This PDF is a selection from an out-of-print volume from the National Bureau of Economic Research

Volume Title: The Microstructure of Foreign Exchange Markets

Volume Author/Editor: Jeffrey A. Frankel, Giampaolo Galli, Alberto Giovanni editors

Volume Publisher: University of Chicago Press

Volume ISBN: 0-226-26000-3

Volume URL: http://www.nber.org/books/fran96-1

Conference Date: July 1-2, 1994

Publication Date: January 1996

Chapter Title: List of Contributors, Indexes

Chapter Author: Jeffrey A. Frankel, Giampaolo Galli, Alberto Giovannini

Chapter URL: http://www.nber.org/chapters/c11370

Chapter pages in book: (p. 333 - 348)

Contributors

Fabio Bagliano
Università di Torino
Dipartimento di Scienze Economiche e
Finanziarie
C.so Unione Sovietica 218bis
10134 Torino, Italy

Andrea Beltratti
Università di Torino
Dipartimento di Scienze Economiche e
Finanziarie
C.so Unione Sovietica 218bis
10134 Torino, Italy

Giuseppe Bertola
Dipartimento di Scienze Economiche e
Finanziarie
Università di Torino
C.so Unione Sovietica 218bis
10134 Torino, Italy

Lorenzo Bini-Smaghi European Monetary Institute Kaiserstrasse 29 Frankfurt a.M. D-60311, Germany

Zhaohui Chen London School of Economics University of London Houghton Street London WC2A 2AE, United Kingdom Bernard Dumas
Department of Finance
HEC School of Management
78351 Jouy-en-Josas Cedex, France

Barry Eichengreen Department of Economics 540 Evans Hall University of California Berkeley, CA 94720

Mark D. Flood Department of Finance Concordia University 1455 De Maissonneuve Blvd. West Montreal, QC H3G 1M8, Canada

Robert P. Flood Research Department International Monetary Fund 700 19th Street NW Washington, DC 20431

Silverio Foresi Department of Finance Stern School of Business New York University 44 West 4th Street New York, NY 10012

Jeffrey Frankel University of California Department of Economics 549 Evans Hall, Room 3880 Berkeley, CA 94720 Giampaolo Galli Direttore Centro Studi Confindustria Viale dell' Astronomia 30 00144 Roma, Italy

Peter M. Garber
Department of Economics, Box B
Brown University
64 Waterman Street
Providence, RI 02912

Alberto Giovannini Lungotevere Amaldo da Brescia, 11 00197 Roma, Italy

Charles Goodhart London School of Economics University of London Houghton Street London WC2A 2AE, United Kingdom

David A. Hsieh The Fuqua School of Business Duke University Durham, NC 27705

Takatoshi Ito Research Department International Monetary Fund 700 19th Street NW Washington, DC 20431

Philippe Jorion Graduate School of Management University of California, Irvine Irvine, CA 92717

Alan Kirman
Department of Economics
European University Institute
I-50016
San Domenico di Fiesole
Florence, Italy

Allan W. Kleidon Comerstone Research 1000 El Camino Real Menlo Park, CA 94025 Richard K. Lyons Haas School of Business 350 Barrows Hall University of California Berkeley, CA 94720

António Mello Banco de Portugal Rua Febo Moniz, 4 1100 Lisboa, Portugal

Richard Payne
London School of Economics
Financial Markets Group
University of London
Houghton Street
London WC2A 2AE, United Kingdom

William Perraudin
Department of Economics
Birkbeck College
University of London
7-15 Gresse Street
London W1P 1PA, United Kingdom

Andrew K. Rose School of Business Administration 350 Barrows Hall University of California Berkeley, CA 94720

Michael G. Spencer Research Department IS 12–808 International Monetary Fund Washington, DC 20431

Antti Suvanto Bank of Finland Monetary Policy Department PO Box 160 FIN-00101 Helsinki, Finland

Lars E. O. Svensson
Institute for International Economic
Studies
Stockholm University
10691 Stockholm, Sweden

Mark P. Taylor Department of Economics University of Liverpool Liverpool L69 3BX, United Kingdom José Viñals Banca de España Alcalá, 50 28014 Madrid, Spain

Paolo Vitale 308 Kings College Cambridge CB2 1ST, United Kingdom Charles Wyplosz INSEAD Boulevard de Constance 77305 Fontainebleau Cedex, France

Author Index

Abramovitz, M., 81n4 Bollerslev, Tim, 6, 24, 27, 42, 43, 44n4, 45, Adams, P., 30n12 48, 54, 56-57, 124, 129n19, 134, 137, 155, 190 Adler, Michael, 236n5, 263 Admati, A. R., 41, 42n1, 43, 47, 54, 55-58, Boothe, Paul, 6 65, 137, 139, 153, 184 Bossaerts, P., 73 Brady Commission, 8, 209n1 Allen, Helen, 13, 286 Alogoskoufous, George, 314n14 Branson, William H., 268n5, 269 Alonso, Javier, 322n21 Brock, W. A., 55n13, 56, 61n18 Amihud, Y., 62 Burnham, J. B., 44n4, 47 Canina, L., 35 Backus, David K., 267 Chan, K. C., 62 Bagehot, W. (pseud.), 54 Chesney, M., 30 Baillie, R. T., 124 Banerjee, A., 104 Cheung, Yin-Wong, 264 Chiang, Raymond, 213n8 Bank for International Settlements (BIS). Christie, W. G., 62 108n2, 180, 211n3, 212, 213nn8,9, 218, 220-21n17 Clark, P., 22 Cohen, K., 130n20 Bank of England, 211n3, 314t Bank of Italy, 246 Commodity Futures Trading Commission (CFTC), 211n3 Banque de France, 314t Barclay, M. J., 42n1 Cookson, Richard, 215 Batten, J., 23 Copeland, T., 76 Baxter, Marianne, 273, 285 Cornell, B., 22, 25 Beckers, S., 29 Crnja, Z., 60n15 Cumby, Robert E., 281n18 Bensaid, Bernard, 314n13 Bessembinder, H., 6, 24, 112, 129n19, 134, Curcio, R., 129n19 153, 155 Bhar, R., 23 Dacorogna, M. M., 140 Biais, B., 75 Decupere, Danny, 13 Bikhchandani, S., 104 De Grauwe, Paul, 13 Bilson, John F. O., 267, 276 De Long, J. Bradford, 5 Black, Fisher, 29 Demos, A., 114 Blitz, J., 107, 108 Demsetz, H., 203

Gennotte, Gerard, 9, 43n2, 209n1

Deutsche Bundesbank, 211n3 Ghysels, E., 39 Dickey, D., 29 Giovannini, Alberto, 11, 276, 303 Dimson, E., 135 Glass, G. R., 117 Glassman, Debra, 6, 24, 153 Dini, Lamberto, 11 Dixit, Avinash, 324 Glosten, L. R., 74, 79, 84, 86, 99, 187 Goldstein, Morris, 211n3, 212nn5,6, 217n14. Dominguez, Kathryn M., 269 Domowitz, Ian, 6, 42, 43, 44n4, 45, 48, 54, 222n19, 303, 312 56-57, 108, 124, 137, 190, 276 Goodhart, Charles A. E., 5, 13, 44n4, 45n7, Donders, M. W. M., 40 89, 114, 125, 129n19, 186, 190, 286 Dornbusch, Rudiger, 236n5, 265, 266n3, 267, Goodman, S., 13 281n18, 285 Grabbe, O., 213n8 Duan, J.-C., 30 Grammatikos, T., 22 Dumas, Bernard, 213n8, 236 Griffiths, M. D., 135 Gros, Daniel, 11, 304 Grossman, Sanford J., 9, 56n14, 73, 209n1 Easley, D., 25, 38n1, 79, 86, 183, 198 Ederington, L. H., 40, 125 Group of Ten (G-10), 8, 222n19 Eichengreen, Barry, 232n2, 246, 303, 305, Group of Thirty, 211n3 307, 314n13, 320n17, 321, 328 Engle, R., 27 Hakkio, Craig, 276 Engle, Robert F., 286n21 Halttunen, Hannu, 269 Hansch, O., 62 European Parliament, 303 Hansen, Lars P., 276 Hasbrouck, J., 112, 137, 138, 163-66, 185 Fama, Eugene, 275, 286 Federal Reserve System: Board of Governors. Hausman, J., 185 Henderson, Dale W., 268n5 211n3; Federal Reserve Bank, New York, 194 Heston, S., 31 Fialkowsky, D., 114 Hillion, P., 73 Fieleke, Norman, 5, 324n22 Hirshleifer, David, 104 Figlewski, S., 35 Ho, T. S. H., 62, 137, 138, 199 Figliuoli, L., 5, 44n4, 45n7, 89 Hodrick, Robert J., 275n12, 276, 281 Flood, M. D., 73, 110, 184n1 Hooper, Peter, 274n11 Flood, Robert P., 266n3, 285, 285-86n20, 320 Hsieh, D., 27n11, 102 Folkerts-Landau, David, 211n3, 212n5 Hull, J., 30 Hull, John C., 214n10 Foster, F. D., 43n3, 56, 153 Frankel, Jeffrey, 4, 5, 11, 13, 24, 25, 59, 60, 104, 231, 236n5, 261, 264, 267, 268, International Monetary Fund (IMF), 230, 269, 272, 274n11, 276, 285, 286 Ito, Takatoshi, 5, 286n21 Freedman, R., 42n1 Freitas de Oliveira, Luis F., 323 French, K., 5, 156 Jacklin, C., 43n2 Frenkel, Jacob, 39, 263, 264, 267, 281n18 Jasiak, J., 39 Friedman, Milton, 274 Jeanne, Olivier, 314n13 Froot, Kenneth, 4, 5, 13, 24, 59, 104, 275, Jennergren, Peter, 213n8 276, 285, 286, 325 Johnson, Harry G., 263 Fuller, A., 29 Jorion, Philippe, 25, 30n12, 276 Galai, D., 76 Karpoff, J., 22n2 Garbade, Kenneth D., 99 Kirman, A. P., 104 Garber, Peter, 301, 320, 322n19 Kleidon, A. W., 43n2, 55n13, 56, 60nn15,16, Garman, Marc, 9, 41, 59, 62, 65, 102, 213 61n18, 63, 102 Kohlhagen, Steven, 9, 213 General Accounting Office (GAO), 210n2, 211n3 Kroner, Kenneth, 213n8

Krugman, Paul, 9, 13, 73, 285n20

Obstfeld, Maurice, 230, 281n18, 304n1, 320, Kurz, M., 104 Kyle, Albert, 55 321n17 Officer, Lawrence H., 277n14 Lai, Kon S., 264 O'Hara, M., 25, 38n1, 62, 79, 86, 183, 185, Lamoureux, C., 32, 35 Lastrapes, W., 32, 35 Okunev, John, 213n8 Leach, C., 164 Oldfield, G. S., 62 Lease, R., 138 Ord, J. K., 135 Lee, C. M. C., 114 Ozkan, F. Gulcin, 304n1 Lee, J. H., 40, 125 Lehmann, Bruce, 263 Page, J., 138 Leland, Hayne, 9, 25n6, 43n2, 209n1 Perraudin, William R., 213n8 Levich, Richard, 39 Petersen, M. A., 114 Lewis, K. K., 60, 104, 269, 276 Pfleiderer, P., 42n1, 43, 47, 54, 55-58, 65, Lin, Wen-Ling, 286n21 137, 139, 153, 184 Linde, Luis M., 322n21, 323f Pictet, O. V., 115 Litzenberger, R. H., 42n1 Pitts, M., 6, 21, 22, 23, 27 Lo. A., 185 Pomrenze, Jay L., 99 Lothian, James R., 264 Lucas, Robert E., Jr., 269 Ready, M. J., 114 Lyons, R., 5, 6, 24n4, 25n5, 44nn4,5,6, 47, Reuters, 191 54n12, 62, 73, 103, 109, 110, 118, Richardson, M., 23n3 155n28, 181, 184n1, 185, 186, 189, 195, Rogoff, Kenneth, 10, 11, 267, 268, 273, 274, 202, 204, 230, 286 276, 305n3, 325 Roley, V. Vance, 5 MacDonald, Ronald, 261, 262n1, 268, 274, Roll, R., 5, 137, 156 277n14 Romer, D., 43n2 McInish, T. H., 135, 140 Rose, Andrew. 11, 59, 60, 231, 246, 261, 285, MacKinlay, C., 185 305, 307, 320n17, 328 McKinnon, Ronald, 5 McMahon, Patrick C., 264 McNown, Robert, 264 Saunders, A., 22 Madhavan, A., 155n28, 164, 185, 203 Schulmeister, Stephen, 13 Manaster, S., 185 Schultz, P. H., 62 Scott, E., 25, 26n8 Mann, S., 185 Mark, Nelson C., 264, 274 Scott, L., 30 Marston, Richard C., 285 Securities and Exchange Commission (SEC), 209n1 Masson, Paul R., 268 Masulis, R., 138 Sharfstein, D. S., 105 Shastri, K., 30n12 Meese, Richard A., 10, 267, 273, 274, 305n3 Melino, A., 30n14, 213n8 Silber, William L., 99 Melvin, Michael, 6, 24, 124, 129n19, 134, 155 Smidt, S., 155n28, 185, 203 Mendelson, H., 62 Smith, T., 23n3 Milgrom, P. R., 74, 79, 84, 86, 99, 187 Son, G., 62 Miller, M. H., 56n14 Sorenson, Bent E., 213n8 Spencer, Michael, 301 Miller, Marcus, 13, 73 Morton, John, 274n11 Srinivas, P. S., 38 Müller, U. A., 140 Stegun, I. A., 81n4 Mussa, Michael, 273, 281n18, 303 Stein, J. S., 104 Stigler, G. J., 203 Naik, N., 62, 75, 213n8 Stock, J., 39, 163 Näslund, Bertil, 213n8 Stockman, Alan C., 269, 270n8, 272, 273, Neuberger, A., 75 285

Stoll, H., 62, 199 Stoughton, N., 30n12 Subrahmanyam, A., 42n1, 43, 47, 54, 55–57 Sultan, Jahangir, 213n8 Sutherland, Alan, 304n1 Suvanto, A., 68, 70, 103 Svensson, Lars E. O., 297, 299, 300f

Tandon, K., 30n12
Tauchen, G., 6, 21, 22, 23, 27
Taylor, Mark, 13, 261, 262n1, 264, 268, 274, 281, 286, 322n19
Thaler, Richard, 275
Throop, Adrien W., 274
Thygesen, Niels, 11, 304
Tobin, James, 5, 262, 330
Truman, Edward, 304
Tucker, A., 25, 26n8

Turnbull, S., 30n14, 213n8

Viswanathan, S., 43n3, 56, 62, 75, 153 Vorst, T. C. F., 40

Wallace, Myles, 264

Warner, J. B., 42nl
Wei, Shang-Jin, 6, 25
Welch, I., 104
Werner, I. W., 63
White, A., 30
White, H., 26
White, R. W., 135
Wiggins, J., 30
Wood, R. A., 135, 140
Wyatt, S., 30n12
Wyplosz, Charles, 11, 232n2, 246, 303, 305, 307, 309n10, 314n13, 320n17, 321, 328

Zhou, B., 124 Zhou, Z., 73

Subject Index

- Admati-Pfleiderer asymmetric information model, 55-58
- Arbitrage: avoidance, 203-5; conditions in foreign exchange trading for, 69-70; opportunities before ERM crisis, 230
- Asset market models: characteristics of macro, 2; problems of macro, 2-3
- Asset markets: approach to exchange rate research, 1-2; simplifying assumptions of, 2
- Asymmetric information: costs of bid-ask spreads, 24; data for analysis of foreign exchange market, 45-47, 62; in foreign exchange market microstructure, 4-6, 41-42; in interdealer trading, 102-4
- Asymmetric information models: analysis of volatility using, 42–43; differences of recent models from standard, 43; standard, 54–58, 60–63
- Balance-of-payments data: to analyze heterogeneous behavior, 254; shortcomings, 254-55
- Black model of European options on futures, 29-30
- Black-Scholes option pricing model, 30-31, 39-40
- Bollerslev-Domowitz asymmetric information model, 56-57
- Brokers: in currency market, 108; role in decentralized markets, 89; role in foreign exchange markets, 73-74

- Capital controls: evidence during speculative attacks of, 307–11; expansionary macroeconomic policies with, 329–30; relation to balance-of-payments crises, 319
- Central banks. See Intervention, central bank Currency markets: dynamic hedging in, 209; speculation, 311–19; swaps, 209
- Currency risk: hedging, 209; with increased volatility, 21–22; management by fund managers, 216–17
- D2000-2. See Reuters D2000-2 dealing
- Data: characteristics of foreign exchange transactions data, 135–39; Reuters D2000-2 dealing system, 116, 124, 139–58; Reuters indicative quote system (FXFX), 116, 139–58, 181
- Data sources: for analysis of asymmetric information, 44–47, 59; analysis of foreign exchange market risk and turnover, 26; direct and brokered interdealer, and customer trading, 181; for index of speculative pressure, 305–7; for relation between exchange rate movements and macro fundamentals, 277, 280–81, 287; for Reuters D2000-2 analysis, 109–12; for transaction price model, 190–94
- Dealers: in hot potato metaphor, 184; influence of information arrival on decisions, 68-70; in static and dynamic models of

- Dealers (continued)
 - interdealer trading, 75-88, 99-101. See also Marketmakers; Traders
- Dealing: automatic trading system. 113-14; electronic systems. 108, 181; in Reuters D2000-2, 114-24; study of relation to price revision, 163-65. See also Reuters D2000-2 dealing system; Reuters Dealing 2000-1
- Delta, or hedge ratio: conditions for increased, 221; of a currency put option, 215, 221-22; role in dynamic hedging, 223
- Derivations, transaction price model, 200–201 Derivatives: exchange-traded, 211–12; exchange-traded interest rate contracts, swaps, options, and forwards, 211; foreign exchange swaps, forwards, and options, 211; growth of market in, 210;

option-pricing methods to construct, 209;

Efficient markets hypothesis: expectations component, 276; random walk transaction prices, 135; risk neutral, 275–76

stock index, 211

- Electronic Banking Service (EBS), 108 EMS. See European Monetary System (EMS) EMU. See European monetary union (EMU)
- Equilibrium model of exchange rates: allowances and intent, 262; empirical evidence, 272–73; real and nominal exchange rates in, 270–73; simple model, 270–72
- ERM. See Exchange rate mechanism (ERM)
 European Monetary System (EMS): ERM crises (1992), 8, 232–33; exchange rate regime with narrow band (1992), 232. See also Exchange rate bands; Exchange rate mechanism (ERM)
- European monetary union (EMU), 303-4, 319-21, 324-26
- Event-uncertainty view: intertransaction time signals, 187; of trading intensity, 8, 183– 84, 206
- Exchange rate bands: with fixed rate regimes, 297; under Maastricht Treaty conditions, 320
- Exchange rate mechanism (ERM): dynamic hedging sales in 1992 crisis, 223n21; exchange rate depreciation within bands, 297-98; interest rate differentials leading

- up to crises, 230; Italy and Britain abandon (1992), 232–33; narrow band fixed exchange rate (1990), 232; proposal to preserve stability, 331; under terms of Maastricht Treaty, 320
- Exchange rate models: asset market macro models, 2–3; based on macroeconomic theory fundamentals, 262–74; criticism of macroeconomic approach, 285–87; forecasting with macro-based models, 273–74; support for macroeconomic approach, 277–84
- Exchange rate regimes: predictions with fixed rates, 297; predictions with floating rates, 296–97; related to equilibrium model of exchange rates, 273; speculative pressure against fixed rate, 219–25
- Exchange rates: as flexible price in monetary model of exchange rates, 264-65; movements related to macroeconomic fundamentals, 277-84, 286-87; real and nominal rate in equilibrium model, 270-71; speculative attacks on, 305
- Expectations: component in efficient market hypothesis, 276; in exchange rate market turnover, 21; formation in transaction price model with time, 187–88
- Flexible-price monetary model. See Monetary model, flexible-price exchange rates
- Forecasts: bid-ask spreads as forecast of volatility, 33t, 34; GARCH model to forecast volatility, 31t, 32-33, 39-40; information content to forecast volatility, 32-34; with monetary exchange rate models, 273-74
- Foreign exchange: hedging exposure of, 212-13; in hot potato hypothesis of order-flow information, 187; optionpricing formula, 213-14. See also Prices, foreign exchange: Spreads, bid-ask
- Foreign exchange market: bid-ask spread in centralized and decentralized, 83; changing patterns of activity, 19–20; correlation of turnover and volatility, 19–21; crashes in decentralized, 84–86, 99; dealing banks in, 217–18; decentralized, 7, 74–75, 87–89, 185; distinction between brokered and direct trading, 180–81; efficiency in centralized and decentralized, 83–84; growth of, 19–20; intermarket connections with overlapping time zones,

70-71; marketmakers and retail market in, 44; microstructure analysis, 73; microstructure research, 286; noise trading and learning models of, 59-60, 66; price determination in, 1; research in speculative efficiency, 286; speculative efficiency literature, 274; study of microstructure, 3-4. See also Currency markets; Currency risk; Interbank foreign exchange market; Prices, foreign exchange; Risk; Risk management; Risk premium; Spot foreign exchange market

Futures market: contracts, 209; source of daily volume information, 19

GARCH model: to forecast market volatility, 31t, 32-33, 39-40; to measure foreign exchange market volatility, 27-28

Garman/Kohlhagen option-pricing formula, 213-14, 218

Globex trading system, 108

Glosten-Milgrom theory of microstructure, 7

Hedge ratio. See Delta, or hedge ratio
Hedging: cross-hedges, 217; instruments, 209;
money market hedges, 227; rolling
hedges, 227; against short-term exchange
rate movements, 216. See also Delta, or
hedge ratio

Hedging, dynamic: banks' use of techniques, 217–19; in crisis, 219–24; defined, 214; influence on trading volume and price movements, 219; during managed or fixed rate regime, 222–25; option pricing and delta hedging, 8–9, 215, 221–23; option-pricing theory in, 213

Heterogeneity: in foreign currency crises, 9-10; of information, 69-70; in market behavior leading to ERM crisis, 230; in market microstructure perspective, 4-5; model of various agents' behavior, 234-35, 253-54; as research topic in microstructure of foreign exchange, 295

Hot potato view: clumped trading relation to, 197: intertransaction time signals, 187; of trading intensity, 8, 183-84, 206

Illiquidity, 219-24

Imperfect information aggregation models, 59-61

Implied standard deviation (ISD): as best estimate of future volatility, 21, 34-35;

Black-Scholes model as approximation to, 31, 39–40; to explain bid-ask spreads, 35; as predictor of future volatility, 25, 33

Information: in asset markets, 2–3; daily equilibria related to, 21; efficient processing of, 4–5; flow over time in transaction price model, 186–87; in forecasts of volatility, 32–34; heterogeneous, 69–70; in implied standard deviation of volatility, 25; of marketmakers in decentralized market, 74, 87–89; marketmakers' sale of, 87–89; nonprice, 204–5; price in transaction price model with time, 186–87; in static and dynamic models of interdealer trading, 75–88, 99–101. See also Asymmetric information; Imperfect information aggregation models; Information flow model

Information flow model: assumptions, 75–77; bid-ask spreads in centralized and decentralized markets, 83; dynamic model, 81; efficiency of centralized and decentralized markets, 83–84; filtering, 78–79; information rents, 79–80; martingale properties and volatility, 86–87; static form, 77–78, 84; value of information propositions, 82–83

Instinet trading system, 108

Interbank foreign exchange market: characteristics of, 45–47; components of, 44–45; trading, 74

Interest rates: derivative instruments of, 211; differentials in pre-ERM crisis period, 230; effect of hedging strategies on defense of, 210, 219–20; in performance of uncovered interest rate parity, 281–83; raised in defense of fixed exchange rate, 220–25; smoothing within exchange rate bands, 297–300, See also Uncovered interest rate parity

Intervention, central bank: effect of hedging strategies on, 210; during ERM crisis, 233; microstructure research of sterilized, 300–301; as research topic in microstructure of foreign exchange, 295; during speculative pressure, 306; with speculative pressure against currency, 219–25. See also Capital controls; Speculative attacks

Inventory: inventory-based models, 61-62; inventory-carrying costs of bid-ask spreads, 24

- Kolmogorov-Smirnov test, 307–11, 318 Kruskal-Wallis test, 307–11, 318
- Lamoureux-Lastrapes model, 32, 33, 35 Learning models: asymmetric information in foreign exchange, 43-44, 59-60; to validate assumptions, 66
- Liquidity: effect with central bank defense of interest rate, 219-24; in foreign exchange markets, 4-6; in standard asymmetric information models, 54-58; trading, 184, 186-87. See also Illiquidity
- Maastricht Treaty on European Union, 304; provision for Intergovernmental Conference (1996), 322; qualifications for participation, 320
- Macroeconomic variables: behavior with capital controls, 305; tests for equality of distribution, 307-11, 318
- Marketmakers: in decentralized foreign exchange market, 74; sale of information in interdealer market, 87-89; in transaction price model, 203-4. See also Brokers; Dealers; Traders
- Market microstructure, 41, 65; correlation of trading volume and volatility, 4-5; Glosten-Milgrom theory of, 7; proposed research topics in, 12, 286, 295-96; reasons to study, 2-4
- Market microstructure models. See Information flow model; Trading model, interdealer
- Martingale properties of price: in decentralized market, 74; relation to volatility, 86-87
- Microstructure, market. See Market microstructure
- Minex dealing system, 108
- Mixing variable of information arrival: measurement of volatility with, 39; role in volume-volatility model, 38-39. See also Mixture of distribution hypothesis (MDH)
- Mixture of distribution hypothesis (MDH): assumptions, 22; correlation of unexpected risk and volume model, 21; volatility-volume relation, 22-24, 31-34. See also Mixing variable of information arrival
- Monetary model, flexible-price exchange rates: assumptions, 262; empirical evidence, 267-68

- Monetary model, sticky-price exchange rates: additions and allowances, 262; characteristics, 265; convergent saddle path, 266, 267f; empirical evidence, 267-68; monetary shocks, 266-67
- Noise trading: models of, 59; as research topic in foreign exchange microstructure, 295; volatility and trading volume interaction, 5
- Option pricing: methods in dynamic hedging strategies, 209; put pricing formula, 213-16
- Option-pricing model, 29. See also Implied standard deviation (ISD)
- Options: exchange-traded, 209; over-thecounter (OTC), 209, 218; put delta value, 215; with stochastic volatility, 30–31
- Order-processing costs, bid-ask spreads, 24 Over-the-counter (OTC) markets: exchangetraded derivatives, 211; options, 209, 212, 218
- Peso problem, 276, 299
- Portfolio balance model of exchange rates: empirical evidence, 269; specifications, 262; substitutability of domestic and foreign assets in, 268-69
- Predictions: of floating- and fixed-rate regimes, 296-97; of macro exchange rate models, 3
- Prices, foreign exchange: D2000-2 and FXFX bid and ask transactions data, 135-58; determination, 1; formation in imperfect information aggregation models, 60; indicative quotes, 110, 113, 190; intertransaction time signals, 186-87; model of transaction prices with time, 185-90; of options with stochastic volatility, 30-31; in Reuters D2000-2 system, 114-24; volatility of bid-ask spreads, 24. See also Asymmetric information; Delta, or hedge ratio; Hedging; Hedging, dynamic; Information; Martingale properties of price; Spreads, bid-ask; Transaction price model
- Purchasing power parity (PPP): as exchange rate model, 263-64; regression of exchange rate movements and macro fundamentals, 288-90; relation between exchange rate movements and macro

fundamentals, 277-80, 286-87, 294-95

Put pricing. See Option pricing

Random walk: of asset prices, 137; efficient markets hypothesis, 135; of real exchange rates, 10-11

Rational bubbles, 276

Regime shifts, learning about, 276

Regularity of trading volume and volatility correlation, 4

Research: asset market approach for exchange rates, 1-2; in central bank intervention, 295; market microstructure, 12, 286, 295-96; noise trading suggestion for, 295: proposed future, 12-13; suggestion to study heterogeneity, 295

Reuters D2000-2 dealing system: brokered interdealer trading data, 180; characteristics of, 113-24; comparison with FXFX, 124-35; conditional heteroskedasticity in, 158-63; data from interdealer trading, 167-77f; development and competition of, 107-8

Reuters Dealing 2000-1: dealer direct quotes and trades, 191-92; for direct trading, 181

Reuters indicative quote system (FXFX): comparison with Reuters D2000-2 dealing system, 124-35; data, 44-45, 66-67, 71, 116, 139-58, 181; shortcomings, 110, 190

Risk: with high volatility, 21-22; model of relation to turnover, 22-24

Risk management: of bank foreign exchange books, 217-19; dynamic hedging techniques used by banks, 217-18; by fund managers, 216-17; Garman/Kohlhagen option pricing formula, 213-16; trading limits as, 194

Risk premium: assumption in portfolio balance model of exchange rates, 269; influence on uncovered interest rate parity, 275; risk aversion in models of, 276

Speculative attacks: behavior of macroeconomic variables with, 305; evidence on capital controls during, 307–8; mechanics of, 311–19, 321; proposal to deter, 321– 24, 330

Speculative pressure: under fixed exchange rate regime, 219–25; during transition to EMU, 319–24

Speculative pressure index, 305-6
Spot foreign exchange market: ratio of dealer to customer trades, 180; trading in bid and ask dealing systems analysis, 180; trading volume in, 180, 194-95

trading volume in, 180, 194–95

Spreads, bid-ask: comparison of regressions on, 32t, 33–34; in decentralized market, 74–89; difference in cross-market midquote variance, New York–London, 53–54; difference in mid-quote variance, New York–London of fifteen-minute intervals), 48, 52; distribution of New York–London daily, 48, 51f; with expected and unexpected trading volume, 25; forecast of volatility, 33t, 34; with price volatility, 24; relation to volatility and volume, 24–25; standard deviations of New York–London, 48, 51f; types of costs, 24

Sticky-price exchange rate model. See Monetary model, sticky-price exchange rates Stochastic volatility models, 30–31 Subrahmanyam asymmetric information model, 55–58

Tauchen-Pitts model of turnover and risk, 21, 33

Touch, the, 110

Traders: in models of imperfect information aggregation, 59-63; in standard asymmetric information models, 54-58; in static and dynamic models of interdealer trading, 75-81, 99-101. See also Dealers; Marketmakers

Trading: brokered and direct, 180–81; day trading, 61, 68–69; event-uncertainty view of intensity, 183–84, 187; hot potato view of intensity, 183–84, 187; interdealer trade and information flow model, 75–81; on International Money Market futures market, 194–95; limits, 194; microstructure analysis, 41; relation of activity to bid-ask spread, 24–25; screen- and voice-based, 180–81. See also Eventuncertainty view; Hot potato view

Trading, liquidity: effect of trader clumping of, 184; hot potato hypothesis, 186-87

Trading model, interdealer: assumptions, 75–77; bid-ask spreads in centralized and decentralized markets, 83; dynamic model, 81; efficiency of centralized and decentralized markets, 83–84; filtering,

- Trading model, interdealer (continued) 78-79; information rents, 79-80; martingale properties and volatility, 86-87; static form, 77-78, 84-85; value of information propositions, 82-83
- Trading systems, electronic, 108-9
- Trading volume: ARMA time-series model for, 28-29; correlation with volatility, 4-5; as measure of trading activity, 25; measurement of futures market, 38; regularity of correlation with volatility, 4-6
- Transaction price model: estimates of order flow information content, 195–96; formation of expectations, 187–88; with role for intertransaction time, 185–86
- Turnover: heterogeneous expectations in, 21; relation to risk, 22-24

- Uncertainty: as determinant of bid-ask spread, 24; event-uncertainty view, 8, 183-84, 187
- Uncovered interest rate parity: as condition for exchange rate market efficiency, 274-76; conditions for rejection of, 299; relation between exchange rate movements and macro fundamentals, 280-83, 286-87; in sticky-price model of exchange rates, 265
- Volatility, 47–50; correlation with trading volume, 4–6; GARCH model of, 27–28; implied volatilities, 29–31; stochastic, 30–31; time-series model for, 27–28. See also Implied standard deviation (ISD); Noise trading

JEFFREY A. FRANKEL is a research associate of the National Bureau of Economic Research, where he is also director for International Finance and Macroeconomics. He is also professor of economics at the University of California, Berkeley. GIAMPAOLO GALLI is chief economist of the Confederation of Italian Industry in Rome. When this book was written, he was head of the International Section of the Research Department of the Banca d'Italia. ALBERTO GIOVANNINI is a research associate of the National Bureau of Economic Research, a research fellow of the Centre for Economic Policy Research, and senior adviser of Long Term Capital Management, L.P.

An NBER Conference Report

For information on books of related interest or for a catalog of new publications, please write:

Marketing Department The University of Chicago Press 5801 South Ellis Avenue Chicago, Illinois 60637 U.S.A.

Printed in the U.S.A.

Books of Related Interest

The Internationalization of Equity Markets

Edited by JEFFREY A. FRANKEL

This timely volume addresses three important recent trends in the internationalization of equity markets: extensive market integration through foreign investment and links among stock prices around the world; increasing securitization as countries such as Japan come to rely more than ever before on markets in equities and bonds at the expense of banks; and the opening of national financial systems of newly emerging markets to international financial flows and institutions, as governments remove capital controls and other barriers.

An NBER Project Report

Studies in International Taxation

Edited by Alberto Giovannini, R. Glenn Hubbard, and Joel Slemrod

This volume presents pioneering empirical research on how taxes affect the investment and financing decisions of multinational corporations in today's global economy. The authors examine international financial management, business investment, and international income shifting. They discuss the form of ownership of foreign corporate equity, the impact of tax incentives on R&D activities, and the fact that foreign companies in the United States pay lower taxes than do domestic companies.

An NBER Project Report

The Political Economy of American Trade Policy

Edited by Anne O. Krueger

Eight analytical histories explore the political and economic determinants of trade protection, providing a wealth of information on key American industries to document the process of seeking and conferring protection. Also included is a cross-section study of the determinants of administered protection and a concluding essay that suggests that current protection practices fail to consider adequately economic efficiency, the public good, and a wide range of indirect negative economic effects.

An NBER Project Report

The University of Chicago Press

