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EXCHANGE RATE
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— VOLUME II —

Ronald MacDonald and
Mark P. Taylor

Exchange Rate Economics

Volume II

Edited by

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International Monetary Fund

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Published by
Edward Elgar Publishing Limited
Gower House
Croft Road
Aldershot
Hants GU11 3HR
England

Edward Elgar Publishing Limited
Distributed in the United States by
Ashgate Publishing Company
Old Post Road
Brookfield
Vermont 05036
USA

CIP catalogue records for this book are available from
the British Library and the US Library of Congress

ISBN 1 85278 409 1 (2 volume set)

Printed in Great Britain at the University Press, Cambridge

Exchange Rate Economics
Volume II

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Acknowledgements

The editor and publishers wish to thank the following who have kindly given permission for the use of copyright material.

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Blackwell Publishers for article: Mark P. Taylor (1989), 'Covered Interest Arbitrage and Market Turbulence', *The Economic Journal*, **99**, 376–91.

Butterworth Scientific Ltd for articles: Jeffrey A. Frankel (1982), 'In Search of the Exchange Risk Premium: A Six-Currency Test Assuming Mean-Variance Optimization', *Journal of International Money and Finance*, **1** (3), 255–74; Sebastian Edwards (1982), 'Exchange Rates and "News": A Multi-currency Approach', *Journal of International Money and Finance*, **1** (1), 211–24.

Elsevier Science Publishers B.V. for articles: Laurence S. Copeland (1984), 'Oil News and the Petropound: Some Tests', *Economics Letters*, **16**, 123–7; Ronald MacDonald (1985), 'News' and the 1920's Experience with Floating Exchange Rates', *Economics Letters*, **17**, 379–83; Mark P. Taylor and Patrick C. MacMahon (1988), 'Long-Run Purchasing Power Parity in the 1920s', *European Economic Review*, **32**, 179–97; Jeffrey A. Frankel and Alan T. MacArthur (1988), 'Political vs. Currency Premia in International Real Interest Differentials: A Study of Forward Rates for 24 Countries', *European Economic Review*, **32**, 1083–1121; Jacob A. Frenkel (1978), 'Purchasing Power Parity: Doctrinal Perspective and Evidence from the 1920s', *Journal of International Economics*, **8**, 169–91; Ian Domowitz and Craig S. Hakkio (1985), 'Conditional Variance and the Risk Premium in the Foreign Exchange Market', *Journal of International Economics*, **19**, 47–66; William S. Krasker (1980) 'The "Peso Problem" in Testing the Efficiency of Forward Exchange Markets', *Journal of Monetary Economics*, **6**, 269–76; Edward J. Bomhoff and Pieter Korteweg (1983), 'Exchange Rate Variability and Monetary Policy Under Rational Expectations: Some Euro-American Experience 1973–1979', *Journal of Monetary Economics*, **11**, 170–206; Eugene F. Fama (1984), 'Forward and Spot Exchange Rates', *Journal of Monetary Economics*, **14**, 319–38.

International Economic Review for article: Craig S. Hakkio (1981), 'Expectations and the Forward Exchange Rate', *International Economic Review*, **22** (3), 663–78.

Oxford University Press for article: Ronald MacDonald and Thomas S. Torrance (1990), 'Expectations Formation and Risk in Four Foreign Exchange Markets', *Oxford Economic Papers*, **42** (3), 544–61.

University of Chicago Press for articles: John F.O. Bilson (1981), 'The "Speculative Efficiency" Hypothesis', *Journal of Business*, **54** (3), 435–51; Jacob A. Frenkel and Richard M. Levich (1975), 'Covered Interest Arbitrage: Unexploited Profits?', *Journal of Political Economy*, **83** (2), 325–38; Jacob A. Frenkel and Richard M. Levich (1977), 'Transaction Costs and Interest Arbitrage: Tranquil versus Turbulent Periods', *Journal of Political Economy*, **85** (6), 1209–26; Michael P. Dooley and Peter Isard (1980), 'Capital Controls, Political Risk, and Deviations from Interest-Rate Parity', *Journal of Political Economy*, **88** (2), 370–84; Lars Peter Hansen and Robert J. Hodrick (1980), 'Forward Exchange Rates as Optimal Predictors of Future Spot Rates: An Econometric Analysis', *Journal of Political Economy*, **88** (4), 829–53; Richard A. Meese (1986), 'Testing for Bubbles in Exchange Markets: A Case of Sparkling Rates?', *Journal of Political Economy*, **94** (2), 345–73.

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In addition the publishers wish to thank the library of The London School of Economics and Political Science and The Alfred Marshall Library, Cambridge University, for their assistance in obtaining these articles.

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Part I

Expectations and Market Efficiency

[1]

Excerpt from *Exchange Rate and Trade Instability*, 43–69



Chapter 3

Analysis of Short-Run Exchange Rate Behavior: March 1973 to November 1981*

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The variability of exchange rates among currencies in recent years has been a prominent and troublesome feature of the international monetary system. In this chapter we evaluate two popular views of exchange rate determination that offer alternative explanations for this experience.

The *price dynamics* view emphasizes the role of perceived trends in the formation of traders' expectations. The resulting exchange rate path is only loosely related to fundamental factors and is interpreted in terms of price runs, bandwagons, and technical corrections.

The *efficient markets* view emphasizes the volatility of the economic environment in recent years. The resulting exchange rate path reflects frequent revisions in expectations for factors such as current account balances and rates of inflation. According to this view exchange rates do not follow patterns that could be the basis for profitable private position-taking or the basis for government intervention in exchange markets.

In this chapter we examine daily exchange rate data from March 1973 to November 1981 in order to determine which view of exchange rate determination is more consistent with experience under floating rates. We find that paths for exchange rates do seem to follow patterns and that simple trading rules based on readily available

*The authors wish to acknowledge the contribution of Alice Loftin of the Federal Reserve Board staff, who gathered the data and performed the calculations. Teizo Taya provided helpful comments on an earlier draft. The views expressed herein are solely those of the authors and do not necessarily represent the views of the Federal Reserve Bank of New York or the Federal Reserve System.

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information about past exchange rate changes would have yielded substantial profits. This finding casts considerable doubt on a simple efficient markets model.

Two interpretations of the statistical results are possible. First, exchange markets may have been dominated by participants whose behavior is determined by the price dynamics of the market. The behavior of these market participants has led to patterns in exchange rates over time that are unrelated to fundamental factors and that could have been profitably exploited. The failure of either private or official market participants to take advantage of these opportunities would suggest that the floating rate system could benefit from institutional changes that encourage speculative positions based on this information.

A second interpretation is that these profit opportunities reflect changes in the equilibrium rates of return on assets denominated in different currencies. The possibility that expected rates of return can diverge by substantial and variable margins would also have important implications for our understanding of the floating exchange rate system. This would suggest, for example, that analyses of monetary policies, exchange market intervention policies, current account imbalances, or other factors that might alter equilibrium expected rates of return will provide a better understanding of the behavior of exchange rates.

TWO VIEWS OF EXCHANGE RATE DETERMINATION¹

Exchange rates among major foreign currencies have experienced considerable short-run variability since the inception of generalized floating exchange rates in March 1973. Exchange rate movements of individual foreign currencies against the U.S. dollar of 0.5 percent or more in a single day have been frequent; movements of 2 percent or more have occurred on a few occasions. Moreover, while the variability of daily exchange rates has changed since 1973, there has been no consistent reduction over time. One set of explanations offered for the variability of exchange rates is in terms of the price dynamics of the market. The price dynamics view emphasizes the role of perceived price trends in the formation of exchange traders' expectations. Expectations based on "fundamental factors" are said to be "weakly held," and hence traders are unwilling to take large positions on the basis of them. The resulting exchange rate path is interpreted in terms of price runs, bandwagons, and technical corrections.

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The origins and implications of the price dynamics view are elaborated in the next section.

Another explanation offered for this great (by historical standards) exchange rate variability is that the international monetary system has been subjected to frequent, severe shocks—rampant world inflation, the fall of governments, oil crises, deep and widespread recession, change in exchange controls, and more. These shocks, it is argued, have resulted in frequent revisions of expectations for future exchange rates. Under this view expectations are subject to frequent revision on the basis of small pieces of information, but the market for foreign exchange is “efficient” in taking into account whatever information is available. A weak form of the efficient market hypothesis is that all information contained in the past history of exchange rates is reflected in the current rate. Under this hypothesis bandwagons do not occur, and any attempt to profit from projected trends will fail to yield more than a normal rate of return.

In this chapter an analysis of exchange rates presented in Dooley and Shafer 1976 is extended in order to judge which view of exchange rate determination is more consistent with experience since March 1973. In the 1976 paper several well-known statistical tests were applied to the sequence of daily spot exchange rates for eight foreign currencies over the first 25 months of floating exchange rates. The conclusion was that substantial evidence existed that exchange markets did not behave according to the predictions of a weak efficient market model.²

In the past few years a large number of empirical studies have been conducted employing similar and more sophisticated techniques.³ A common thread in this literature has been the argument that for many reasons a sequence of prices formed in a “speculatively efficient” market might not follow a martingale process.⁴ This qualification was also a major element in the theoretical section of Dooley and Shafer 1976. However, they argued that it was unlikely, on the basis of an informal assessment of the size and nature of the profit opportunities, that such departures would be evident in a foreign exchange market that was speculatively efficient.

If foreign exchange markets were weakly efficient, spot exchange rates would follow a submartingale or supermartingale (depending on whether the exchange rate is expressed as x or $1/x$) if countries have different inflation rates and/or if equilibrium rates of return on assets denominated in various currencies are different. We account for the predictable component of changes in daily spot exchange rates by

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adjusting all exchange rate series for overnight Eurocurrency interest rate differentials or the best available alternative. We assume that any predictable exchange rate changes remaining in the data are not due to equilibrium differences in expected rates of return. We do not need to assume that equilibrium returns are constant but only that they move together across countries. Since we assume that equilibrium rates of return are the same on assets that differ only in their currency denomination, we are testing a joint hypothesis: that expected returns are identical and that exchange rate forecasts are weakly efficient. It is not possible to test market efficiency without putting some restriction on the behavior of expected returns since any time dependence in an exchange rate series can be "explained," or more accurately "defined," *ex post* as reflecting equilibrium rates of return. Nor is it useful to posit that "risk" generates whatever equilibrium returns are needed to ensure that the efficiency hypothesis is impossible to reject. In this study we test the joint hypothesis that equilibrium expected returns are identical across Eurocurrency assets and that exchange rate forecasts are weakly efficient. Other types of restrictions based on models of equilibrium rates of return might be called for if this simple and most obvious restriction leads to a rejection of the joint hypothesis. Since a joint hypothesis is being tested, it can only be concluded that one or both of the hypotheses is not supported by the data. We leave it to further research to determine whether the results are more likely due to the variability of equilibrium rates of return or a lack of efficient speculative activity.

The most surprising finding in Dooley and Shafer 1976 was that simple trading rules yielded substantial profits from March 1975 through October 1975 even when careful account was taken of opportunity costs, in terms of interest rate differentials, and transactions costs. An obvious limitation of this finding is that it is likely that several of the large number of possible trading rules would be profitable purely by chance over the short time then available. This chapter presents out-of-sample results for the same trading rules as well as other statistical tests for October 1975–November 1981. In order to provide results for the samples of about equal length, statistics for the two halves of the "post-1975" sample are also reported. If the profitability of these rules in the earlier time period was due to chance or if the structure of time dependence of exchange rates has changed over time, it would be extremely unlikely that the same rules would continue to yield comparable profits. The profitability of trading rules and the results of other statistical tests changed very little in the out-of-sample time period. The conclusion, therefore, is

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that exchange rates have continued to behave in ways that provide substantial potential for profit.

At a minimum the results suggest that a simple model of exchange rate determination that assumes both speculative efficiency and risk neutrality is not supported by the data. Finally we outline possible explanations for the failure of this model. In particular, further research might focus on an attempt to explain how and why equilibrium rates of return vary over time.

THE PRICE DYNAMICS VIEW

The price dynamics view asserts that prices in speculative markets follow predictable patterns. Several hypotheses concern the behavior of market participants that creates these patterns. Probably the oldest explanation is the "greater fool" hypothesis (MacKay 1841). According to this hypothesis speculators are not concerned with the factors that determine the long-run equilibrium price of a stock, a commodity, or, in the case of exchange markets, a currency. No price is too high as long as a greater fool will pay a higher price tomorrow. Once the price begins to move in one direction, it is argued, a speculative fever will keep pushing the price in that direction as long as the madness of the crowd is expected to last. The speculation feeds on itself.

The "bandwagon" hypothesis is a variant of the greater fool hypothesis. According to this hypothesis a small set of market leaders are known, or thought, to have more accurate information concerning the factors that will affect future prices. When this set of market participants buys or sells, generating a price change, a signal is provided to other market participants to jump on the bandwagon. The followers are thought generally to overshoot the new equilibrium price. The price dynamics implied by this hypothesis, therefore, involves successive changes in one direction followed by partial reversals. To quote a prominent banker-economist:

Once a currency begins to fall, then the other banks join in the selling pressure, pushing the currency down further. The momentum can gather ground very quickly as the market trend becomes self-fulfilling assuming that no institutions are willing to take the opposite view. And many banks have concluded (quite correctly in the short term) that by following the pack it is easy to pick up profits; or, if they do not respond to the market movement they are exposed to the danger of serious currency losses. It is only when a currency has fallen (or risen) by a very great amount that the pressure of selling (or buying) stops and is reversed. (Bell 1974)