

Contents

| | |
|--|-----------|
| Preface | xiii |
| Introduction | xvii |
| 1 Evidence on Money, Prices, and Output | 1 |
| 1.1 Introduction | 1 |
| 1.2 Some Basic Correlations | 1 |
| 1.3 Estimating the Effect of Monetary Policy on Output and Inflation | 8 |
| 1.3.1 The Evidence of Friedman and Schwartz | 9 |
| 1.3.2 Granger Causality | 13 |
| 1.3.3 Policy Uses | 14 |
| 1.3.4 The VAR Approach | 17 |
| 1.3.5 Structural Econometric Models | 25 |
| 1.3.6 Alternative Approaches | 27 |
| 1.4 Monetary Policy at Very Low Interest Rates | 31 |
| 1.4.1 Measuring Policy at the Effective Lower Bound (ELB) | 32 |
| 1.4.2 The Effects of Quantitative Easing (QE) Policies | 33 |
| 1.5 Summary | 40 |
| 2 Money-in-the-Utility Function | 41 |
| 2.1 Introduction | 41 |
| 2.2 The Basic MIU Model | 43 |
| 2.2.1 Steady-State Equilibrium | 48 |
| 2.2.2 Multiple Equilibria in Monetary Models | 55 |
| 2.2.3 The Interest Elasticity of Money Demand | 57 |
| 2.2.4 Limitations | 61 |
| 2.3 The Welfare Cost of Inflation | 61 |
| 2.4 Extensions | 66 |

| | | |
|----------|---|------------|
| 2.4.1 | Interest on Money | 66 |
| 2.4.2 | Nonsuperneutrality | 67 |
| 2.5 | Dynamics in an MIU Model | 69 |
| 2.5.1 | The Decision Problem | 70 |
| 2.5.2 | The Steady State | 73 |
| 2.5.3 | The Linear Approximation | 74 |
| 2.5.4 | Calibration | 78 |
| 2.5.5 | Simulation Results | 80 |
| 2.6 | Summary | 83 |
| 2.7 | Appendix: Solving the MIU Model | 83 |
| 2.7.1 | The Linear Approximation | 85 |
| 2.7.2 | Collecting all Equations | 90 |
| 2.7.3 | Solving Linear Rational-Expectations Models with Forward-Looking Variables | 91 |
| 2.8 | Problems | 94 |
| 3 | Money and Transactions | 97 |
| 3.1 | Introduction | 97 |
| 3.2 | Resource Costs of Transacting | 98 |
| 3.2.1 | Shopping-Time Models | 98 |
| 3.2.2 | Real Resource Costs | 102 |
| 3.3 | Cash-in-Advance (CIA) Models | 103 |
| 3.3.1 | The Certainty Case | 104 |
| 3.3.2 | A Stochastic CIA Model | 113 |
| 3.4 | Search | 120 |
| 3.4.1 | Centralized and Decentralized Markets | 122 |
| 3.4.2 | The Welfare Costs of Inflation | 127 |
| 3.5 | Summary | 129 |
| 3.6 | Appendix: The CIA Approximation | 130 |
| 3.6.1 | The Steady State | 130 |
| 3.6.2 | The Linear Approximation | 130 |
| 3.7 | Problems | 132 |
| 4 | Money and Public Finance | 137 |
| 4.1 | Introduction | 137 |
| 4.2 | Budget Accounting | 138 |
| 4.2.1 | Intertemporal Budget Balance | 143 |
| 4.3 | Money and Fiscal Policy Frameworks | 144 |
| 4.4 | Deficits and Inflation | 145 |

| | | |
|----------|---|------------|
| 4.4.1 | Ricardian and (Traditional) Non-Ricardian Fiscal Policies | 148 |
| 4.4.2 | The Government Budget Constraint and the Nominal Rate of Interest | 151 |
| 4.4.3 | Equilibrium Seigniorage | 153 |
| 4.4.4 | Cagan's Model | 157 |
| 4.4.5 | Rational Hyperinflation | 159 |
| 4.5 | The Fiscal Theory of the Price Level | 162 |
| 4.5.1 | Multiple Equilibria | 163 |
| 4.5.2 | The Basic Idea of the Fiscal Theory | 164 |
| 4.5.3 | Empirical Evidence on the Fiscal Theory | 168 |
| 4.6 | Optimal Taxation and Seigniorage | 169 |
| 4.6.1 | A Partial Equilibrium Model | 170 |
| 4.6.2 | Optimal Seigniorage and Temporary Shocks | 173 |
| 4.6.3 | Friedman's Rule Revisited | 174 |
| 4.6.4 | Nonindexed Tax Systems | 186 |
| 4.7 | Summary | 188 |
| 4.8 | Problems | 189 |
| 5 | Informational and Portfolio Rigidities | 193 |
| 5.1 | Introduction | 193 |
| 5.2 | Informational Frictions | 194 |
| 5.2.1 | Imperfect Information | 194 |
| 5.2.2 | The Lucas Model | 195 |
| 5.2.3 | Sticky Information | 200 |
| 5.2.4 | Learning | 204 |
| 5.3 | Limited Participation and Liquidity Effects | 206 |
| 5.3.1 | A Basic Limited-Participation Model | 208 |
| 5.3.2 | Endogenous Market Segmentation | 212 |
| 5.3.3 | Assessment | 214 |
| 5.4 | Summary | 215 |
| 5.5 | Appendix: An Imperfect-Information Model | 215 |
| 5.6 | Problems | 219 |
| 6 | Discretionary Policy and Time Inconsistency | 221 |
| 6.1 | Introduction | 221 |
| 6.2 | Inflation under Discretionary Policy | 223 |
| 6.2.1 | Policy Objectives | 223 |
| 6.2.2 | The Economy | 225 |
| 6.2.3 | Equilibrium Inflation | 227 |

| | | |
|----------|---|------------|
| 6.3 | Solutions to the Inflation Bias | 234 |
| 6.3.1 | Reputation | 235 |
| 6.3.2 | Preferences | 247 |
| 6.3.3 | Contracts | 251 |
| 6.3.4 | Institutions | 256 |
| 6.3.5 | Targeting Rules | 259 |
| 6.4 | Is the Inflation Bias Important? | 264 |
| 6.5 | Summary | 271 |
| 6.6 | Problems | 271 |
| 7 | Nominal Price and Wage Rigidities | 277 |
| 7.1 | Introduction | 277 |
| 7.2 | Sticky Prices and Wages | 277 |
| 7.2.1 | An Example of Nominal Rigidities in General Equilibrium | 278 |
| 7.2.2 | Early Models of Intertemporal Nominal Adjustment | 282 |
| 7.2.3 | Imperfect Competition | 285 |
| 7.2.4 | Time-Dependent Pricing (TDP) Models | 288 |
| 7.2.5 | State-Dependent Pricing (SDP) Models | 295 |
| 7.2.6 | Frictions in the Timing of Price Adjustment or in the Adjustment of Prices? | 300 |
| 7.3 | Assessing Alternatives | 301 |
| 7.3.1 | Microeconomic Evidence | 302 |
| 7.3.2 | Evidence on the New Keynesian Phillips Curve | 304 |
| 7.3.3 | Sticky Prices versus Sticky Information | 312 |
| 7.4 | Summary | 313 |
| 7.5 | Appendix: A Sticky-Wage MIU Model | 314 |
| 7.6 | Problems | 316 |
| 8 | New Keynesian Monetary Economics | 319 |
| 8.1 | Introduction | 319 |
| 8.2 | The Basic Model | 320 |
| 8.2.1 | Households | 321 |
| 8.2.2 | Firms | 323 |
| 8.2.3 | Market Clearing | 325 |
| 8.3 | A Linearized New Keynesian Model | 327 |
| 8.3.1 | The Linearized Phillips Curve | 327 |
| 8.3.2 | The Linearized IS Curve | 331 |
| 8.3.3 | Local Uniqueness of the Equilibrium | 332 |
| 8.3.4 | The Monetary Transmission Mechanism | 336 |
| 8.3.5 | Adding Economic Disturbances | 339 |

| | | |
|----------|--|------------|
| 8.4 | Monetary Policy Analysis in New Keynesian Models | 341 |
| 8.4.1 | Policy Objectives | 342 |
| 8.4.2 | Policy Trade-offs | 344 |
| 8.4.3 | Optimal Commitment and Discretion | 346 |
| 8.4.4 | Commitment to a Rule | 353 |
| 8.4.5 | Endogenous Persistence | 354 |
| 8.4.6 | Targeting Regimes and Instrument Rules | 358 |
| 8.4.7 | Model Uncertainty | 363 |
| 8.5 | Labor Market Frictions and Unemployment | 365 |
| 8.5.1 | Sticky Wages and Prices | 366 |
| 8.5.2 | Unemployment | 369 |
| 8.6 | Summary | 377 |
| 8.7 | Appendix | 378 |
| 8.7.1 | The New Keynesian Phillips Curve | 378 |
| 8.7.2 | Approximating Utility | 381 |
| 8.8 | Problems | 388 |
| 9 | Monetary Policy in the Open Economy | 397 |
| 9.1 | Introduction | 397 |
| 9.2 | A Two-Country Open-Economy Model | 398 |
| 9.2.1 | Households | 398 |
| 9.2.2 | International Consumption Risk Sharing | 401 |
| 9.2.3 | Firms | 402 |
| 9.2.4 | Equilibrium | 404 |
| 9.2.5 | Optimal Policy | 414 |
| 9.3 | A Model of the Small Open Economy | 424 |
| 9.3.1 | Households | 424 |
| 9.3.2 | International Risk Sharing and Uncovered Interest Parity | 428 |
| 9.3.3 | Domestic Firms | 429 |
| 9.3.4 | Equilibrium Conditions | 430 |
| 9.3.5 | Monetary Policy in the Linear Model | 433 |
| 9.4 | Additional Sources of Nominal Distortions | 437 |
| 9.4.1 | Imperfect Pass-Through | 437 |
| 9.4.2 | Local Currency Pricing | 440 |
| 9.4.3 | Sticky Tradeable and Nontradeable Goods Prices | 442 |
| 9.5 | Currency Unions | 442 |
| 9.6 | Summary | 447 |
| 9.7 | Appendix | 448 |
| 9.8 | Problems | 449 |

| | | |
|-----------|---|------------|
| 10 | Financial Markets and Monetary Policy | 455 |
| 10.1 | Introduction | 455 |
| 10.2 | Interest Rates and Monetary Policy | 456 |
| 10.2.1 | Interest Rate Rules and the Price Level | 456 |
| 10.2.2 | Interest Rate Policies in General Equilibrium | 459 |
| 10.3 | The Term Structure of Interest Rates | 462 |
| 10.3.1 | The Basic Expectations Theory | 463 |
| 10.3.2 | Expected Inflation and the Term Structure | 465 |
| 10.4 | Macrofinance | 467 |
| 10.4.1 | Affine Models of the Term Structure | 467 |
| 10.4.2 | A Preferred Habitat Term Structure Model | 469 |
| 10.5 | Policy and the Term Structure | 473 |
| 10.5.1 | A Simple Example | 473 |
| 10.5.2 | An Affine Example | 476 |
| 10.6 | Financial Frictions in Credit Markets | 478 |
| 10.6.1 | Adverse Selection | 480 |
| 10.6.2 | Moral Hazard | 482 |
| 10.6.3 | Monitoring Costs | 484 |
| 10.6.4 | Agency Costs | 488 |
| 10.6.5 | Intermediary-to-Intermediary Credit Flows | 491 |
| 10.7 | Macroeconomic Implications | 495 |
| 10.7.1 | General Equilibrium Models | 496 |
| 10.7.2 | Agency Costs and General Equilibrium | 501 |
| 10.7.3 | Agency Costs and Sticky Prices | 504 |
| 10.8 | Summary | 505 |
| 10.9 | Problems | 505 |
| 11 | The Effective Lower Bound and Balance Sheet Policies | 509 |
| 11.1 | Introduction | 509 |
| 11.2 | The Effective Lower Bound | 510 |
| 11.3 | Liquidity Traps | 512 |
| 11.4 | Conventional Policies at the ELB | 515 |
| 11.4.1 | Equilibria at the ELB | 516 |
| 11.4.2 | Analytics at the ELB | 518 |
| 11.4.3 | Commitment and Forward Guidance | 522 |
| 11.4.4 | Summary on the ELB | 531 |
| 11.5 | Balance Sheet Policies | 532 |
| 11.5.1 | Asset Pricing Wedges | 534 |
| 11.5.2 | Market Segmentation and Transaction Costs | 538 |

| | | |
|-----------|--|------------|
| 11.5.3 | Costly Intermediation | 543 |
| 11.5.4 | Moral Hazard in Banking | 547 |
| 11.5.5 | Resaleability Constraints | 552 |
| 11.5.6 | Summary on Balance Sheet Policies | 556 |
| 11.6 | Appendix: Derivation of the Asset Pricing Wedges | 556 |
| 11.7 | Problems | 557 |
| 12 | Monetary Policy Operating Procedures | 561 |
| 12.1 | Introduction | 561 |
| 12.2 | From Instruments to Goals | 562 |
| 12.3 | The Instrument Choice Problem | 563 |
| 12.3.1 | Poole's Analysis | 563 |
| 12.3.2 | Policy Rules and Information | 568 |
| 12.3.3 | Intermediate Targets | 570 |
| 12.3.4 | Real Effects of Operating Procedures | 578 |
| 12.4 | Operating Procedures and Policy Measures | 579 |
| 12.4.1 | Money Multipliers | 579 |
| 12.4.2 | The Reserve Market | 581 |
| 12.5 | Interest on Reserves in a Channel System | 590 |
| 12.6 | A Brief History of Fed Operating Procedures | 595 |
| 12.6.1 | 1972–1979 | 595 |
| 12.6.2 | 1979–1982 | 596 |
| 12.6.3 | 1982–1988 | 599 |
| 12.6.4 | 1988–2008 | 599 |
| 12.6.5 | 2009–2016 | 600 |
| 12.7 | Other Countries | 603 |
| 12.8 | Summary | 605 |
| 12.9 | Problems | 605 |
| | References | 609 |
| | Name Index | 645 |
| | Subject Index | 651 |