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# The dynamic relationship between exchange rates and macroeconomic fundamentals: Evidence from Pacific Rim countries



Ming-Jen Chang\*, Che-Yi Su

National Dong Hwa University, Taiwan

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### ABSTRACT

This study explores the linkages between exchange rates and macroeconomic fundamentals to determine the long-run relationship, the short-run dynamic correction as well as the direction of causality for several Pacific Rim countries. The conventional cointegration tests fail to find the long-run equilibrium for any country-pairs except Taiwan, but cointegration tests with structural breaks demonstrate the long-run connections between exchange rates and fundamentals for some country-pairs. Evidence from the VECM with structural breaks reveals that exchange rates bear the burden of adjustment toward the long-run equilibrium in three countries during the floating exchange rate regime. The direction of causality between exchange rates and fundamentals appears to vary over time in the S. Korea–U.S. pair. However, there is a uni-directional causality in the Canada–U.S., Japan–U.S., and Thailand–U.S. country-pairs. That is, the Canadian dollar/dollar, yen/dollar, and baht/dollar exchange rates contain information about future changes in macroeconomic fundamentals which correspond to the implications of the asset-pricing model of exchange rates. Finally, this study determines the time-varying causality between both variables during several sub-periods using a bootstrap rolling window approach for the four country-pairs.

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\* Corresponding author at: Department of Economics, National Dong Hwa University, Hualien 97401, Taiwan.  
Tel.: +886 3 863 5551; fax: +886 3 863 5551.

E-mail address: [mjchang@mail.ndhu.edu.tw](mailto:mjchang@mail.ndhu.edu.tw) (M.-J. Chang).

## 1. Introduction

The world's major industrialized countries successively abandoned the fixed exchange-rate regime after the crash of the Bretton Woods system in 1973 and instead adopted the floating exchange-rate system. The floating exchange rate has caused dramatic exchange rate fluctuations to be more violent than ever before. For the past two decades, many countries have relaxed restrictions in the foreign exchange market to promote market efficiency, resulting in substantial growth in international trade and cross-border investment. In a global economy, the exchange rate plays a key role in determining relative prices in the world markets. However, exchange rate changes could be influenced, in the short- or long-run, by macroeconomic fundamentals, such as interest rate, output and price level. Therefore, the linkages between exchange rates and fundamentals are always given careful scrutiny by monetary authorities under the floating exchange rate regime.

The past several decades have been characterized by the vigorous development of international trade, financial market liberalization and accelerating integration of regional economies. The economic integration that has come about in the Pacific Rim countries, for example, the North American Free Trade Agreement (NAFTA), the Asia-Pacific Economic Cooperation (APEC), and the Association of Southeast Asian Nations (ASEAN), has been conducive to enhancing the connections of investment and trade in these economies and has supported economic growth and financial market development in the region. On the downside, if one of the member countries triggers a financial crisis, this tempest will spread to other neighboring countries. Examples of this include the Asian financial crisis in 1997–1998, and the subprime mortgage crisis in 2008–2009 which stemmed from the U.S.

Regarding the connections between exchange rates and fundamentals, [Meese and Rogoff \(1983\)](#) pioneered the exploration of the dynamic linkages of dollar/mark, dollar/pound, and dollar/yen rates with their corresponding monetary fundamentals in 1976–1981. Meese and Rogoff argued that fundamentals do not contain predictive components of nominal exchange rate changes at the short-horizon. That is, out-of-sample exchange rate forecasting accuracy using the structural monetary model cannot outperform models using a naïve random walk process. This finding puzzled most policy-makers as well as international economists, and attracted them to engage in research on this topic.

[MacDonald and Taylor \(1994\)](#) first applied the vector autoregressive (VAR) approach to the monetary model of exchange rates and utilized the dollar-sterling exchange rate, as well as UK–US macroeconomic variables, in the period 1976–1990. They concluded that the out-of-sample forecasting ability of an unrestricted monetary model outperforms that of a naïve random walk process. In order to deal with small-sample bias as well as size distortion problems in asymptotic tests, [Mark \(1995\)](#) conducted alternative bootstrap distributions under the null hypothesis that exchange rate is unpredictable. Mark employed a long-horizon regression and found that monetary fundamentals have long-run forecasting ability to exchange rate changes. However, Mark's empirical findings have been debated, including the deviation of the log-level of the exchange rate from its fundamental value, which was assumed to be stationary.

Some recent studies, such as [Mark and Sul \(2001\)](#) therefore argued that the inability to find evidence of a long-run equilibrium relationship between exchange rates and fundamentals is due to the low power of conventional tests. To improve the testing power, they adopted panel cointegration analysis to test nominal exchange rates and their fundamental values for a panel of 19 countries. Their empirical findings generally supported the hypothesis of cointegration between exchange rates and fundamentals. In addition, [Engel and West \(2005\)](#) took a new line of attack on the question of the link between exchange rates and fundamentals. Engel and West utilized five different measurements of macroeconomic fundamentals and used the conventional asset-pricing models to evaluate the exchange rate as the expected present value of a linear combination for observable fundamentals and unobservable shocks. They showed that the exchange rates may help forecast monetary fundamentals. This conclusion implies that exchange rates and fundamentals are linked in a way that is broadly consistent with the asset-pricing models of the exchange rate. However, their bivariate cointegration tests generally failed to find cointegration between exchange rates and fundamentals.

Some macro-economists, such as [Dumas \(1992\)](#), [Sercu et al. \(1995\)](#) and [Michael et al. \(1997\)](#), claim that exchange rates are characterized by nonlinear adjustment toward equilibrium that can arise from transaction costs or other frictions in the international financial markets. Accordingly, [Taylor and](#)

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