stage of economic development rather than mere productivity increases.

Keywords: Balassa-Samuelson, Currency, Equilibrium real exchange rate, Productivity, Unrestricted error correction model.

1. Introduction

According to Balassa (1964) and Samuelson (1964), as an economy expands, there is a tendency for the economy to exhibit productivity increases which in turn leads to RER appreciation. In other words, robust economic growth is accompanied by RER appreciation as a result of differential in productivity growth between tradable and non-tradable sectors. Currency RER appreciation can imply reduced export competitiveness for an economy, hence empirical findings from this work have policy implications particularly to exchange rate management as they may clear some dilemma regarding productivity increases and the effects to competitiveness (Mohamad & Nair, 2007).

Although the traditional BS hypothesis is usually treated as the relevant theory to explain the RER appreciation, empirical evidence gathered from several developing countries is not always in accordance with the BS hypothesis (Gente, 2006). In particular, the growth exhibited by productivity increases in the tradables in developing countries was not accompanied by RER appreciation. On the other hand, the BS theory is found to be valid for the OECD countries. In an earlier work, Japan, Korea, Taiwan and to a lesser extent, Hong Kong and Singapore were found to follow the BS path as these fast growing countries observe a similar industrialization pattern (Ito, Isard, & Symansky, 1997).

The objective of this paper is to empirically examine the validity of the BS theory in the selected Asian economies of Indonesia, Malaysia, Singapore and Thailand. The emphasis will be in putting forward evidence on the long-run relationship between RER and productivity and a set of other control variables.

2. The theory and empirical methodology

The RER is defined as the relative price of non-tradable (P_n) to tradable (P_T) (Edwards, 1989):

$$RER = \frac{P_n}{P_t}, \tag{1}$$

The RER can also be written as follows:

$$RER = \frac{P_n}{P_t} = E\frac{P_n}{P^*_t}, \tag{2}$$

where, P_T is the domestic price of tradable, P_n is the domestic price of non-tradable, P_T^* is the world price of tradable and E is the nominal exchange rate defined as the price of domestic currency in terms of foreign currency (foreign currencies per unit of domestic currency).

The equilibrium real exchange (ERER) rate is defined here as the steady-state real exchange rate conditional on a vector of permanent values for the fundamentals (Baffes, Elbadawi, & O'Connell, 1999), and can be described by the following linear transformation:

$$\log q_t^* = \beta' F_t, \tag{3}$$

where, q_t^* is the ERER and F_t is the vector for the fundamental variables at period t. The vector β is the parameter of interest.

The empirical analysis in this study is motivated by the theoretical model of Elbadawi (1998) and Edwards (1989). The RER can be written as a function of the following determinants:

$$\log q_t = f\left(F_t, NFI_t, DRNK_t, MACRO_t, CNER_t\right) \tag{4}$$

where,

q Real exchange rate (defined as the ratio of the price of non-tradable to tradable, where an increase in the value of RER means an appreciation)

F Vector of four trade balance fundamentals:

TOT - Terms of trade

GCON - Government consumption as a ratio of GDP

OPEN - Trade openness defined as total exports plus imports as a ratio of GDP

PROD - Productivity proxies by productivity differential between manufacturing and services industries

NFI Ratio of net income from abroad to GDP

DRNK The difference between the change in RES and *NKI*

(i.e., $DRNK = \Delta RES - NKI$), where, ΔRES - The ratio of change in reserves to GDP

NKI Ratio of net foreign capital inflows to GDP

CNER Rate of change in nominal exchange rate where exchange rate is defined in terms of foreign currency (USD) per unit of domestic currency

MACRO Indicator of monetary policy measured as a ratio of change in domestic credit and lagged broad money supply

Next, the UECM framework used for modeling the ERER is outlined. The dependent variable is the RER ($\log q_t$) and the matrix x_t denotes the vector of all the independent variables. The focus of this paper is on the conditional modeling of $\log q_t$ given the vector x_t, and the past values of $\log q_t$ and x_t. This can be characterized by the following UECM:

$$\Delta \log q_t = \alpha_0 + \varphi \ln q_{t-1} + \psi_{t-1} + \sum_{j=1}^{p-1} \beta_{yj} \Delta \log q_{t-j} + \sum_{j=1}^{q-1} \beta_{xj} \Delta x_{t-j} + w\Delta x_t + u_t, \tag{5}$$

where φ and ψ captures the long-run effects, while the βs capture the short-run effects of the determinants on RER. The UECM model in (5) can be estimated using the OLS method. It can also be interpreted as an autoregressive distributed lag model (ARDL).

The Bounds test was used to test the long-run relationship between RER and its determinants. The Bounds test is equivalent to conducting a restricted F-test (or Wald test), where the null and alternative hypotheses are as follows:

H_0: $\varphi = \psi = 0$ (no long-run relationship between $\log q_t$ and x_t)

H_1: $\varphi \neq \psi \neq 0$ (there is long-run relationship between $\log q_t$ and x_t)

The asymptotic distribution of the test statistics of the Bounds test is non-standard under the null hypothesis. The Bounds test is conducted as follows: if the computed F-statistic falls outside the critical value bounds, a conclusive inference can be drawn without needing to know the order of integration of regressors. For example, if the F-statistics is higher than the upper critical bound (UCB), then the null hypothesis of no cointegration is rejected. If the F-statistics is smaller than the lower critical bound (LCB), then the null hypothesis of no cointegration is not rejected. However, if the computed F-statistic falls between the LCB and UCB, the inference is inconclusive and knowledge of the order of integration is required before conclusive inference can be made.

The rejection of the no cointegration relationship implies that there exists a stable long-run relationship between $\log q_t$ and x_t which can be described as follows:

$$\log q_t = \theta_0 + \theta_1 x_t + v_t, \tag{6}$$

where $\theta_0 = -\frac{\alpha_0}{\varphi}$, $\theta_1 = -\frac{\psi}{\varphi}$ and v_t is a mean zero stationary process. Note that θ_1 is the long-run multiplier. The estimated model in (6), that is $\log q_t$ is the estimated ERER.

For all the countries, all the potential variables of LTOT, LPROD, LOPEN, LGCON, DRNK, NFI, CNER, MACRO and LRER(-1) are tested for long-run relationship.

The long-run coefficients obtained can then be used to generate the long term path of RER. This long-term path of RER represents the ERER that is defined as the RER that is consistent with the internal and the external balance.

3. Results

Based on the Bounds test in Table 1, the computed F-statistics exceeds the UCB for Malaysia and Indonesia with the 8 regressors at the 5% significance level. This implies that there exists a long-run relationship between the RER and the 8 regressors in these economies. In the case of Thailand, the rejection of the null hypothesis of no cointegration can be established if LPROD and LOPEN are dropped from the model. This implies that RER and LGCON, LTOT, NFI and DRNK are co-moving at the 5% significance level. For Singapore, co-integration relationship can be established if LTOT is excluded from the model, implying that the RER in Singapore is co-integrated with all the predictor variables, except LTOT.

<Table 1>

Table 2 gives the final specification for the most parsimonious models for the estimated ERER for each of the countries. All the models chosen pass the diagnostic tests of Lagrange multiplier test of serial correlation, Ramsey's RESET test for functional form, normality test and heteroskedasticity test.

The long-run coefficients of the fundamentals obtained from the final specification are now used to derive the ERER. Instead of using the actual values of the fundamentals based on the historical time series to derive the ERER, the set of *permanent values or sustainable values* of fundamentals are taken from the five years moving averages of the fundamentals.

<Table 2>

4. Analysis

The variable productivity LPROD is significant in all the countries, except Thailand but only Singapore registers a positive sign--with increases in productivity giving an appreciating effect to RER. This means that only the Singapore case supports the BS hypothesis. The findings for Malaysia and Indonesia with negative impacts of a productivity measure on RER are not an isolated case. This finding is consistent with some other empirical studies, for example, Edwards (1989, 1994), and Montiel (1997) where the variables used to proxy for the BS effect did not give the expected appreciating impact on RER.

The BS hypothesis is based on several assumptions, including that higher income per capita reflects higher total productivity and that productivity growth is faster in the traded-goods sector than in the non-traded-goods sector. Secondly, capital is highly mobile internationally and intersectorally, and in particular, the real interest rate parity holds (Montiel, 1999). Thirdly, there is identical relative size of the tradable sectors across all economies (Benaroya & Janci, 1999).

In this framework, the price of the traded good is determined by the law of one price and wage competitions then lead to price increases in the non-tradable rather than the tradable. The theory assumes that as an economy progresses there will

be higher productivity increases in the tradable relative to non-tradable, but the competition for labour and law of one price means that there will be rises in the price for the non-tradable (the price for the tradable depends on world price which is assumed to be based on free competition and therefore is not influenced by domestic wage increases) which will result in RER appreciation.

There may be a few reasons why the BS effect does not hold true in these economies. Firstly, assuming indeed that there is higher productivity in the tradable, it is conceivable that for some economies this has not led to corresponding rises in the price of the non-tradable in practice or that because of spare capacity, growth can still take place without large increases in wages in the non-tradable sector. This is indeed plausible in the case of Indonesia and to a lesser extent Malaysia where labour in the service sector is still cheap and can actually be lower than those in the manufacturing export sector. Only when the labour market is tight, like in the case of Singapore, would increases in the price of non-tradable most likely to take place.

Secondly, it is plausible that until a certain stage of development high growth rates in these countries may not be accompanied by productivity increases that surpass their trading partners. Even though growth in these countries has been rapid, labour productivity relative to some trading partners like Japan was lagging behind (Montiel, 1997). Recent findings on the productivity performance of the dynamic economies of East-Asia suggest that the growth process in these countries has been "extensive" in the sense that it is primarily driven by input accumulation rather than productivity increases (Unayama, 2003).

5. Conclusion

Overall the estimation results of the RER model strongly corroborate the predictions of the theoretical model, in which current account and capital account fundamentals are found to be associated in the long-run. Countries however, differ in terms of specific factors and/or the degree to which the factors influence the RER in the long-run.

The study indicates that the effect of productivity on RER is not uniform across countries and economic growth accompanied by productivity increases need not lead to RER appreciation. This means that the appreciating effect of productivity increases would only come into effect at a certain stage of economic development. An RER appreciation supported by productivity increases means that the economy has reached a certain stage of economic development and this should not be viewed as a loss of international competitiveness that requires intervention into the exchange rate trends.

References

Baffes, J., Elbadawi, I. A., & O'Connell, S. A. (1999). Single-Equation Estimation of the Equilibrium Real Exchange Rate. In L. E. Hinkle & P. J. Montiel (Eds.), *Exchange Rate Misalignment: Concepts and Measurement for Developing Countries* (pp. 405-464). New York: Oxford University Press.

Balassa, B. (1964). The Purchasing Power Parity Doctrine: A Reappraisal. *Journal of Political Economy, 72*, 584-596.

Benaroya, F., & Janci, D. (1999). Measuring Exchange Rate Misalignments with Purchasing Power Parity Estimates. In S. Collignon & J. Pisani-Ferri (Eds.), *Exchange Rate Policies in Asian Emerging Countries* (pp. 222-241). London: Routledge Press.

Edwards, S. (1989). Real Exchange Rates in the Developing Countries: Concepts and Measurement. *NBER Working Paper Series No. W2950*.

Edwards, S. (1994). Real and Monetary Determinants of Real Exchange Rate Behaviour: Theory and evidence from developing countries. In Williamson, J. (Ed.), *Estimating Equilibrium Exchange Rates* (pp. 61-91). Washington DC: Institute for International Economics.

Elbadawi, I. A. (1998). Real Exchange Rate Policy and Non-Traditional Exports in Developing Countries. *UNU World Institute for Development Economics Research Research for Action 46*.

Gente, K. (2006). The Balassa-Samuelson Effect in a Developing Country. *Review of Development Economics, 10*(4), 683-699.

Ito, T., Isard, P., & Symansky, S. (1997). Economic Growth and Real Exchange Rate: An Overview of the Balassa-Samuelson Hypothesis in Asia. *NBER Working Paper, 5979*.

Mohamad, S., & Nair, M. (2007). Were Currencies Deliberately Undervalued to Promote Exports? An Empirical Examination of Selected ASEAN Countries (1965-1998). *Applied Economics and Policy Analysis, 1*(1-2), 183-193.

Montiel, P. J. (1997). Exchange Rate Policy and Macroeconomic Management in ASEAN Countries. In Hicklin. J., D. Robinson & A. Singh (Eds.), *Macroeconomic Issues Facing ASEAN Countries* (pp. 253-296). Washington DC: International Monetary Fund.

Montiel, P. J. (1999). The Long-Run Equilibrium Real Exchange Rate: Conceptual Issues and Empirical Research. In L. E. Hinkle & P. J. Montiel (Eds.), *Exchange Rate Misalignment: Concepts and Measurement for Developing Countries* (pp. 219-263). New York: Oxford University Press.

Pesaran, H. & Pesaran, B. 1997. *Working with Microfit 4.0: Interactive Econometric Analysis*. Oxford: Oxford University Press.

Samuelson, P. (1964). Theoretical Notes on Trade Problems. *Review of Economics and Statistics, 46*, 145-164.

Unayama, T. (2003). Product Variety and Real Exchange Rates: The Balassa-Samuelson Model Reconsidered. *Journal of Economics, 79*(1), 41-60.

Table 1.Cointegration Test: The Bounds Test

Country	**Computed F-statistics**	**Critical Bounds* Lower**	**Upper**
Indonesia (8 regressors)	12.072	2.272	3.447
Malaysia (8 regressors)	5.872	2.272	3.447
Singapore (7 regressors)	4.544	2.365	3.553
Thailand (6 regressors)	3.537	2.141	3.250

* at 5% significance level

Note: Critical values are taken from Pesaran and Pesaran (1997: 478), Table F Case II: intercept and no trend. Lag structure =1.

Table 2. Long-run Parameter Estimates for Selected East-Asian Countries

	Indonesia	**Malaysia**	**Singapore**	**Thailand**
Constant	1.4878** (2.16)	4.8838*** (6.5)	6.1342*** (7.82)	3.2528*** (2.55)
Log(TOT)	0.5793*** (3.08)	0.4035** (2.4)		0.2098 (1.01)
Log(GCON)	-0.3309 (-0.93)		-0.0859 (-0.44)	0.2845* (1.83)
Log(PROD)	-1.6739*** (-8.01)	-0.2385*** (-5.22)	0.2776** (2.02)	
Log(OPEN)		-0.4669*** (-8.58)	-0.1914** (-2.22)	
NFI			0.0223* (2.78)	0.0812* (1.73)
DRNK	0.0031 (0.3)	-0.0125*** (-5.29)	0.0060** (2.11)	0.0047 (0.76)
Adjusted R^2	0.94	0.97	0.88	0.87

Notes: The numbers in parentheses are t-ratios. The dependent variable is log (RER).

*,**,*** denote 10%, 5% and 1% levels of significance.