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The Euro: A Seafarer on Tides of 'Stateless' Money?

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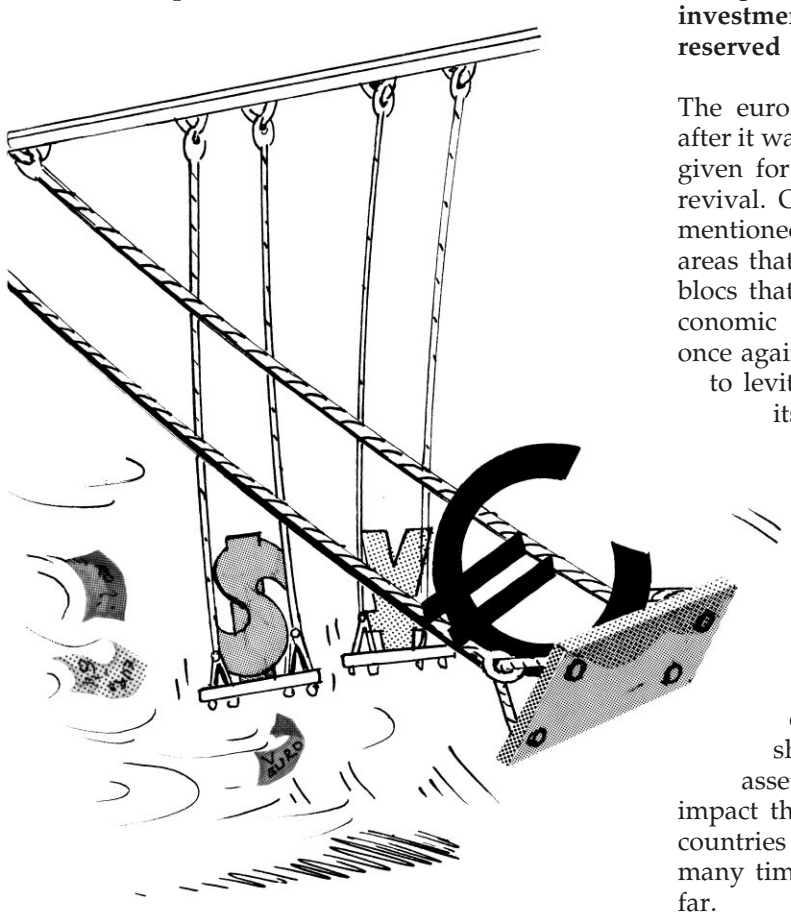
Using an Excel simulation model, John Marthinsen and John Edmunds demonstrate how portfolio investment flowing from one currency zone to another can easily cause the value of the euro to spiral away from its 'correct' value. The authors simulated trajectories for exchange rates among the euro, the yen and the US dollar. They found repeatedly that in a short span of days, the market valuations of an entire region's capital stock can drop more than 20 per cent or rise more than 40 per cent.

The result shows that the euro displays longer swings, with wider amplitude, than the 11 European currencies would have done if they had not been unified. This provocative result has major implications for the capital stock of the European Union, and shows how important it is for economic policymakers to manage investor expectations beyond the usual policy measures. It is particularly important in the European Union where the euro appears, to judge by this research, to magnify the swings caused by international flows of portfolio investment.



The euro went into an embarrassing slide shortly after it was introduced. Many explanations have been given for its anaemic performance and subsequent revival. One reason that has not been prominently mentioned is that financial fads now spread across areas that are larger than the hemispheric economic blocs that set monetary and fiscal policies. Macroeconomic management has its efficacy questioned once again. Policymakers in Euroland are struggling to levitate the euro, so there has been a delay in its hoped-for emergence as a counterwieght to the dollar.

The growth of cross-border financial transactions has given international capital markets the power to inflict a new form of *capital punishment* on entire continents whether those continents have truly sinned or not. Any real or perceived worsening of economic conditions can set off capital outflows that put sharp downward pressure on the nation's asset prices and exchange rate. The destructive impact that international capital flows can have on countries that lose favor with investors has been seen many times. Euroland has suffered only slightly so far.

As far back as the 1980s, the daily volume on the foreign exchange markets was estimated 40 times the volume of world trade and 60 times the level of international portfolio investment flows.[1] Since then, international capital markets have grown by approximately 17 per cent per year (on a dollar basis), thereby compounding the power of global investors.

International investment flows can put massive pressure on exchange rates and they can also cause wealth-related consumption effects that significantly alter nations' growth rates. Links between cross-border capital flows and swings in discretionary income have become important forces influencing economic cycles. An example might put this effect into perspective. The market value of industrial countries' financial claims is three to five times the level of their GDP.[2] If a wave of foreign investment flows increased market value of a developed nation's financial claims by 10 per cent, and at the same time raised the market value of its currency by an additional 10 per cent, the effect on wealth could be as much as 105 per cent of the nation's yearly GDP.[3] This example is a close approximation to what happened in the US from 1995 to 1999, when the value of stocks and bonds rose by more than $8 trillion (i.e. about 100 per cent of US GDP). It is an example in reverse of what happened in Japan during the same time period, when the dollar value of Japanese stocks and bonds fell by more than 150 per cent of Japan's GDP (measured in dollars).

The impact of international capital flows has apparently been to magnify and prolong the swings in exchange rates that underlying competitive conditions would justify. The erratic and volatile behavior of exchange rates has been one of the reasons why traditional international exchange rate theories (e.g. purchasing power parity and uncovered interest parity) have been such inaccurate predictors of foreign exchange rates. The level of inaccuracy has generated a debate concerning the wisdom of having open international capital markets.[4] Malaysia's 1998 imposition of capital controls is a recent event that keeps this controversy boiling.

The Advent of the Euro

The euro was intended to act as a homogenizing force, helping to forge a supra-State that could transcend the 11 nationalities joining into Euroland. In the rhetoric prior to its launch, the euro was going to marginalize the US dollar. Whether the euro gradually replaces the US dollar as an international medium of exchange and as a store of value, it has provided financial benefits to the member nations. Most obviously, it has eliminated foreign exchange uncertainty within Euroland, thereby reducing hedging costs and eliminating many intra-EMU transaction costs (e.g. foreign exchange bid-ask spreads that have been estimated at $30 billion a year). It is also rapidly creating common capital markets (i.e. equity, debt, and derivative markets) with breadth and depth that were previously unknown in Europe.[5] The euro will substantially reduce the risks associated with differential inflation rates, end competitive devaluations, promote rationalization, and stimulate merger and acquisition activities. On the trade side, the common currency should promote greater specialization and economies of scale, increase price transparency, encourage competition, and diminish protectionist forces in Europe.

Euroland used to rely on bank-intermediated financing; the euro accelerates the move toward securities markets and exchange-quoted financial asssets. This makes world financial markets more pre-emptive over goods markets. Protected enclaves, and insular local arrangements are less viable since the euro replaced 11 local currencies.

'Stateless Money'

The mundane truth is that the source of international portfolio investment is the savings of middle-class individuals. These savers are not acting through offshore, numbered accounts, and they are not especially savvy. They are simply trying to earn decent returns, protect their capital, and make the most of their hard-earned savings. Though individually they are small, in the aggregate they are an awesome and terrifying force confronting international policymakers. If these investors lose confidence in a country and liquidate their investments, they can do more damage than a hundred billionaires, drug lords, or hedge fund 'gunslingers'.

'Stateless money' is the total stock of financial wealth that flows internationally due to (real or perceived) changes in relative international risks and returns. These funds have no national loyalty and flow in enormous volumes at the slightest change in economic and/or political conditions. Though much of this wealth is already invested across national boundaries in foreign stock, bond, and real estate markets, a varying portion is invested in home markets. For example, a US middle-class saver owning shares in a mutual fund that invests in Southeast Asia might have been induced by the events of 1997–1998 to liquidate these mutual funds and buy US Blue Chip stocks and bonds. If, after 1999, the US economy goes into a recession and Euroland rallies, these same individuals would not hesitate to cash out of their US investments and purchase European securities.

The gross size of these mobile financial assets is large, and consequently, fluctuations in their market value can compound investors' wealth and directly raise or lower economic growth. As these funds flow into and out of a nation's stock, bond, and real estate markets,

they move both currency and financial asset values. In 1999, US mutual fund investors directed as much as $30 billion per month into equity funds, of which as much as $2 billion per month has been directed into international mutual funds.

These flows pass through foreign exchange markets. Yet exchange rates supposedly adjust to reflect the conditions in each currency's zone. That assumes, however, that cross-border investors know what those conditions are. The reality has been that exchange rates have deviated for extended periods of time from their parity levels. This disparity has helped spur corporate globalization.[6] The disparity, however, has incubated both an active interest in technical analysis and a healthy debate over the assumptions regarding consumer and investor rationality.[7] Currency zones have benefited from a 'halo effect' and have been hurt by falling out of favor unjustly. Theory has been faulted for its inadequate explanations of exchange rate fluctuations (Schulmeister, 1988).

Longer Rises and Declines for Exchange Rates?

We found that the advent of the euro makes it more likely that exchange rate fluctuations will display longer waves than before. When there were more different currencies, the fluctuations were choppier. Since January 1999 the euro, the yen and the dollar have displayed sustained declines and rises. We discovered this while working to model cross-border portfolio investment fluctuations. We were modeling money moving from the dollar to the euro to the yen. Exchange rates were affected as a consequence of money moving from Tokyo to Euroland to New York in the course of the trading day. Our objective was to see how much the flows of 'stateless' money could affect the market value of the capital stock of Japan, the US, or Euroland.

The surprising result was that once a currency starts rising, it tends to go on rising, for longer periods of time than it would have done in a world with a larger number of currencies. We used exogenous random disturbances, which disrupt an initial equilibrium. Then arbitrage takes over, to profit from prices being temporarily out of line. In particular, we used random, exogenous changes in risk (i.e. volatility) to cause predictable international portfolio adjustments. These then result in a sequence of stimulus and feedback effects. These effects, despite being small, cause exchange rates to spiral far away from their initial values. Financial wealth is then affected, and changes in real living standards can result.

Our approach was to assume that interest parity conditions are in balance at the beginning and end of each day, but that open covered interest differentials may persist during the trading day. Short-term interest rates for the dollar, yen, and euro, figure into the model, but not as policy variables. Interest rates, in addition to interest elasticities, imports, and exports are assumed to be exogenous and fixed in the short run.

We separated the world's foreign exchange markets into three, non-overlapping time zones (i.e. the Asian time zone represented by the yen, the European time zone represented by the euro, and the North American time zone represented by the dollar) that open and close iteratively over a 24-hr day. We assumed that each market opens to a random shock that could be greater than, less than, or equal to the shock expected by investors.

The trading day begins in Asia, and traders learn what the random shock is for that day. If the random shock is greater than expected, Asians reduce the weighting of domestic stocks in their portfolios and increase the weighting of yen bonds and foreign stocks and bonds. We assumed that the portion of investors' portfolios held in bonds rises by 1 per cent for every 2 per cent rise in stock market volatility.

Using this approach we generated daily figures for the three exchange rates (i.e. yen/dollar, euro/dollar, and yen/euro) and three security markets (i.e. North America, Asia, and Europe) over a 60-day period. The exchange rate movements are caused solely by random shocks to world stock markets and by investors' rational direct responses to those shocks (Schulmeister, 1988).

We assumed that flows between the various markets occur in proportion to the their size. For example, the portion of funds moving from the euro market to dollar market is equal to the size of the US stock market relative to the combined size of dollar and euro stock and bond markets. Furthermore, for every 1 per cent change in the demand for stocks, it is assumed that the exchange rate varies inversely by 0.25 per cent. This ratio of 1:0.25 is then used to calculate the change in bond demand.

Purchases of foreign securities put upward pressure on the value of the receiving nation's currency, and thereby create opportunities for covered interest arbitrageurs. Depending on investors' demand elasticities with respect to interest differentials covered arbitrage flows act partly or fully to offset the risk-induced changes in exchange rates.[8]

At the end of a currency region's trading day, any excess supply or demand spills over into the next market, which is assumed to open with a random shock, which is greater than, less than, or equal to the shock expected by investors. Again, this shock (positive or negative) affects the composition of investors' portfolios and the international value of

the domestic currency. Covered interest arbitrageurs react to the new incentives and the market closes only to have the process repeated in the newly opening market.

At the end of the 24-hr trading day (i.e. the close of the North American market), the model changes the spot exchange rate by 0.25 per cent for each 1 per cent change in net demand and assumes that changes in the forward rate compensate for any residual open interest differentials. The end-of-the-day change in a nation's exchange rate is determined by the size of the random shock *relative to other markets*, but the intra-day change is based on the size of the random shock *relative to what investors anticipated*.

When the markets open each day, investors are influenced not only by new random shocks, but also by the memory of the previous days' random shocks. We propagated each random shock forward for the next three days, with diminishing intensity. It is assumed that the currency exchange rate is influenced by 40 per cent of the preceding day's unexpected random shock, 20 per cent of the unexpected shock from two days earlier, and 10 per cent of the unexpected shock three days earlier. These echo effects are small, but are enough to trigger long, self-reinforcing rallies and plunges in exchange rates.

The trajectories that we generated for the euro, the yen, and the dollar seem very realistic. In spite of the short (three day) duration of auto-correlated effects, the model produces considerable movements of exchange rates. There are long periods of stability followed by a tide of international capital flows that cause significant movements away from the original rates (Schulmeister, 1988). If our model correctly portrays the short-term bubbles in foreign exchange markets, then, in contrast to other studies (Fang and Loo, 1994; Yu, 1996; Aggarwal, 1981 changes in stock prices should have significant effects on exchange rates.[9]

We were surprised to get such large, sustained movements away from the original exchange rates. We left out real variables, like exports and imports, that are normally included in an analysis of the foreign exchange markets. Our suspicion is that if we included these, they would make the rallies and declines in exchange rates and dollar value of financial assets even more prolonged and manic-depressive than they already are. We were looking at short-term financial fluctuations only, so we took the unusual step of assuming that exports and imports of goods and services, as well as the net balance on goods and services, would adjust passively to capital flows. Then, carrying on with that approach, we assumed that interest rates, GDP growth rates, fiscal deficits, and exchange-rate regimes do not change. This implies that policymakers are aware of how inefficacious these instruments are, and so refrain from using them.

We also assumed there was no new issuance or retirement of either stocks or bonds during the period. Nor is there new money from savers adding to the demand for stocks and bonds. We left these out to keep our analysis simple, and to highlight the effects of adjustments to portfolios in response to random changes in risk. A major feature of the financial landscape has been the steady drumbeat of new savings flows into stock and bond markets, as savers seek to buy securities. To include these new purchases in the model would add yet another source of volatility, because savers would probably put their new money into the market that looked most promising at that moment. So no new buying power comes in during the time period that our analysis covers, and no buying power leaks out into the market for tangibles. Nor is there any leakage in the other direction, from tangibles to securities. During the time interval we analyze, gold bugs do not give up and sell gold and then use the money to buy securities.

Finally, an investor who sells any one of the assets has only five others to reinvest in, and is presumed to do so immediately. There is no cash held at the end of each day. Cash exists in our analysis only as an intermediate good, which investors own only briefly during each day. At the beginning and end of each day, they are fully invested in stocks and bonds denominated in yen, euros, and dollars.

Implications

Past prices are not supposed to be helpful in predicting future prices.[10] In our results, however, past random shocks have predictable intra-day effects on exchange rates. These effects can be reversed at the end of the day if there is a larger random shock somewhere else in the world. Past information in this model is useful in predicting today's prices, but only if the intra-day (not the day's-end) prices are considered. Our results suggest that technical analysis could be useful, albeit only for intra-day movements, but even with that caveat the result is extraordinary.

Our major result is that long, sustained swings in exchange rates and in the market values of stocks and bonds can result from small, random, initial disturbances. Figures 1–3 in Appendix A show time series results that are typical of our results. In our analysis, exchange rate movements following the advent of the euro are characterized by long stretches of exchange rate stability followed by dramatic, self-reinforcing movements away from *normal* levels. Though these movements are substantial, they cannot be regarded as explosive, because in each case, exchange rates return endogenously to more normal levels.

Intentionally, we assume that only a modest portion of investors has hair-trigger reactions; and we limit the forward propagation of shocks to three days.

Nevertheless, in simulations of 60-day periods, exchange rate fluctuations exceed ± 20 per cent, brought on by gyrations in stock market demand ranging between − 80 and + 200 per cent. The combined movements of exchange rates and stock market demand give rise to significant variations in the value of financial assets and thereby, to variations in wealth exceeding 100 per cent of the annual GDP for Japan, the US, and Euroland.

The results highlight how important it is for economic policymakers to manage investor expectations, with very few effective policy instruments beyond the bully pulpit. Monetary, fiscal, and exchange-rate policies are now harder to manage because they induce international portfolio adjustments. The process modeled here is driven by the daily variations in expectations of over 200 million people who own stocks and bonds directly or via mutual funds. These people are, in the aggregate, unsophisticated and given to acting *en masse*. Their actions tend to snowball, so the increase or decrease in the value of financial assets can be enormous, entirely out of proportion to the change in underlying real output potential. Since these swings influence day-to-day decisions in the real economy, the consequences can be very serious. The sunshine of prosperity can smile on a country, and can depart just as abruptly. This paper sheds a sobering light on this new reality. And the euro appears to magnify the swings.

Notes

1. See Schulmeister (1988).
2. For emerging countries the ratio of financial claims to GDP is one-to-three. Any country with financial claims worth less than 100 per cent of its GDP is classified as *pre-emerging*.
3. If GDP is 100 and financial assets are valued at 500, then a 10 per cent increase in the exchange rate and a 10 per cent increase in asset prices will result in a new financial asset value equal to 605, which is an increase of 105 or 105 per cent of the GDP.
4. See Claessens *et al*. (1995); Dooley (1995); Dornbush (1986); Eichengreen and Fishlow (1995); Eichengreen *et al*. (1995); Garber and Taylor (1995).
5. IFO Institute estimates that transaction costs (e.g. bank commissions, personnel costs, and non-personnel costs) are about 1 per cent of GDP.
6. See Logue (1995).
7. See Schulmeister (1988).
8. See Marthinsen and Miller (1979).
9. For the effect that exchange rates have on stock prices and bi-directional effects, see: Soenen and Hennigar (1988); Bahmani-Oskooee and Sohrabin (1992).
10. See Fama (1970).

Appendix A

Typical Simulation Results

See figures 1–3 below.

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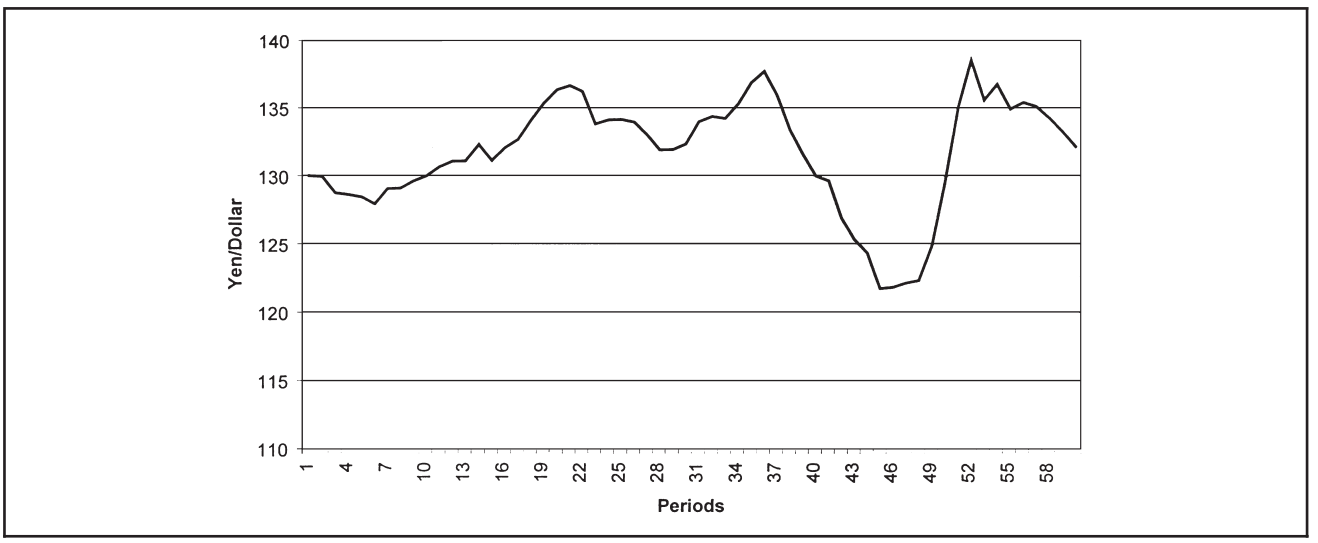


Figure 1 Yen per Dollar over a 60 Day Period

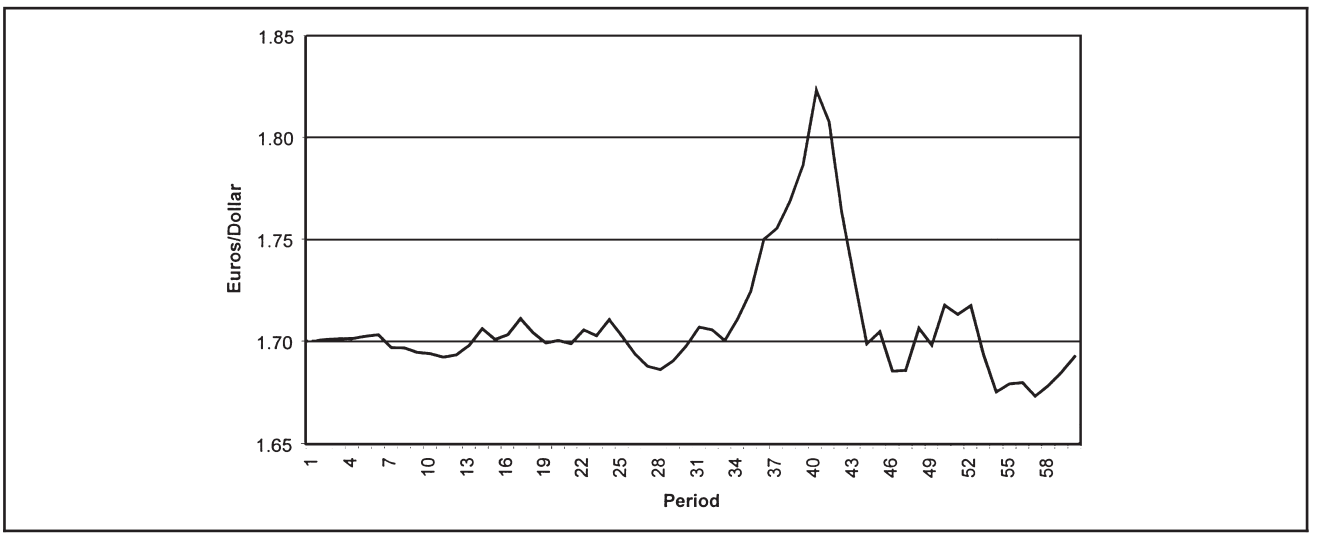
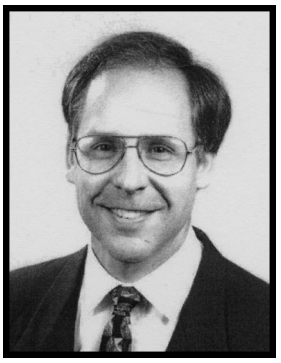


Figure 2 Euros per Dollar over a 60 Day Period

Figure 3 Implied Yen per Euro over a 60 Day Period



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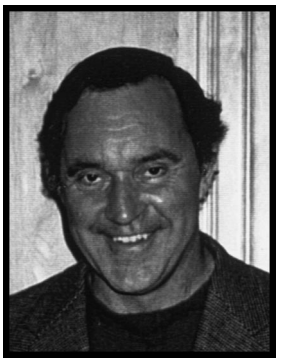

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