



An alternative way to track the hot money in turbulent times[☆]



Ahmet Sensoy*

Borsa Istanbul, Research & Business Development Department, Emirgan, Istanbul 34467, Turkey

HIGHLIGHTS

- Using DCC between exchange rates, we propose an approach to track the hot money.
- We introduce a time-varying strong correlation definition using DCC matrix.
- We construct evolving networks from strong correlations.
- Approach is demonstrated for the financial turmoil of 2008.
- Other application areas of the approach (such as classification) are discussed.

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ABSTRACT

During recent years, networks have proven to be an efficient way to characterize and investigate a wide range of complex financial systems. In this study, we first obtain the dynamic conditional correlations between filtered exchange rates (against US dollar) of several countries and introduce a time-varying threshold correlation level to define dynamic strong correlations between these exchange rates. Then, using evolving networks obtained from strong correlations, we propose an alternative approach to track the hot money in turbulent times. The approach is demonstrated for the time period including the financial turmoil of 2008. Other applications are also discussed.

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1. Introduction

The degree of integration in the global financial markets has increased dramatically in recent years. With the liberalization of the capital movement in many countries, net capital flows (in particular short-term flows) to developing countries have reached the highest level since the 1980s debt crisis.

However, some academics think of this increase in capital mobility as a mixed blessing. They have taken the view that, on the contrary to the foreign direct investments, short-term capital flows i.e. “hot money”¹ can increase the fragility of the financial system and destabilize the economy [1,2]. The financial crises in the 1990s are good examples in this sense. In particular, first signs of destabilization effect appeared with the Mexican crisis during 1994–1995. Subsequently, during 1997–1998, much of emerging Asia was engulfed in a financial crisis of unprecedented severity for that region. Similarly, Brazil found itself with a currency crisis of its own in early 1999. An important lesson learned from these events is that short-term foreign capital can exit as easily as it enters in an open economy. Additionally, it is more volatile than other categories

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* Tel.: +90 212 298 27 39; fax: +90 212 298 25 00.

E-mail address: ahmet.sensoy@borsaistanbul.com.

¹ “Hot money” refers to the flow of speculative funds or capital from one country to another in order to mainly earn a short-term profit on interest rate differences and/or expected exchange rate shifts.

of capital flows and its sudden reversal tends to have destabilizing effects on the host country if the country heavily relies on these short-term capital flows for external financing.

In the literature, several studies focused on the determinants of the level (and/or volatility) of short-term capital flows or their effects on the host economy and its financial stability [3–8]. However for many obvious reasons, it is also important (especially for regulators) to keep track of the short-term capital flow which, surprisingly, has not been studied in detail yet.

In this manuscript, we propose a primitive however an efficient way to track the hot money in turbulent times using exchange rates, dynamic conditional correlations and networks. Our proposal depends on the bilateral relationship between capital flows and exchange rates as explained in the following:

Empirically, many studies have found a relationship between short-term capital flows and exchange rates. For example; Edwards [9], in his analysis of Latin American countries, shows that in seven out of the eight countries studied, it is not possible to reject the hypothesis that capital flows influence real exchange rates.² Kim and Singal [10], using data from twenty emerging market economies, find that foreign capital flows lower the currency risk and encourage foreign investors to invest more at a lower required rate of return. Froot et al. [11] find a positive correlation between net portfolio inflows and dollar equity and currency returns; and they attribute the co-movement to the information content of capital flows. Siourounis [12] finds evidence suggesting that a considerable amount of change in the exchange rates for Germany, Switzerland, the UK and the US can be explained by net cross-border capital flows. Brooks et al. [13] find that large and initially unanticipated outflows from the euro area are accounted for a substantial part of the dollar's fall and persistent weakness. More recently, Heimonen [14] presents results indicating that an increase in the euro area equity returns with respect to US equity returns causes an equity capital outflow from the euro area to the US; and that this equity flow leads to an appreciation of the US dollar. Jongwanich [15] finds that short-term capital inflows elicit a fast speed of real exchange rate appreciation.

As one can notice, these studies suggest that capital inflows (outflows) appreciate (depreciate) the local currency. Accordingly, as hot money leaves one country and arrives to specific another, we expect to have strong negative co-movement between the value of the currencies of these countries, and our approach arises from this assumption which is demonstrated with an important example in this study: First by filtering the global FX market effect, we obtain the dynamic conditional correlations between several exchange rates (against US dollar) in the last decade. Later, we define a time-varying negative threshold level for correlations and we illustrate the countries having correlations below this threshold level during the turbulent times of 2008 by using networks. Accordingly, we will be able to roughly comment on the short-term capital's path in times of the global financial crisis.

2. Data and methodology

The data used in our study (obtained from Bloomberg) covers a period from January 3, 2003 to November 29, 2013 and includes the US dollar index³ and exchange rates (against US dollar) of the following 36 countries: Canada, Euro Area, UK, Switzerland, Sweden, Norway, Denmark, Iceland, Japan, Singapore, Australia, New Zealand, Brazil, Mexico, Argentina, Colombia, Peru, Czech Republic, Poland, Hungary, Russia, Ukraine, Turkey, Israel, Algeria, South Africa, Nigeria, India, Pakistan, Malaysia, South Korea, Thailand, Philippines, Indonesia, Fiji and China. Instead of daily, we use weekly log-returns so that the adverse effects of belonging to different time zones are minimized, yet we do not lose the dynamics of the correlations.⁴

2.1. Filtering the global FX market effect

We analyze the dynamic relationship between the exchange rates of the aforementioned countries. First, we estimate the following model including dollar index returns to filter the exchange rate return series from the global FX market effect⁵

$$r_t = \Phi_0 + \Phi_1 r_t^{\text{dollar index}} + \varepsilon_t \quad (1)$$

where $r_t = [r_{1,t}, \dots, r_{n,t}]'$ is the vector of n exchange rate returns, Φ_0 is a vector of constants with length n , $r_t^{\text{dollar index}}$ is the vector of length n including the dollar index returns at time t and Φ_1 is the corresponding coefficient matrix. Finally, $\varepsilon_t = [\varepsilon_{1,t}, \dots, \varepsilon_{n,t}]'$ is the vector of filtered returns.

² Strikingly, the data shows no evidence that the real exchange rate causes capital inflows.

³ US dollar index is a measure of the US dollar value relative to a basket of six major foreign currencies. It is calculated as $50.14348112 \times (USD/EUR)^{0.576} \times (USD/JPY)^{0.136} \times (USD/GBP)^{0.119} \times (USD/CAD)^{0.091} \times (USD/SEK)^{0.042} \times (USD/CHF)^{0.036}$. An increase in the US dollar index indicates US dollar appreciation against other currencies in the basket.

⁴ Another reason we use weekly data is the following: Except a few, the selected 36 countries implement floating or dirty-floating currency regimes. However, no matter what the currency regime is, central banks of these countries tend to intervene to the FX market to minimize the effects of the severe capital flights on the local currency in times of crises. Due to these interventions, local currency may artificially keep its value for a few days thus daily data may be misleading. However, a depreciation is expected in longer time intervals and we believe a "week" is a reasonable duration for this effect to be observed.

⁵ Filtering is necessarily performed since FX market is not a zero-sum game due to monetary expansions such as quantitative easing of Fed.

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