



# Global and country-specific movements in real effective exchange rates: Implications for external competitiveness <sup>☆</sup>



Jun Nagayasu

*Tohoku University, Graduate School of Economics and Management, 27-1 Kawauchi, Aoba-ku, Sendai, Miyagi 980-8576, Japan*

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## ABSTRACT

Using the Bayesian factor model, we decompose real effective exchange rates, which are considered a measure of external competitiveness, into global and country-specific factors. Among several findings, we report a particular global trend in real exchange rates, but a substantial proportion of their variation is found to be country-specific. In line with this finding, we find that structural shifts, when they do exist, are contained in country-specific factors. Furthermore, consistent with economic theory, this global factor is closely related to a trend in the global interest rate, while country-specific factors are closely related to idiosyncratic movements in the countries' own interest rates. Such a decomposition results in better understanding of the exchange rate-interest rate relationship, and therefore our results can be interpreted as evidence that external competitiveness is heterogeneous among countries and that economic policies can influence countries' competitiveness.

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## 1. Introduction

This paper empirically analyzes co-movements in real effective exchange rates. Although previous studies (see [Hallwood and MacDonald, 2000](#) for a survey) on the foreign exchange markets have focused largely on bilateral nominal exchange rates, we study effective rates, because foreign exchange transactions are conducted in a global context with the involvement of more than two countries. Furthermore, researchers and policymakers are certainly interested in studying real effective exchange rates that are often regarded as an economic variable for measuring the external competitiveness of countries (e.g., [UNCTAD, 2012](#); [Brixiova, 2013](#)), and are considered, at least on theoretical grounds, as one important factor contributing to economic growth. Indeed, a number of empirical studies have been conducted in order to investigate whether undervalued currencies bring about economic growth (e.g., [Bhalla, 2008](#); [Rodrik, 2008](#); [Mbaye, 2013](#); [UNCTAD, 2012](#); [Brixiova, 2013](#); [Levy-Yeyati et al., 2013](#)).<sup>1</sup>

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E-mail address: [jnagayasu@econ.tohoku.ac.jp](mailto:jnagayasu@econ.tohoku.ac.jp)

<sup>1</sup> While there is no consensus among previous empirical studies, some have confirmed a link between economic growth and real exchange rates through the trade channel ([Bhalla, 2008](#); [Rodrik, 2008](#)) and the productivity channel ([Mbaye, 2013](#)). Also see for example [Orszaghova et al. \(2013\)](#) about the definition of external competitiveness.

Co-movements in exchange rates have been analyzed in several contexts in economic and financial research. Co-movements, which can be measured by the sensitivity of one currency to another in regression analysis or by the simple correlation coefficient, are important since changes in one currency indeed often affect the currency of other countries (e.g., [McKinnon and Schnabl, 2003](#)), particularly those with a flexible exchange rate regime. Furthermore, currency interdependence has been examined in the context of inferring actual exchange rate regimes that may be deviating from officially announced ones (e.g., [Frankel and Wei, 2008](#)).

Co-movements in exchange rates are also underlined during financial crises; deterioration in one's currency value almost simultaneously affecting others through, for example, speculative attacks (e.g., [Gerlach and Smets, 1995](#); [Masson, 1998](#)). Such an effect is often called contagion in the academic literature, and has been increasingly prominent over recent years when a series of financial crises affected the world economy. Such crises include the 1997 Asian crisis that erupted in Thailand, the Lehman Shock (2008) in the United States, and the European sovereign debt crisis that started in Greece (2009). Each crisis led the original country's economy and regional and/or the world economy into recession.

Against this background, this paper analyzes and quantifies co-movements in real effective exchange rates for a wide range of countries. There must be some level of correlation in these rates as they are affected by developments in international economies. However, given that competitive and non-competitive countries co-exist in the global market, it would be of interest to researchers and policymakers to quantify the level of the rate's co-movements and determinants. We analyze the determinants based on previous studies that, without data decomposition, have used real interest rates to explain bilateral real exchange rates. Early studies tend to cast doubt on the credibility of this relationship for individual exchange rates ([Edison and Pauls, 1993](#); [Edison and Melick, 1999](#)); for example, based on the lack of cointegration and/or wrong coefficient signs for real interest rates. However, stronger evidence in favor of this relationship is reported by more recent studies ([MacDonald and Nagayasu, 2000](#); [Byrne and Nagayasu, 2010](#)) in the panel data context.

In short, this paper has several distinguishing and interesting features. First, a large panel of real effective exchange rates are decomposed into the global and country-specific factors on the basis of a Bayesian factor model, which thus allows us to estimate a comprehensive definition of global movements in exchange rates.<sup>2</sup> Second, the decomposition into global and country-specific factors is also conducted for the driving forces of exchange rates. By doing so, we can estimate foreign variables that are often assumed to be the U.S. data in previous studies. In this way, our statistical model departs from those of previous studies on bilateral exchange rates and becomes more congruent with economic theory and data.<sup>3</sup> Furthermore, based on our empirical findings, we discuss whether real effective exchange rates can be regarded as a measure of the external competitiveness of countries, which is a highly questionable issue in previous studies taken from the standpoint of international trade.

## 2. Driving forces behind real effective exchange rates

What are the driving forces behind real effective exchange rates? Among others, economic theory suggests that real exchange rates are determined by the real interest rate differential or the productivity differential in tradable sectors (known as the Balassa-Samuelson theorem). Here we use real interest rates that are available for more countries, and summarize their theoretical link following [Obstfeld and Rogoff \(1996\)](#). Their derivation of the model is more general than the conventional one using solely the purchasing power parity (PPP) theorem and the uncovered interest rate parity (UIRP) condition, in the sense that sticky prices are considered in the model.

Let us consider domestic inflation that can be explained by the Dornbusch-type inflation specification for an open economy:

$$\Delta p_{t+1} = \gamma(y_t^d - \bar{y}_t) + \Delta s_{t+1} + \Delta \tilde{p}_{t+1}^* \quad (1)$$

where  $y_t^d$  is the demand for home country output,  $s$  is the nominal effective exchange rate and  $p$  is the price. All variables are in log form, and  $\Delta$  represents the differenced operator; therefore,  $\Delta p_{t+1} = p_{t+1} - p_t$  becomes inflation. A variable with a bar indicates a natural level, and a foreign variable is denoted with an asterisk. In the presence of multiple partner countries, the latter can be thought of as a weighted average of foreign variables suggested by the tilde in Eq. (1). With  $\gamma > 0$ , it implies that home inflation increases due to excessive demand for home products, exchange rate depreciation, and increases in foreign inflation. In such cases, there is no market clearance, that is,  $\Delta p_{t+1} \neq 0$ .

Further, the demand for home products ( $y_t^d$ ) is assumed to be expressed as:

$$y_t^d = \bar{y}_t + \delta(s_t - p_t + \tilde{p}_t^* - \bar{q}) \quad (2)$$

where  $\delta > 0$ . As in the previous studies, the long-run (or natural) real exchange rate ( $\bar{q}$ ) is assumed to be fixed here. According to Eq. (2), the demand for domestic goods exceeds its natural level to an extent proportional to the level of currency misalignment.

<sup>2</sup> Over the last decade much progress has been made in estimating commonality in large data sets, especially in studies on business cycles ([Forni et al., 2000](#); [Kose et al., 2003](#); [Foerster et al., 2011](#)) and general commodity (non-financial asset) inflation ([Bernanke et al., 2005](#); [Canova and Ciccarelli, 2009](#); [Mumtaz and Surico, 2012](#)).

<sup>3</sup> Thus unlike contagion studies, this study does not emphasize the direction of causality from one country to another.

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