



# The precise form of financial integration: Empirical evidence for selected Asian countries

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## ABSTRACT

A noteworthy attribute of the empirical studies on financial integration is that many published papers rely on the approximate form of financial integration by studying the degree of regional financial integration. Therefore, the approximate form of financial integration cannot be used to refute the precision of the financial integration simply because of complex data collection procedures and the misspecification of a commonly used model. To overcome this shortcoming, this study uses the precise form to specify the measures of financial integration and examines the empirical validity based on a sample of ASEAN-5 countries plus 3 additional countries. Using the panel error correction method, the findings provide a number of policy implications; the precise form of financial integration can characterise the capital mobility conditions and the degree of sterilised foreign exchange intervention, and serve as a guiding policy instrument for fine-tuning the disruptions in the foreign capital market through sterilised foreign exchange intervention in exchange rate misalignments without abandoning the role of domestic interest rate policy that eventually promotes orderly financial integration.

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## 1. Introduction

“Financial integration” refers to a condition whereby traders can transact financial assets freely within an area; capital mobility refers to the ease with which financial assets flow across national borders.<sup>1</sup> Previous literature has largely discovered that the collapse of the Bretton Woods fixed exchange rate system has increased international capital mobility and generated unstable exchange rates (James, 1996). In subsequent years, researchers have attempted to investigate the vagueness of exchange rate regimes in terms of promoting financial integration within the inconsistent triangle framework.<sup>2</sup> A great deal of emphasis has been placed on the explanation of financial integration in contexts in which a country can either choose monetary autonomy and capital mobility, which result in pure floating exchange rates, or in contexts where a country can choose exchange rate stability and capital mobility, which result in a fixed exchange rate (Ariyoshi et al., 2000; Obstfeld et al., 2005). An autonomous interest rate policy is ineffective in a fixed exchange rate system but is effective in a pure floating system. Despite such expansive research, a realistic outcome remains unclear

and is not consistent with the experience of many central banks. Therefore, the question remains as to whether further research in this area could enhance the knowledge concerning financial integration and improve the scientific accuracy of financial integration theory.

A noteworthy attribute of the empirical studies on financial integration is that many published papers rely on the approximate form of financial integration by studying the degree of regional financial integration. Therefore, the approximate form of financial integration cannot be used to refute the precision of the financial integration simply because of complex data collection procedures and the misspecification of a commonly used model. Empirical measurements of financial integration are typically based on price-based<sup>3</sup> and quantity-based measures.<sup>4</sup> With respect to price-based measures, Baharumshah et al. (2011) find strong evidence that the ASEAN-5 countries and Korea are financially integrated with global financial markets using real interest parity procedures. Espinoza et al. (2011) claim that the convergence of interest rates and stock markets are significantly integrated across countries in the region of the Gulf Cooperation Council. Park and Lee (2011) suggest that emerging Asian equity-market prices have converged over time and have become increasingly globally integrated since the 1997/1998 Asian financial crisis. Kim and Lee (2012) examine

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<sup>1</sup> The international finance literature suggests that capital mobility and financial integration are closely linked, and they have often been used interchangeably; a high level of capital mobility indicates a high level of market integration (Moosa, 1996).

<sup>2</sup> The inconsistency triangle (also known as the Mundell-Fleming model) from the seminal works by Mundell (1962) and Fleming (1962), only focuses on the polar solution that limits the central banks to the selection of capital mobility and exchange rate fixity or capital mobility and monetary autonomy.

<sup>3</sup> The price-based measures measure the inconsistency in the estimation of the rate of return of comparable assets across different markets; the financial integration is complete when the rate of return differentials tends toward equality in all economies.

<sup>4</sup> The quantity-based measures assess asset quantities and flows of cross-border activities, which are intended to capture the effects of market friction on investment opportunities (i.e., the demand for and supply of investment).

the financial integration of East Asian economies using observations from cross-country government bond yields, overnight interbank rates and stock prices. They conclude that the degree of financial integration increased substantially during the aftermath of the Asian crisis.

With respect to the quantity-based measures of financial integration, Lane and Milesi-Ferretti (2008) imply that there is some degree of convergence in the international financial integration between developed and developing countries via the reduced form of foreign assets as a share of national gross domestic product (GDP) estimation. Kool and Keijzer (2009) have noted that there is significant deterioration in the saving retention coefficient prior to 2004 in 23 Organisation for Economic Co-operation and Development (OECD) countries, and their findings thus support financial integration using the approach of Feldstein–Horioka (FH). Buch and Yener (2010) suggest that greater financial openness has been associated with lower consumption volatility, and they support the theory that financial integration remains a work in progress for G7 countries. Herwartz and Xu (2010) apply panel data procedures to measure the savings–investment relationship of a number of countries. They discover that the savings–investment relationship is established in the short run and is influenced by financial integration. However, non-price- and non-quantity-based measures are also used to measure financial integration. A recent study by Beine and Candelon (2011), employed a stock market covariation measure of financial integration and demonstrated that there is an optimistic influence of trade and financial liberalisation on the degree of cross-country stock market linkages among emerging countries. Using equity-market movement analysis, the results of the study by Johansson (2011) corroborate the findings of Beine and Candelon (2011). Johansson (2011) concludes that financial turmoil does not impede the development of financial integration and high levels of market co-movement.

Based on these literature studies, the performance of financial integration measures is rarely disastrous. However, the trustworthiness of the empirical evidence in supporting financial integration has diminished. The price-based measure of financial integration is vague when the law of one price and uncovered interest rate parity (UIP) are not empirically reliable. The literature concerning the failure of the law of one price includes studies by Miller (1977), Engel and Rogers (2001) and Pippenger and Phillips (2008); the literature on the failure of UIP includes such works as those by Hansen and Hodrick (1980), Fama (1984) and Alper et al. (2009). Quantity-based measures of financial integration are subject to data availability limitations and the possibility of the differentiated or non-standardised treatment of data. For example, there are some countries (e.g., India, Indonesia, Malaysia and Philippines) that do not officially disclose the foreign asset and liability positions of all sectors (Pongsaparn and Unterberdoerster, 2011). Not surprisingly, savings–investment relationships failed to reach consensus with respect to capital mobility, which is an essential condition for financial integration (De Vita and Abbott, 2002; Miller, 1988). The stock market covariation measure of financial integration, however, and the well-documented empirical failure of the capital asset pricing model (CAPM) can have undesirable effects on reliability (Fama and French, 2004, 2006).

The motivation for this study is the inconsistency triangle framework's failure to consider a strategy of managed floating in which a policy of intervention in the foreign exchange market can be classified as a system of managed floating (Bofinger and Wollmershauser, 2001). Correcting the exchange rate misalignment to induce a stable foreign capital market may promote orderly financial integration.<sup>5</sup> The theory of managed floating proposed by Bofinger and Wollmershauser (2001) under free capital mobility, a component set

that consists of monetary autonomy and managed floating exchange rates, is mutually compatible for a country. The authors note that such compatibility uses open market operations to control the interest rate, while leaving sterilised foreign exchange interventions as an additional, independent central bank instrument; sterilised foreign exchange interventions are an operation in which the central bank carries out equal net domestic asset and net foreign asset transactions in opposite directions to nullify the impact of their foreign exchange operations on the domestic money supply.<sup>6</sup> Past studies have demonstrated that sterilising foreign exchange interventions would calm exchange rate variations and result in little change (Cavoli and Rajan, 2006; Edison, 1993; Kwack, 2001; Wang, 2010).<sup>7</sup> The United Nations (2001) recommends a managed floating policy that can be used to limit exchange rate volatility and that can promote healthier financial integration, at least for Asian economies. Moreover, empirical data in many East Asian economies typically indicate the mirror-image path of changes in net domestic and foreign assets (see International Monetary Fund (IMF), *International Financial Statistics (IFS)*, CD-ROM).<sup>8</sup> Therefore, it seems natural to examine sterilised intervention that in the presence of free capital mobility, with monetary policy (hereafter, domestic interest rate policy) assumed to remain autonomous, can strengthen exchange rate stability and promote orderly financial integration (Note that as stressed by Bernanke (2010), interest rates will be an important though not universal tool to tame the threats to financial stability<sup>9</sup>).

The objective of this paper is to examine financial integration in a precise form such that (i) the precise form can serve as a good information summary instrument that characterises the capital mobility conditions and the degree of sterilised foreign exchange intervention, and (ii) the precise form can serve as a guiding policy instrument for fine-tuning the disruptions in the foreign capital market through sterilised foreign exchange intervention on exchange rate misalignments without abandoning the role of domestic interest rate policy. In doing so, the precise form of financial integration should help promote orderly financial integration. The sterilised foreign exchange intervention may therefore play a significant role without changing the domestic interest rate policy. The ASEAN-5 countries, Indonesia, Malaysia, Philippines, Singapore and Thailand, and 3 additional Asian countries, China, Japan and South Korea, are included in this study. The main innovative feature of this paper is the adoption of the precise form of financial integration, which has arisen from the link between exchange rate stability policy (i.e., the operation of sterilised foreign exchange intervention) and capital mobility and is a combination of two models – the sterilisation coefficient and the offset coefficient. Using the panel error correction method proposed by Pesaran et al. (1997, 1999), the paper examines the precise form of financial integration, i.e., the combination of two models – the sterilisation coefficient and the offset coefficient, by analysing the dynamic relationships between the central bank's net domestic assets and the central bank's net foreign assets and vice versa.

The rest of the paper is organised as follows. Section 2 describes the theoretical model that yields the precise form of financial integration and presents an empirical model that is to be used in the proposed panel method. The data and empirical results are described in Section 3. The conclusions are presented in Section 4.

<sup>6</sup> Note that many economists do not distinguish between sterilised foreign exchange interventions and managed floating exchange rates in which sterilised foreign exchange intervention is perfectly controllable by the central bank's managed floating strategy. A sterilised foreign exchange intervention is therefore a managed floating strategy.

<sup>7</sup> Examples of the countries examined by Edison (1993) include Bundesbank and the Bank of Japan; Kwack (2001) examines Indonesia, Korea, Malaysia, Philippines, Singapore, Thailand and Taiwan; Cavoli and Rajan (2006) examine Indonesia, Korea, Malaysia, Philippines and Thailand; Wang (2010) examines China.

<sup>8</sup> The first paragraph of Section 3 provides a description of these assets obtained; one may use a line chart to show that the country's net domestic and foreign assets are mirror images of each other on the y-axis and time is on the x-axis (cf. Ouyang et al., 2008).

<sup>9</sup> The evidence is available from the central banks' website, Gan (2014) and the International Monetary Fund (2012).

<sup>5</sup> To this end, empirical studies on the identification of the orderly financial integration based on an explicit formula are rare or simply do not exist. In this paper, the stance of orderly financial integration would mean that financial integration has a systematic arrangement (see subsection 2.1).

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