

Are all currencies equally predictable?

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Predictable or not

- The random walk hypothesis states that asset prices evolve according to a random walk and thus the price of the asset, say exchange rate or a stock price, can not be predicted. Goes back to Louis Bachelier (The Theory of Speculation, published 1900).
- A random walk (RW) is a mathematical formalization of a trajectory that consists of taking successive steps. Examples include, the path traced by a molecule as it travel in a liquid or the financial status of a gambler, or a drunk person's walk.
- If asset prices follow a random walk then this may constitute evidence for the efficiency. According to Fama (1970) an efficient market is the "one in which prices always fully reflect information".
- Big discussion among the academicians and practitioners in the financials industry about if stock or other asset prices are random walks.

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Predictable or not



- Do not reject random walk (unpredictable):
 - Meese and Rogoff (1983)
 - Baillie and Bollerslev (1989)
 - Rogoff and Stavrakeva (2008)
- Mixed results across exchange rates:
 - Chang (2004)
 - Belaire-Franch and Opong (2005)
 - Rossi (2006)
 - Yang et al. (2008)
- Reject random walk (predictable):
 - Lai and Pauly (1992)
 - Klaassen (2005)
 - Chortareas and Kapetanios (2009)
- Mixed results across time periods:
 - Newbold *et al.* (1998)
 - Sweeney (2006)
 - Chang (2004)

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Predictable or not



- A large literature exist that investigates the predictability of exchange rates using monetary and non-monetary fundamentals.
- Seminal works of Meese and Rogoff (1983a, b, 1988), and numerous follow-up studies have found that a random walk predicts exchange rates better than the macroeconomic models in the short run.
- Recently, a growing number of papers have reported results that suggest predictability of exchange rates in the short-term by implementing panel forecast methods, innovative estimation procedures, more powerful out-of-sample test statistics, and new structural models (e.g., Gourinchas and Rey (2007), Engel, Mark and West (2007), and Molodtsova and Papell (2009)).
- On the other hand, Rogoff and Stavrakeva (2008) challenge the findings from these recent studies.

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As Equally Important Questions



“All animals are equal, but some animals are more equal than others.”

George Orwell, Animal Farm, 1945

- Are all exchange rates the same with respect to random walks? If not how do they differ?
- Or are all currency prices equally (un)predictable?
- Are there factors that can be useful in explaining the temporal and cross-currency variation in random walk behavior?

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Talk is based on



1. “Investment intensity of currencies and the random walk hypothesis: Cross-currency evidence” JBF 2011 (Kilic-Koc Univ., Eun-GaTech and Chuluun –Loyola Univ.)
2. “Exchange rate dynamics: Commercial vs. financial transaction”, (1st draft Feb 2011) (Kilic, Koc Univ., Eun, GaTech, and Lai-Singapore Management School)
3. “Testing for cointegration and nonlinear adjustment in a smooth transition error correction model” (Kilic, 2011, JTSA)

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Conjecture

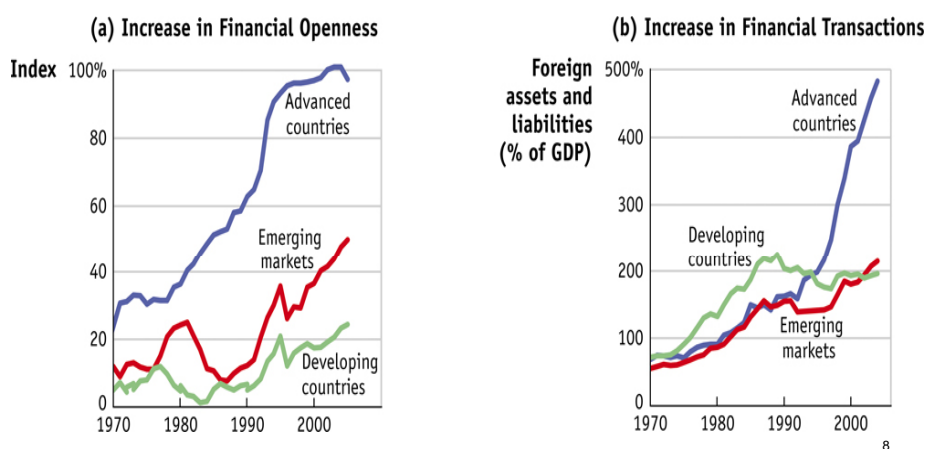
The relative size of investment flow to trade flow (we call it “investment intensity” of a currency) may be a potential determinant of the extent of random walk behavior in exchange rate.

- Explore *if the extent to which the currency’s transactions in FX markets are motivated by investment activities, such as speculation and arbitrage involving various assets, relative to the extent of the transactions motivated by trade in goods and services is a key factor or not in characterizing predictability in exchange rates.*

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Globalization

- Financial openness and financial transactions
 - ♦ Increased steadily since 1970
 - ♦ Most dramatic increase since the 1990s

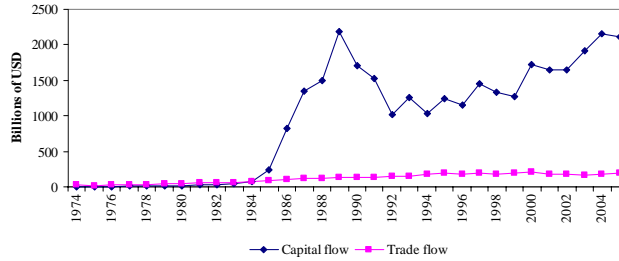


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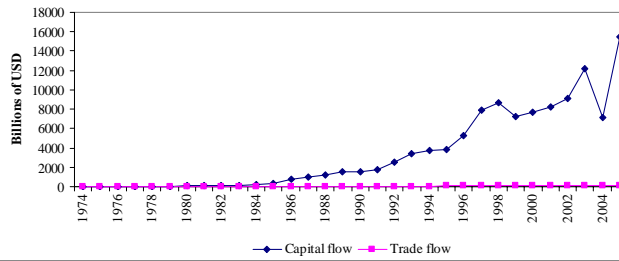
Bilateral capital and trade flows



Flow between Japan and U.S.



Flow between U.K. and U.S.

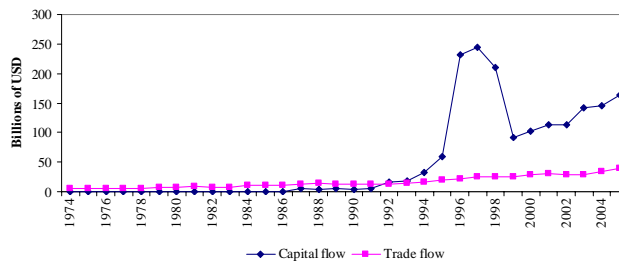


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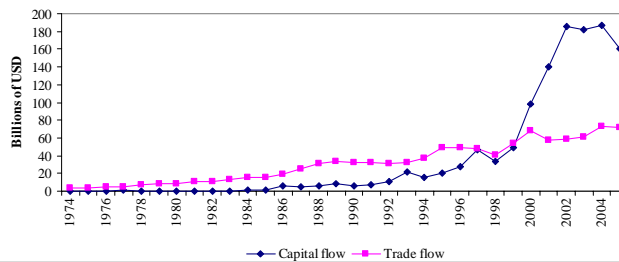
Bilateral capital and trade flows



Flow between Brazil and U.S.



Flow between Korea and U.S.



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Bilateral capital and trade flows



- Over 1974-2005, the sample standard deviation of annual percentage change in:
 - trade flow is 14 percent
 - capital flow is 467 percent
- After simple detrending, the estimated autocorrelation in:
 - trade flow is significant and 0.53
 - capital flow is insignificant

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Conjecture



- If an exchange rate is increasingly driven by investment flows, rather than trade flows, it may exhibit more random walk like behavior
 - The idea is: as investment intensity increases, currencies are more frequently traded for investment and speculative purposes and hence become an asset of their own class. Therefore, we expect that exchange rate returns become less predictable.
 - That is why we explore the impact of various measures of investment intensity, which include a broad measure of financial openness, on the likelihood of rejecting the random walk hypothesis and the degree of deviation from random walk, using twenty-nine floating bilateral U.S. dollar (USD) exchange rates.

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Methods and Data



- We examine the impact of various measures of capital openness and investment intensity on
 - the probability of rejecting the random walk hypothesis
 - the degree of deviation from random walk
 using twenty-nine floating bilateral USD exchange rates

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Variance ratio

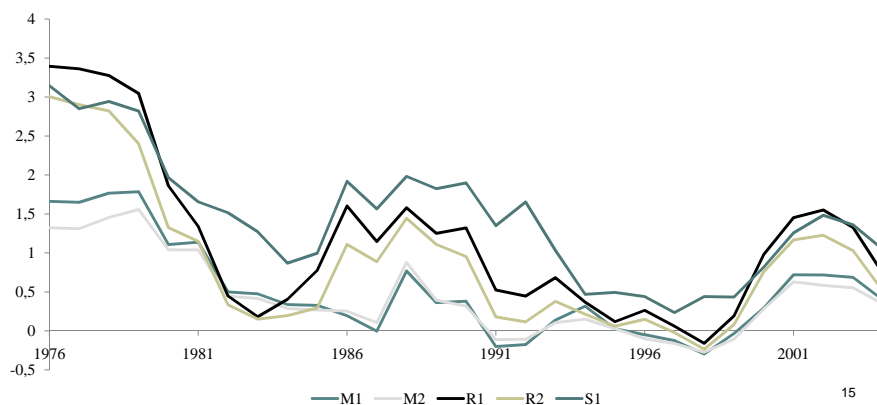


- Lo and MacKinlay (1988):
 - The intuition: the variance of the increments in random walk is linear to the sampling interval.
$$VR(k) = \frac{Var[r_t(k)]}{k \cdot Var[r_t]}$$
 - Variance ratio of random walk should be one.
- This straightforward test of random walk is used widely in various studies.

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Variance ratios

- Temporal variation in random walk-averages over currencies



Here are some key findings

- Findings show that the higher the investment intensity, the less likely it is to reject a random walk in daily and weekly exchange rates.
- After financial openness reaches a high level and capital flow becomes dominant over trade flow, random walk is no longer rejected.
- Exchange rates adhere more closely to random walk and the deviations from random walk are smaller when the level of investment intensity is higher.
- Results are also non-monotonic. Threshold regression results indicate that the investment intensity has no further effect on the deviation from the random walk pattern above a threshold.
- Results uphold to various robustness checks.

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Summary of the results




- Higher the financial openness and investment intensity, less likely it is to reject random walk
- Exchange rates adhere more closely to random walk when
 - the level of financial openness is high
 - the level of investment intensity is high:
 - investment-to-trade flow (ITF) ratio
 - currency turnover-to-trade (CTT) ratio

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Summary of the results (cont')



- However, this impact of investment intensity is non-monotone:
 - For ITF values higher than 11
 - For CTT values higher than 0.43

 the level of investment intensity has no further effect on the deviation from random walk

 - After investment flow grows to be about tenfold the trade flow, random walk is no longer rejected
- These results uphold to various robustness checks

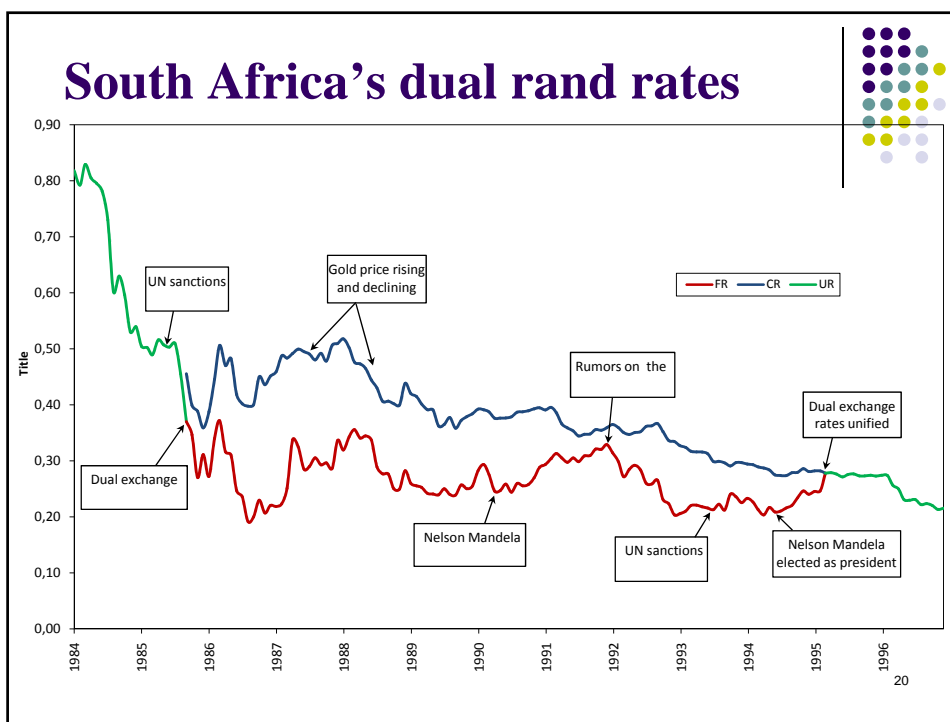
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experiment: Segmented FX markets

- South Africa's dual exchange rate experiment wherein the commercial exchange rate is set exclusively by international trade transactions, whereas financial exchange rate is set by capital account transactions.
- The dual experiment lasted about ten years, (September 1985 until February 1995).
 - Both rates were floating.
 - Provides almost a controlled lab situation that allows us to isolate and study the effect of trade motivated transactions vs. the investment motivated transactions.

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South Africa's dual rand rates



Research done in this paper



- Examine the effectiveness and segmentation of the dual rate system
 - Provide evidence that show that two markets were segmented effectively
- Test the hypotheses concerning the exchange rate behavior
 - Random walk, purchasing power parity, and uncovered interest rate parity for both rand rates
- Predictability of dual rand rates based on economic fundamentals

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Methods and Key Findings



- South African dual-rate regime is highly effective in segmenting FX markets for the commercial vs. financial rand.
 - Used cointegration techniques: commercial and financial rand rates are not cointegrated. Therefore the two rates can diverge from each other without being constrained by cross-rate arbitrage activities.
 - Granger causality tests shows no causality between the current account and the capital account balances, in either direction.
 - The dual rate regime were capable of insulating trade-motivated transactions and investment-motivated transactions and hence two rates are set in two markets.

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Methods and key findings



- Random walk hypothesis is rejected for the commercial rate, but not for the financial rate.
- Commercial rate is predictable but financial rate is not.
- Purchasing Power Parity (PPP) is rejected for the financial rate but not for the commercial rate. Deviations from financial rate PPP is persistent while deviations from commercial rand PPP are not.
- The commercial rate fluctuations are predictable on the basis of monetary fundamentals, while financial rand fluctuations are largely unpredictable.
- Uncovered interest rate (UIP) is rejected for both rates.

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Conclusions



- Potential to reconcile the previous conflicting empirical findings on random walk
 - Random walk rejection/ non-rejection is not universal across exchange rates
- There seems to be important differences in the behavior of exchange rates that are traded mostly for commodity trade purposes than those mostly traded for investment purposes.

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Thank you!