## CONTENTS

# Preface xi

## Notation xxiii

PART I. THE FISCAL THEORY			1
Introduction			3
1	A Two-Period Model		5
	1.1	The Last Day	5
	1.2	Intuition of the One-Period Model	6
	1.3	A Two-Period Model and Present Value	8
	1.4	Monetary Policy, Fiscal Policy, and Inflation	9
	1.5	Fiscal Policy Debt Sales	11
	1.6	Debt Reactions and a Price Level Target	13
	1.7	Fiscal Policy Changes Monetary Policy	15
	1.8	Budget Constraints and Active versus Passive Policies	16
	1.9	Active versus Passive with a Debt Rule	18
2	An Intertemporal Model		21
	2.1	The Intertemporal Model	22
	2.2	Dynamic Intuition	24
	2.3	Equilibrium Formation	27
	2.4	Fiscal and Monetary Policy	30
	2.5	The Fiscal Theory of Monetary Policy	34
	2.6	Interest Rate Rules	40
	2.7	Fiscal Policy and Debt	42
	2.8	The Central Bank and the Treasury	44
	2.9	The Flat Supply Curve	47
	2.10	Fiscal Stimulus	49

#### VI CONTENTS

3	A Bit of Generality		52
	3.1	Long-Term Debt	52
	3.2	Ratios to GDP and a Focus on Inflation	54
	3.3	Risk and Discounting	55
	3.4	Money	57
	3.5	Linearizations	62
	3.6	Continuous Time	71
4	Debt, Deficits, Discount Rates, and Inflation		81
	4.1	U.S. Surpluses and Debt	81
	4.2	The Surplus Process—Stylized Facts	86
	4.3	Surplus Process Estimates	98
	4.4	The Roots of Inflation	102
5	Fisca	116	
	5.1	The Simple New-Keynesian Model	117
	5.2	Long-Term Debt	126
	5.3	Neutrality, and Higher or Lower Inflation?	129
	5.4	A Surplus Process	135
	5.5	Responses and Rules	147
	5.6	Alternative Surplus Processes	160
	5.7	Continuous Time	162
	5.8	Review and Preview	182
6	Fiscal Constraints		187
	6.1	The Present Value Laffer Curve	187
	6.2	Discount Rates	191
	6.3	Crashes and Breakouts	193
	6.4	What If $r < g$ ?	195
	6.5	Assets and Liabilities	208
7	Long-Term Debt Dynamics		211
	7.1	Forward Guidance and Bond Price Targets	212
	7.2	Bond Quantities	214
	7.3	Bond Sales and Bond Price Targets	219
	7.4	A General Formula	223
	7.5	Constraints on Policy	224
	7.6	Quantitative Easing and Friends	227
	7.7	A Look at the Maturity Structure	233

235 PART II. ASSETS, RULES, AND INSTITUTIONS Assets and Choices 237 8 8.1 Indexed Debt, Foreign Debt 238 8.2 Currency Pegs and Gold Standard 240 8.3 The Corporate Finance of Government Debt 244 8.4 Maturity, Pegs, Promises, and Runs 248 8.5 Default 252 8.6 254 Central Bank Independence Better Rules 257 9 9.1 Inflation Targets 257 9.2 A Simple Model of an Inflation Target 260 9.3 Fiscal Rules 262 9.4 Targeting the Spread 268 9.5 A Price Level Target via Indexed Debt 277 9.6 A CPI Standard? 281 10 Balance Sheets and Pots of Assets 284 10.1 Three Pots of Assets 285 10.2 A Managed Central Bank Portfolio 294 295 10.3 Balance Sheets, Contingent Transfers, and the ECB 10.4 Assets 298 10.5 Backing 299 10.6 After Government Money 301 10.7 How Much Money Do We Need, Really? 306 PART III. MONETARY DOCTRINES, INSTITUTIONS, AND SOME HISTORIES 309 Monetary Policies 311 11 11.1 The Composition versus the Level of Government Debt 311 11.2 Open Market Operations 312 11.3 An Elastic Currency 315 11.4 Balance Sheet Control 316 11.5 Real Bills 318 320 12 Interest Rate Targets 12.1 Interest Rate Pegs 320

12.2 Taylor Rules 322

VIII CONTENTS

13	Mon	etary Institutions	325
	13.1	Inside Money	325
	13.2	Financial Innovation	327
	13.3	Interest-Paying Money and the Friedman Rule	330
	13.4	Separating Debt from Money	332
	13.5	A Frictionless Benchmark	334
14	Stories and Histories		336
	14.1	Helicopters	336
	14.2	Hyperinflations and Currency Crashes	338
	14.3	Ends of Inflations	339
	14.4	Episodes of War and Parity	348
15	Esthe	etics and Philosophy	351
PAI	RT IV	. MONEY, INTEREST RATES, AND REGIMES	355
16	The	New-Keynesian Model	357
	16.1	The Simplest Model	357
	16.2	Inflation Targets and Equilibrium Selection	360
	16.3	What's Wrong with Hyperinflations?	362
	16.4	Central Bank Destabilization?	363
	16.5	Identification	364
	16.6	Observational Equivalence	366
	16.7	Responses	367
	16.8	A Full Model and the Lower Bound	370
	16.9	Identification Patches	374
	16.10	) Equilibrium Selection Patches	376
17	Keynesian Models with Sticky Prices		391
	17.1	New versus Old Keynesian Models	391
	17.2	Responses to Interest Rate Changes	392
	17.3	Rational Expectations Responses with Policy Rules	395
	17.4	Full Model Responses	401
	17.5	Optimal Policy, Determinacy, and Selection	410
18	History and Implications		415
	18.1	New and Old-Keynesian Confusion	415
	18.2	Adaptive Expectations?	422
	18.3	Interest Rate Targets: A Summary	425

CONTENTS ix

19	Mon	427	
	19.1	Equilibria and Regimes	428
	19.2	Interest Elastic Money Demand and Multiple Equilibria	429
	19.3	Money in Utility	432
	19.4	Pruning Equilibria	439
	19.5	Cash in Advance Model	441
	19.6	Unpleasant Arithmetic and Fiscal Theory	449
	19.7	Seigniorage and Hyperinflation	451
	19.8	Monetary History	452
20	The Zero Bound		458
	20.1	The Experiment	458
	20.2	Zero Bound Puzzles	463
	20.3	Zero Bound Summary and Implications	476
21	The	COVID-19 Inflation	478
22	Observational Equivalence		487
	22.1	Equivalence and Regimes	487
	22.2	Implications Overview	488
	22.3	Regime Tests and Model-Based Estimates	492
	22.4	Plausibility and Other Evidence	495
	22.5	Laugh Tests	497
	22.6	Chicken and Regimes	498
	22.7	Inconsistent or Undetermined Regimes	499
	22.8	Regimes and Practices	500
PA	RT V.	PAST, PRESENT, AND FUTURE	503
23	Past and Present		505
	23.1	The Rise of Fiscal Theory	505
	23.2	Precursors	506
	23.3	Disputes	509
24	Tests, Models, and Applications		512
	24.1	Tests	512
	24.2	Fiscal Theory Models	512
	24.3	Exchange Rates	520
	24.4	Applications	521

X CONTENTS

25	The Future		523
	25.1	Episodes	523
	25.2	Theory and Models	525

# Bibliography 527 Index 541

# Introduction

WHAT DETERMINES the overall level of prices? What causes inflation, deflation, or currency appreciation and devaluation? Why do we work so hard for pieces of paper? A \$20 bill costs 10 cents to produce, yet you can trade it for \$20 worth of goods or services. And now, \$20 is really just a few bits in a computer, for which we work just as hard. What determines the value of a dollar? What is a dollar, really?

As one simple story, the fiscal theory of the price level answers: Money is valued because the government accepts money for tax payments. If on April 15 you have to come up with these specific pieces of paper, or these specific bits in a computer, and no others, then you will work hard through the year to get them. You will sell things to others in return for these pieces of paper. If you have more of these pieces of paper than you need, others will give you valuable things in return. Money gains value in exchange because it is valuable on tax day. This idea seems pretty simple and obvious, but as you will see it leads to surprising conclusions.

The fiscal theory is additionally interesting by contrast with more common current theories of inflation, and how its simple insight solves the problems of those theories. Briefly, there are three main alternative theories of the price level. First, money may be valued because it is explicitly backed: The government promises 1/32 of an ounce of gold in return for each dollar. This theory no longer applies to our economies. We will also see that it is really an interesting instance of the fiscal theory, as the government must have or obtain gold to back dollars.

Second, intrinsically worthless money may be valued if people need to hold some money to make transactions and if the supply of that money is restricted. This is the most classic view of fiat money. ("Fiat" means money with no intrinsic value, redemption promise, or other backing.) But current facts challenge it: Transactions require people and business to hold less and less money. More importantly, our governments and central banks do not control internal or external money supplies. Governments allow all sorts of financial and payments innovation, money multipliers do not bind, and central banks follow interest rate targets, not money supply targets.

Third, starting in the late 1970s a novel theory emerged to describe that reality, and in response to the experience of the 1970s and 1980s. In this theory, inflation is controlled when the central bank follows an interest rate target, so long as the target varies more than one for one with inflation, following what became known as the Taylor principle. We will analyze the theoretical problems with this view in detail below. Empirically, the fact that

inflation remained stable and quiet even though interest rates did not move in long-lasting zero bound episodes contravenes this theory.

The fiscal theory is an alternative to these three great classic theories of inflation. The first two do not apply, and the third is falling apart. Other than the fiscal theory, then, I argue that there is no simple, coherent economic theory of inflation that is vaguely compatible with current institutions.

Macroeconomic models are built on these basic theories of the price level, plus descriptions of people's saving, consumption, production, and investment behavior, and potential frictions in product, labor, or financial markets. Such models are easily adapted to the fiscal theory instead of alternative theories of inflation, leaving the rest of the structure intact. Procedurally, changing this one ingredient is easy. But the results of economic models often change a lot if you change just one ingredient.

Let's jump in to see what the fiscal theory *is*, how it works, and then compare it to other theories.

#### INDEX

active-fiscal passive-money regimes, 488, 494–95 active fiscal policy, 499; budget constraints and, 16-18; debt rule and, 18-20; debt target and, 138-41; in nonlinear model, 141-44 active-money passive-fiscal regime, 428-29, 488, 517 active-money regime, 140, 494, 495 active regimes, passive regimes vs., 498-99 adaptive expectations model, 422-25; association with instability, 396; interest rate pegs and, 322; old-Keynesian, 392; responses with policy rules, 399-400 aggregate demand: equilibrium formation and, 27-30; price level determination and, 6-8; wealth effect and, 27, 415 aggregate demand shocks, 108–10 aggregate supply, 6, 348 aggregate uncertainty, 204–7 Aiyagari, S. Rao, 454, 507 Akerlof, George A., 454 Alesina, Alberto, 188 Allais, Maurice, 454 Alstadheim, Ragna, 385 Alves, Felipe, 183 American Revolution, financing of, 348-49 Ammer, John, 98, 103 Andersen, Leonall C., 453 Angeletos, George-Marios, 216 Apple Pay, 329 applications of fiscal theory, 521-22 AR(1), surplus process estimate using, 98, 100-101 AR(1) interest rate model, responses in sticky price new-Keynesian model, 405-6, 408-10 AR(1) model, new-Keynesian model and, 359 AR(1) monetary policy shock: adaptive expectations responses to, 399-400; responses to policy rules, 397-99; responses in sticky price continuous time model, 167-68

AR(1) representations, capturing expected movements, 126 AR(1) surplus model, 146-47 arbitrage, 93, 206, 270-71, 276, 279, 372, 491 arbitrage opportunity, central bank offering, 291, 355, 384-85, 446 Argentina: Calvo fairy in, 414; currency board in, 240; failure of inflation target in, 260 asset price inflation, 282 asset pricing, 103, 204, 491; formulas for, 490-91; valuation equation, 24 assets, 237-56, 285-94; central bank independence and, 254-56; corporate finance of government debt and, 244-48; currency pegs and gold standard and, 240-44; default and, 252-54; indexed debt, foreign debt, and, 238-39; maturity, pegs, promises, and runs and, 248-52; nominal debt and real assets, 286-88; price level and, 298-99; right to trade real assets, 288-91; shares as money and, 291-94 assets and liabilities, as streams of state-contingent surpluses, 208-10 Atkeson, Andrew, 29, 379, 380, 382, 510 Auclert, Adrien, 183 austerity: avoiding a deflation spiral and, 322; government response to inflation and, 14 Austria, end of inflation in, 340-42

backing, 299–301; Bitcoin and lack of, 304–5; for cryptocurrency, 305; frictionless valuation and, 334; of monetary policy, 405; war financing and, 348–50
bailouts, 209, 302, 303
balance sheet, central bank, 294–98
balance sheet control, 316–18
bank notes, 300, 326, 332
Bank of England, 247, 256, 300
Bank of Japan, 222
bank run, 26, 218, 352, 379, 497

542 INDEX

Barro, Robert J., 95, 418 barter, 414 Bassetto, Marco, 29, 208, 297, 385, 420, 510, 511 Bastiat, Frédéric, broken window fallacy, 472-74 Baumol, William J., 454 Baumol-Tobin model, 307, 329 Beck-Friis, Peder, 518 Benhabib, Jess, 321, 383, 386, 419, 460 Berentsen, Aleksander, 110, 208 Berg, Claes, 259 Bernanke, Ben S., 352 Bianchi, Francesco, 517-18 Bitcoin, 302, 334; El Salvador and, 303; as fiat money, 304-5 Blanchard, Olivier, 208 "blow up the world" proposals, 379, 381, 385-86; pruning equilibria and, 439-40 Bohn, Henning, 99, 206, 492, 509, 512 bond beta, 193 bond liquidity premiums, 94 bond prices: expectations hypothesis model of, 126-28, 249; fiscal shock and, 52, 53, 107; forward guidance and, 212-14; government changes in debt sales and control of, 31–32; inflation and, 110; nominal interest rate and, 9,52 bond price targets, long-term debt and, 219-23 bond quantities, long-term debt and, 214-19; intertemporal linkages, runs and defaults, 217-19; maturing debt and a buffer and, 215 - 16"bond rain," 337, 338 bond return, linearized identity for, 62-63, decompositions, 153, 155, identity, 68, 72, 78, 106 bonds. See government bonds bond sales: bond quantities and, 222-23; disinflation and, 43; long-term debt and, 219-23 bond values, present value formula and, 26 boom, inflationary shocks in a, 110 Bordo, Michael D., 251n, 348, 524 borrowing to finance a deficit, 12, 13-15, 90-91 Brash, Donald, 369 breakouts, 193-95 Bretton Woods era, end of, 85, 251 broken window fallacy, 472-74 Brunnermeier, Markus K., 208

budget constraints: active vs. passive fiscal policies and, 16-18; household, 22, 23; on price level, 224 Buiter, Willem H., 509 Burdekin, Richard C. K., 350 Burnside, Craig, 520-21 business cycles, 81; surpluses and inflation and, 85 Cachanosky, Nicolás, 260 Cagan, Phillip, 432 Calvo fairy, 414 Campbell, John Y., 63, 98, 103 Canada, inflation targets in, 257, 258 Canzoneri, Matthew B., 96, 494, 512, 515 capital taxes, 189 Caramp, Nicolas, 519 Carlozzi, Nicholas, 416 cash, contemporary use of, 329 cash in advance model, 307, 427, 432, 441-49; frictionless model and, 445-47; monetary-fiscal coordination and, 444-45; monetary model and, 443-44; reemergence of multiple equilibria and, 447-49; setup, 442-43 cashless limit puzzle, 247 causality tests, 493-94 central bank independence, 254-56 central bank open-market operation, 46, 48 central bank portfolio, managed, 294-95 central banks: assets matching liabilities in, 284; assets of, 285-94, 319; balance sheets of, 294-98; contemporary doctrine on balance sheet control in, 316-18; debt management and, 279-80; debt sales and, 33; destabilization and, 363-64; determination of expected inflation and, 10-11; digital currencies and, 306; equilibrium selection policy, 375; exploiting short-run dynamics, 133-34; fiscal shock and control of interest rates and, 68; flat supply curve and, 47-49; forward guidance and, 347-48, 470-72; game of chicken with treasury, 498–99; helicopters and, 336-38; hyperinflation and, 338-39; indirect fiscal implications of actions of, 46; inflation targets and, 258; money supply and, 427; nominal debt and real assets of, 286-88; price level and split on debt between treasury and, 311, 312; quantitative easing policies and, 227, 228-30; right to trade real assets,

288–91; role of, 44–47; seigniorage revenue and, 60–61; shares as money and, 292–94; short-term interest rates and, 49; spread targets and, 268–71; stochastic intercept policy and, 408, 411; theories of monetary policy and, 353-54; timing of inflation and, 69; trend to lower interest rates since 1980 in U.S., 192-93; uniting treasury and central bank balance sheets, 33. See also Federal Reserve; interest rate targets Chamley, Christophe, 189 Chari, Vardarajan V., 29, 379, 380, 382, 510

chartalist school, 508

checking accounts: as example of inside money, 325; interest-bearing, 330, 331

- Chen, Xiaoshan, 518
- Chicago school, 6, 328, 351-52, 452. See also monetarism
- Christiano, Lawrence J., 134, 186, 379, 382, 387, 432, 474, 509-10, 512
- Chung, Hess, 517
- Civil War, financing of, 348, 349-50
- Clarida, Richard, 154, 321, 374, 421, 460, 492, 512
- classic monetary doctrine, 309; on balance sheet control, 316, 317; on financial innovation, 327-30; on a frictionless benchmark, 334-35; on inside money, 325, 326; on interest-paying money, 330-331; on interest rate pegs, 320-321; on open market operations, 312-13; on real bills, 318; on separating debt from money, 332-333
- Cleveland, Grover, 241, 252
- Cole, Harold L., 455
- communication devices, gold standard and foreign exchange pegs and, 241
- composition of government debt, vs. level of, 311-12
- Confederate currency, 349, 350

Congressional Budget Office (CBO) projections, 210, 497-98

constant discount rate model, 97-98

- consumer demand, budget constraints and, 16-17 consumers, equilibrium value of the price level
- and, 27-30
- consumption: aggregate demand shock and, 109-10; sticky price model in continuous time and habit persistence in, 179-82

consumption shocks, surplus shocks and, 93 contingent transfers, 295-98

continuous time, 71-80; linearized identities and, 76-79; long-term debt and, 74-76; money in, 79-80; short-term debt and, 73-74 continuous time, sticky price model in, 162-82; analytic solution to, 164-67; long-term debt and policy rules and, 170-72; monetary-fiscal coordination and, 175-79; response functions and price-level jumps and, 172-75; Sim's model and, 179-82; s-shaped surpluses and, 167-69 Copernicus, Nicolaus, 354 corporate finance of government debt, 244-48 COVID-19 crisis, institutional response to, 46 COVID-19 inflation, 51, 146, 578-86 CPI (consumer price index), 280; inflation targets and, 259; through COVID-19 inflation, 478-79; basket, 282-83standard based on, 281-83; swaps, 270-71 crashes, 193-95; currency, 193, 338-39 credit guarantees, 209 credit risk, private debt and, 319 cryptocurrency, 285, 304-6, 328; backed or partially backed, 305; competition from, 302 Cui, Wei, 208

- Cumby, Robert E., 96, 494, 512, 515
- currency: digital, 306; elastic, 315-16; private,
- 304-6; devaluation of, 26, 252; pegs, 240-44 currency boards, 240 currency crashes, 193, 338-39
- currency crises, fiscal theory of, 520
- currency pegs, 240-44, 247
- currency union, 239

Daniel, Betty C., 510, 520 Davig, Troy, 515–16, 517, 521 debt. See government debt debt accumulation equation, 92, 126 debt ceiling, debate over U.S., 303 debt crisis, 210; danger of in United States, 86; mechanism, 191 debt evolution equation, 138, 139, 165; identity, 63 debt/GDP ratio, in postwar United States, 85 debt, issues during fiscal stimulus, 50-51 debt policy: bond level paths and, 223-224; constraints on, 224–27; to support stimulus with geometric long-term debt, 229-30 debt reactions, price level target and, 13-15 debt rule, active vs. passive fiscal policy and, 18-20

544 INDEX

- debt sales, 10, 11–13; control of interest rates, bond prices, and expected inflation and changes in, 31–32; fiscal, 42–44, 45; fiscal policy financing deficits via, 42–44; inflating away government deficit using, 15; monetary, 44, 45; nominal interest rates targeting and, 32–33; Ricardian *vs.* non-Ricardian, 13; with spread target, 275–77; surpluses generated by, 13–15; Treasury and, 47–49
- debt sustainability analysis, 207
- debt target, surplus process and, 138–41
- debt-to-GDP ratio, 54, 63–64, 66–67; government treatment at low interest rates, 162; linearization and, 186; in postwar United States, 83–85; upper bound on, 196, 197
- default, 245, 252–54; long-term debt and, 217–19; sovereign authority to, 247–48
- deficit reduction, fiscal stimulus with promise of future, 481
- deficits: changes in value of debt and accumulation of, 144–46; correlation with inflation, 86, 88–89, 94; currency crises and, 520–21; debt sales and, 11; financing strategies for, 12–13; financing through bond sales, 42–44; financing with revenue or inflation, 90–91; government financing of, 14–15; inflating away outstanding debt using, 15; linked to inflation, 449–50; in postwar United States, 84–85; in recessions, 110; value of debt and, 12–13
- deficit shocks, 13; with policy rules, 153–55; response of surplus process to, 137–38; responses of VARs to, 100; responses to, 95– 96; response to in fiscal theory model with price stickiness, 123–24; without policy rules, 151–53
- deflation, 414; fiscal stimulus and, 462; fiscal tightening and, 145; institutions fighting in 2010s, 47; stimulus response to, 14; surpluses of booms and, 88; zero bound and, 462–63
- deflationary effect, of long-term debt, 70
- deflationary shock, 177
- deflation jump, 466–69

deflation spiral, 145, 322, 399, 400, 458, 476

Del Negro, Marco, 297

demand curve, price level equilibrium and, 29 demand shocks, aggregate, 108–10

- determinancy, 413–14; instability *vs.*, 420; stability
- *vs.*, 415

devaluation, seigniorage *vs.*, 61 Diamond, Douglas W., 250, 251, 379 Diba, Behzad T., 96, 494, 512, 515 digital currencies, central bank, 306

digital dollar, 304

- discount factor, 64; low mean bond returns and, 93–94; value of debt to surpluses and, 491
- discount factor existence theorem, 491
- discounting, 55–57; aggregate uncertainty and, 204, 206–7
- discount rate, 191–93; disinflation in recessions and, 110; inflation and, 8–9; inflation shock and rise in, 104–7; low government debt and, 191–93; in Phillips curve, 164; rates of return *vs.*, 203–4; set by Federal Reserve, 48; sources and durability of low interest rates and, 191–93; time-varying expected returns and, 71; value of debt and, 44; path, 165; shocks, 111–15
- discount rate effect: interest rate rises and, 132–33; response of inflation to interest rates and, 130
- discount rate variation, 86; inflation, sticky prices, and, 128; limit of to a price level jump, 164, 165, 166; price level and, 497, 498
- disinflation, 380; bond sales and, 43; discount rates and, 110; interest rate rise, debt, and sticky prices and, 127, 128; new-Keynesian models and, 182; structural adjustment and, 190; unexpected interest rate rise and, 70
- disturbances, defined, 40
- diversification, of debt, 298
- dividend shock, 130
- dollar, digital, 304
- dollarization, 245, 246, 247, 522
- domestic currency debt, interest rate rise and, 132 DSGE model ingredients, in fiscal theory of
  - monetary policy models, 182–86
- DSGE (dynamic stochastic general equilibrium) model, 35, 38; fiscal theory and, 513, 514, 515–16, 525; Sim's model and, 180 Dupor, William, 520 Dybvig, Phillip H., 379

East Asian currency crises, 497, 520–21 economic growth: containing inflation and, 348; inflation shock and decline in, 104–6; present value of surpluses and, 187; return on bonds and rate of, 205; technological advances and, 192

El Salvador adoption of Bitcoin in, 303

effective lower bound (ELB), 458

Eggertsson, Gauti B., 463, 470, 474

Eichenbaum, Martin S., 134, 186, 474, 509,

520-21

elastic currency, 315–16

electronic payments systems, 328 end-of-period valuation formula, 226–27

entitlements, social, 209

equilibrium/a: money in utility and, 435–39; policies in which equilibrium cannot form, 380–83; pruning, 439–41

equilibrium conditions: monetarism and, 428–29; sticky price model and, 149–50

equilibrium formation, 27–30

equilibrium inflation, 14, 40

equilibrium interest rate, response to financial events, 412–13

equilibrium section patches, 376–90; bit of fiscal theory, 388–90; fiscal equilibrium trimming, 383–84; learning and other selection devices, 387–88; reasonable expectations and minimum state variables, 377–79; residual money demand, 386–87; stabilizations and threats, 379–83; threaten negative nominal rates, 384–85; weird Taylor rules, 385–86

equilibrium selection, 34; multiplier predictions and, 472–74; new-Keynesian model and, 360–62, 501; principles of, 387–88

equilibrium selection policy, 414; central banks and, 364; expectation of future, 465–66, 469; inflation responses and, 367–70; in new-Keynesian model, 377

equilibrium time series, observational equivalence and, 495–97

equity issues, 43, 44–45; debt sales with rise in surpluses, 12; increase in debt and bond sales and, 43

e-stability concept, 387–88

esthetics, of economic theories, 351-54

euro, 301, 510; fiscal foundations of, 522; surplus process and, 95; debt crisis of, 47

Europe: inflation in postwar, 114–15; interest rates and inflation in, 110; quantitative easing in, 231; zero bound era and, 477

European Central Bank (ECB), 295–98; ideal, 284; term financing and, 287

Evans, Charles, 134, 186, 387-88

exchange-rate peg, 240–44 exchange rates: fiscal theory and, 520–21;

stabilization of, 244

expectations hypothesis model of bond prices, 126, 249

expectations management, 45

expected inflation: following interest rate target, 35–38; interest rate policy and, 360–62; interest rate targets and, 34; monetary policy and, 31–32; nominal interest rate target and, 10-11, 32

expected interest rate rises, 70-71

Fama, Eugene F., 491

Federal Open Market Committee, 490;

Federal Reserve: assets of, 209, 284, 298-99, 319; balance sheet and, 334; balance sheet control and, 316, 317–18; bond price targets and, 222; broker-dealer purchases and, 296; digital currencies and, 306; elastic currency and, 315-16; expansion of assets, 319; forward guidance and, 125, 347-38; FRBUS model, 186; interest spread and, 296; mandate for, 255; monetary policy of during COVID-19 epidemic, 483-85; as money market fund, 284, 333-34; money supply target in 1980s, 457; paying interest on reserves, 49; purchase of Treasury bonds by, 46; returning to mistakes of 1970s during COVID-19 epidemic, 484; setting interest rates, 48–49; structure of interventions during crises, 337, 338; term financing and, 287. See also central banks

Federal Reserve Act (1913), 315; real bills policy and, 318, 348

Federal Reserve Strategy Review, 348; forward guidance and, 471–72

Federal Reserve-Treasury accord of 1951, 256

Ferrero, Andrea, 470, 474

fiat money, 3, 509; Bitcoin as, 304–5

fiat money theory: of inflation, 355; on inside money, 327

finance: behavioral *vs.* rational, 491; observational equivalence theorem in, 491

financial crisis of 1907, 316

financial crisis of 2008: COVID-19 stimulus effects compared to, 481–82; institutional response to, 46

financial innovation, 327-330

546 INDEX

financial repression, inside money and, 327

- first-order conditions, 117, 199, money in utility and, 434–35; violation of, 381, 385
- fiscal commitment: foreign exchange pegs or gold standard and, 241; independent central bank and, 254–55; inflation target as, 262

fiscal constraints, 187–210; assets and liabilities as, 208–10; crashes and breakouts as, 193–95; discount rates as, 191–93; present value Laffer curve and, 187–90; what if r < g, 195–208</p>

- fiscal dominance, 514
- fiscal-dominant policy, 20; regime, 492, 495
- fiscal equilibrium trimming, 383-84
- fiscal expansions, unbacked, 383; helicopter drops and, 337
- fiscal gap, 209
- fiscal inflation, 49–51; preannounced partial default creating, 252–54; timing of, 68
- fiscal-monetary interactions, 60-62, 157
- fiscal–monetary reforms, ends of inflation and, 339–48
- fiscal news, unexpected inflation and, 34
- fiscal policy, 30–34; active vs. passive in a nonlinear model, 141–44; debt target and active vs. passive, 138–41; gold standard as active, 242; monetary policy, inflation, and, 9–11; monetary policy changed by, 15–16; trade-offs and, 237; treasury and, 46–47; turning active monetary policy into active fiscal policy, 388–90; unexpected inflation and, 30–31
- fiscal policy debt sales, 11-13
- fiscal policy responses to monetary policy, 159–60
- fiscal policy rules, 148–49, 185, 262–68; a better fiscal rule, 265–66; dynamic fiscal rule with indexed debt, 263–65; indexed debt in one-period model, 262–63; with inflation and interest rates, 267–68; with nominal debt, 268; price level target and, 13–15; price level target rule and, 15–16; responses to in sticky price model, 147–60
- fiscal shocks: bond prices and, 52, 53, 107; debt policy and, 226; long-term debt and, 128; monetary policy reaction to, 155; new-Keyesian model and responses to, 120–24; responses to, 40–42, 66–69; responses to in Sim's model, 180, 181; sticky price model in continuous time and, 165–66

fiscal stimulus, 49–51; coupled with promise of deficit reduction to follow, 481

- fiscal theory: added to new-Keynesian models, 425-26; applications of, 521-22; on balance sheet control, 316, 317; dependence on institutions, 27; disputes in, 509-11; elastic currency and, 316; esthetics of, 351-54; exchange rates and, 520-21; on financial innovation, 327-30; government liabilities relative to surpluses sets the price level in, 311-12; on inside money, 325, 326, 327; on interest-paying money, 330, 331-32; on interest rate pegs, 320, 321-22; with interest rate target, 33-34; monetarism and, 354; money, seigniorage, and, 60-62; on open market operations, 312-15; potential of, 351, 354; precursors of, 506-9; rational expectations model and, 38; on real bills policy, 318-19; rise of, 505-6; in risk-free analysis, 195-97; on separating debt from money, 332-34; on Taylor rules, 323-24; unpleasant arithmetic and, 449-51
- fiscal theory equation, 21
- fiscal theory models in the literature, 512-19
- fiscal theory of monetary policy, 9–11; importation of DSGE ingredients into, 182–86; smooth frictionless limit of, 173.
- fiscal theory of the price level, 506; debt reactions and a price level target, 13–15; defined, 5–6; introduction to, 3–4. *See also* two-period model of the fiscal theory of the price level
- fiscal theory on a frictionless benchmark, 334–35
- fiscal theory plus rational expectations view, COVID-19 inflation and, 485–86
- fiscal theory valuation formula, generalizations of, 52–80; continuous time, 71–80; linearizations, 62–71; long-term debt, 52–53; money, 57–62; ratios to GDP and focus on inflation, 54; risk and discounting, 55–57
- fiscal underpinnings of sticky price new-Keynesian models, 404–8
- Fisher, Irving, 208, 351, 427, 453
- Fisher equation, 138, 371; interest rate pegs and, 320–21
- Fisherian response, 11, 369
- Fitzgerald, Terry J., 509, 512

fixed value claim, liquidity and, 306, 308

- flat supply curve, of bonds, 47-49
- Fleckenstein, Mattias, 270

index 547

- flexible price "IS" equation, 119
- flexible price model, 118-20, 125, 146-47
- floating currencies, surplus process used by
  - countries with, 95
- flow equation, linearized, 62, 63
- flows, r = g discontinuity and, 197–98
- foreign currency debt, 298
- foreign currency peg, 145
- foreign debt, 238-39, 247
- foreign exchange peg, 250
- forward guidance: central banks and, 125, 347-48, 470-72; long-term debt and, 211-14
- France: default in eighteenth century and, 247-48; end of inflation in 1920s in, 344-45; financing WWI in, 350
- FRBUS model, 186
- frictionless benchmark, 334-35
- frictionless limit, 469-70
- frictionless model: cash advance and, 445-47; equilibrium of, 445-47; of the fiscal theory of the price level, 5-8
- Friedman, Milton: on civil war inflation, 349; on failure of interest rate pegs, 455-56; financial innovation and, 351; fixed money growth rule and, 412; on fluctuations from policy mistakes, 418, 455; on helicopters, 336, 338; on interest rate peg, 320-321, 322, 400; monetarism and, 427; monetary and fiscal stability and, 508; monetary history and, 452–53, 455–57; multiple equilibria and, 441; optimal quantity of money and, 330-31, 461, 477; philosophical purpose of, 352; Presidential address by, 129, 388-90; spread target and, 275; on unstable inflation under interest rate peg, 416, rule, 330-32
- full-model transition matrix, eigenvalues of, 413 Functional Finance (Lerner), 508 future inflation, fiscal shock and, 67-68
- Gabaix, Xavier, 424, 425, 474-75
- Galí, Jordi, 117, 154, 321, 374, 421, 460, 492, 512 game theory, equilibrium selection with, 510;
- treatment of off-equilibrium behavior using, 29 García-Schmidt, Mariana, 183, 424, 425, 475 Garín, Julio, 131
- GDP, formulas using ratios to, 54
- general equilibrium models, rational expectations and, 424-25
- geometric maturity structure, 65, 77–78; quantitative easing and, 227-230 Germany, end of post-WWI hyperinflation in, 342 - 44Gertler, Mark, 154, 321, 374, 421, 454, 460, 492, 507, 512 Giannoni, Marc P., 375, 376 gold standard, 3, 240-44; allure of, 252, 281-82; backing and, 301; financing war and, 348-49; promise to repay rather than inflate and, 45; runs and, 250; Sargent on, 341; surpluses and, 145, 257; surplus process used with, 95; United States on, 240-41, 242-43; devaluation, 252 Gorton, Gary, 251 government bonds: pricing, 8-9; returns on, 91-94; wealth effect of, 6 government debt: active fiscal policy responding to, 143-44; active vs. passive fiscal policies and, 18-20; backing and, 299-301; changes in value of due to accumulation of deficits and changes in interest rates, 144-46; composition vs. level of, 311-12; corporate finance of, 244-48; COVID-19 inflation and, 478-80; discount using cumulative return on, 71, 73; evolution of real value of, 73; fiscal policy and, 42-44; fiscal policy debt sales and, 11–13; foreign, 238–39; government promise to repay, 15, 45, 46, 90, 95, 145, 161, 336; growth rate and ex post return on, 207-8; imperfection of, 302-4; indexed, 238-39; inflating away, 12; inflation shock and devaluation of, 104-5; linearized flow equation for the value of, 120-24; long-term, 52-53; money supply and, 307; separating from money, 332-34; short-term, 27; sources of variation in value of, 19; U.S. surpluses and, 81-86. See also debt sales; long-term government debt; nominal government debt; short-term government debt government debt valuation equation: applied to total market value of debt, 93; as asset pricing equation, 24; central bank portfolio and, 294; components of, 30; equilibria selection and, 164; if r < g, 195; inflation theories and, 17-18; intertemporal model and, 22, 25, 26; money demand and, 428; new-Keynesian model
- governments, following policy in which no equilibrium can form, 380-83

surpluses and, 371

and, 404; with reserves, 241; shocks and, 166;

For general queries, contact webmaster@press.princeton.edu

548 INDEX

Granger, Clive W. J., 453; causality tests, 493–94 Grant, Ulysses S., 349 Great Depression, monetary theory and interpretation of the, 352, 455 great recession (2008): debt and, 83; use of fiscal stimulus during, 49-50 Great Society, 252, 456, 523 Greece: euro and, 239, 245, 246, 251; sovereign default and, 297 greenbacks, 349, 350 Greenwood, Robin, 232, 250 Grossman, Herschel I., 418 growth rates: ex post return on government debt and, 207-8; recessions and, 82 growth theory, 199-200 GST (goods and services tax), as part of an inflation target, 259 habit persistence, in continuous time model, 179-82 Hall, Robert E., 45, 65, 86, 295, 348, 349, 350, 417, 523 Hamilton, Alexander, 45, 246, 348 Hansen, Alvin H., 477 Hansen, Lars Peter, 97, 98, 491 Hansen-Sargent prediction formulas, 137, 168-69 Harrison, J. Michael, 491 helicopter drops, 46, 332, 336-38, 383; COVID-19 inflation and, 478, 479-81; government response to deflation and, 14 helicopter vacuums, 46, 336-37 Henderson, Dale W., 385 Heterogeneous agent (HANK) models, 183 Hetzel, Robert, 275 Høien, Torgeir, 524 historical episodes, analysis of, 523-24 Holden, Thomas, 275 Honkapohja, Seppo, 387-88 household budget constraint, 22, 23 household transversality condition, 23 housing "bubble," 455 hyperinflation, 338-39, 362-63, 381, 414; end of, 339-48; government creation of, 51; seigniorage and, 61, 451-52; speculative, 431 identification, 355; new-Keynesian model and,

Identification, 355; new-Keynesian model and, 364–65; reaction to debt and, 19; assumptions in tests, 500–501; patches, 374–76

identity, intuition of, 66 i.i.d. inflation, spread target and, 271 illiquidity, deliberate, 333 Ilut, Cosmin, 518 IMF (International Monetary Fund), 296 impulse-response functions, 102, 103, 108, 125; sticky price model in continuous time and, 179-82 inconsistent regimes, 499-500 indeterminancy: fiscal theory and, 196; interest rate peg and, 321–22 indexed debt, 238-39, 247; central banks and, 298-99; dynamic fiscal rule with, 263-65; in one-period model, 262-63; price level target via, 277-81. See also spread target indexed debt peg, CPI standard and, 282, 283 indexed perpetuities, 292-93 inflation: aggregate demand shocks and, 102, 108-10; austerity response to, 14; business cycles, deficits, and, 85; central bank and timing of, 69-71; as choice, 525; in postwar United States, 83-86; correlation with deficits, 86, 88-89, 94; COVID-19, 51, 146, 478-86; discount rates and, 8–9, 71; effect of interest rates on, 129-35; financing deficits with, 90-91; fiscal rule with interest rates and, 267-68; fiscal shock and, 67-68; fiscal stimulus creating, 49–51; government debt valuation equation and, 17-18; interest rate rise, fiscal contraction, and decline in, 38-39; interest rate shock and, 36–37; interest rate targets and (see interest rate targets); linked to deficits, 449-50; monetary policy, fiscal policy, and, 9-11; monetary policy shock and, 41; new-Keynesian model and 1970s-era, 415-16; nineteen1970s U.S., 68, 84, 415-17, 423, 456-57, 523-24; ratios to GDP and, 54; roots of, 102–15; seigniorage and, 61; sticky price new-Keynesian model and, 401-4; super-Fisherian, 122; surplus and discount-rate shocks and, 111-15; trade deficit and, 251n, 252; variety of causes of, 26; voters and pain of, 246-47; wealth tax via, 482-83; at zero bound, 458-63. See also expected inflation; unexpected inflation inflation, ends of, 339-348; in Austria, 340-42;

in France, 344–45, 346; in Germany, 342–44; in United States and United Kingdom, 346–47

inflation, theory of: based on money supply and demand, 427; theories of, 3-4 (See also fiat money; gold standard; interest rate targets) inflation crashes, 193 inflation decompositions, 153, 155, 176, 177-79; terms of, 102, 107 inflation-dependent surplus rule, 388-90 inflation expectations, managing, 345 inflation identity, 68; sticky price new-Keynesian model and, 404-5 inflation responses, new-Keynesian model and, 367-70 inflation shocks, 13; bond return identities and, 106; discount rate shock and, 110; VAR and, 103-4 inflation stabilization plans, 84 inflation swap, 270 inflation target model, 260-62 inflation targets, 257-60; new-Keynesian model and, 360-62 instability: determinancy vs., 420; meaning of term, 396-97 insurance, moral hazard and, 248 interest, money paying, 58-59 interest cost effect, on inflation, 132-33 interest elastic money demand, 429-32 interest-paying money, 330-32 interest rate changes, Keynesian models with sticky prices and responses to, 392-95 interest rate pegs, 9, 320-22; debt sales and, 276; failure of during and after WWII, 455-56; fiscal theory and, 33, 34; stable, indeterminant inflation and, 391, 392; unstable, determinant inflation and, 391, 392 interest rate policy, constraints on, 224-27 interest rate regimes, observational equivalence for, 487 interest rate rules, 40-42; Leeper and, 505; Taylor-type, 40 interest rates: effect on inflation, 129-35; expected

rises in, 70–71; fighting inflation with high, 486; fiscal contraction and higher, 16; fiscal rule with inflation and, 267–68; government changes in debt sales and control of, 31–32; monetary policy shock and, 41; response to expected rise in in fiscal theory model with price stickiness, 123; set by Federal Reserve, 48–49; sources and durability of low, 191–93; sticky

price new-Keynesian model and, 401-4; Taylor rules and, 322-24 interest rate shocks: in form of forward guidance, 212; with long-term debt, 69, 70; new-Keynesian model and response to, 121; responses to, 35-38; responses to unexpected permanent, 173-74; responses to with surplus rule, 175–79 interest rate targeting models: pruning equilibria in, 439-41 interest rate targets, 320-24; central banks and, 33; defined, 33; expected inflation and, 10-11, 34, 35-38; fiscal theory and, 33-34; inflation and, 3-4; interest rate pegs, 320-22; Keynesian, 7; monetary policy and, 32-33; summary on, 425-26; Taylor rules, 322-24 interest rate target theory of inflation, 355 interest rate tightening, inflation response in sticky price new-Keynesian model, 407-8 interest spread, Federal Reserve and Treasury, 296-97 intertemporal budget constraints, 239 intertemporal linkages, long-term debt and, 217 - 19intertemporal model, 21-24; central bank and the Treasury and, 44-47; dynamic intuition and, 24-27; equilibrium formation and, 27-30; fiscal and monetary policy and, 30-34; fiscal policy and debt and, 42–44; fiscal stimulus and, 49–51; fiscal theory of monetary policy and, 34–39; fiscal theory with an interest rate target and, 33-34; flat supply curve and, 47-49; interest rate rules and, 40-42; interest rate targets and, 32-33; monetary-fiscal interactions and, 38-39 intertemporal optimization, price level equilibrium and, 27-30 intertemporal revolution, Sargent on, 507 IOUs, 325 IS curve: forward-looking, 35; new-Keynesian model and, 183, 184; as Intertemporal Substitution, 117 IS-LM intuition/models: in new-Keynesian models, 415, 417-19, 422; old-Keynesian, 357, 369-70 IS-LM-style monetary policy analysis, 418

IS-LM thinking: efforts to revive, 184; on interest rate pegs, 321; persistence of, 352–354 Italy, debt level in, 298

Jacobson, Margaret M., 145, 161, 242–43, 265, 349 Japan: forward guidance and, 472; government debt in, 83, 497, 498; inflation in postwar, 114– 15; interest rates and inflation in, 110; long-term bond price target and, 222; quantitative easing in, 231; short-term interest rates at zero in, 458, 459, 460; use of fiscal stimulus, 49, 50; zero bound and, 145, 356; zero interest rates in, 477 Jiang, Zhengyang, 93–94, 97, 521

jobless recoveries, 347

joint hypothesis theorem, 491

Jones, Chad, 189, 200

Jonung, Lars, 259

Jordan, Jerry L., 453

Judd, Kenneth L., 189

Kaplan, Greg, 183

Kareken, John, 520

Kehoe, Patrick J., 29, 379, 380, 382, 455, 510, 524

Kelton, Stephanie, 508

Keynes, John Maynard, 350, 461, 476

Keynesian interest rate targets, 7

Keynesianism, 351–52; liquidity trap, 331; zero bound and, 461. *See also* new-Keynesian model; old-Keynesian model

Keynesian models with sticky prices, 391–414; full new-Keynesian model responses, 401–10; new *vs.* old Keynesian models, 391–92; optimal policy, determinancy, and selection in, 410–14; rational expectations responses with policy rules and, 395–400; responses to interest rate changes and, 392–95. *See also* sticky-price

new-Keynesian model

Kiley, Michael T., 475

King, Robert G., 117, 360, 377, 408, 413, 421, 515

Knapp, Georg Friedrich, 508

Kocherlakota, Narayana, 131, 509

Kreps, David, 491

Krugman, Paul, 474 Kydland, Finn E., 352, 418

Ryulalla, 1 lill D., 552,

labor, taxes and, 188–89

labor supply, 185, 187–88, 483, 512. *See also* Laffer curve Laffer curve, present value, 187–90 Laffer limits, 95

laugh tests, easy armchair, 497–98

Law, John, 299, 303

learnability, 387-88, 510-11

Leeper, Eric M.: active and passive fiscal policy terms and, 20; on debt terms as a discount factor, 220; on DSGE tradition, 525; "Equilibria under 'Active' and 'Passive' Monetary Policy," 505, 506; on fiscal inflation without seigniorage, 521-22; on fiscal policy underlying 1980 shift, 518; on fiscal theory models, 492, 493, 512; on interest rate and surplus policy rules, 515-16; on parameter regions, 500; on passive fiscal policy, 493, 507; on Roosevelt administration economic policy, 145, 161, 242-43, 265, 349; sticky price model of, 517; tax rates following AR(1) and, 97 legislature, inflation targets and, 259 Leith, Campbell, 220, 512, 518 Lerner, Abba P., 349; "Functional Finance," 508 Lester, Robert, 131 level of government debt, vs. composition of, 311-12 Levy, Mickey D., 251n, 348, 524 Li, Bing, 493 liabilities, as streams of state-contingent surpluses, 208-10 Libra (cryptocurrency), 305 linearization, 62-71, 204; identity intuition and, 66; monetary policy responses and, 69–71; responses to fiscal shocks and, 66-69; timevarying expected returns and, 71; as weakness in models, 186 linearized bond pricing equation, 170 linearized debt accumulation equation, 170-71 linearized identities, 76-79 liquidity, 200-3; fixed value claim and, 306, 308 liquidity demands, open market operations and, 312-13, 314-15 liquidity trap: classic doctrine and, 331; Keynes and, 461, 476; multipliers and, 473; overlapping generations model of money and, 508; proposals to exit, 383-84; in U.S., 474 Ljungqvist, Lars, 509 Long, John B., 418 Longstaff, Francis A., 270 long-term government debt, 52-53, 56-57; continuous time and, 71, 72, 74-76; discrete time, sticky price model and, 126-28; response to interest-rate shock with, 68, 70; sticky price model in continuous time and, 170-72

long-term government debt dynamics, 211–34; bond quantities and, 214–19; bond sale and bond price targets and, 219–23; constraints on policy, 224–27; forward guidance and bond price targets and, 212–14; general formula, 223–24; maturity structure and, 233–34; quantitative easing and, 227–32

lower bound, new-Keynesian model and, 370–74 Loyo, Eduardo, 132, 522

Lucas, Robert E. Jr.: cash in advance model and, 441, 444; critique of new-Keynesianism/IS-LM theory, 117, 353, 417, 418, 423; on inflation, prices, and wages, 183, 184; information-based rational expectations model and, 125; interest rate rises and output and, 402; on state contingent partial defaults, 245 Lustig, Hanno, 216, 270

"Macroeconomics of the French Revolution" (Sargent & Velde), 523 mandates, central bank and Federal Reserve, 255 Mankiw, N. Gregory, 188, 475 marginal cost shocks, 118 marginal rate of substitution, 208, 445 marginal utility: of consumption, 64; of money, 437 marginal utility growth, surplus shocks and, 93 Marimon, Ramon, 509 Markovian state variables, 378 Markov process, 515-16 Markov switching, 517, 518 mark-to-market accounting, 68-69 Martin, William McChesney, 255 martingale measure theorem, 491 Massachusetts Bay Colony, paper money in, 300 maturity, 248-52 maturity structure of government debt, 70-71, 233-34; maturing debt and, 215; open market operation and, 314; quantitative easing and, 230 - 32Mazza, Federico Julián Ferrelli, 260 McCallum, Bennett T., 377, 378, 387, 388, 416, 510 McCandless, George T., 349 McDermott, John, 259 Medicare/Medicaid, 209, 521 Mehrotra, Neil, 208, 463 Melosi, Leonardo, 517-18

Merkel, Sebastian, 208 Messer, Todd, 297 Metrick, Andrew, 251 Mexico, dollarization in, 245, 246 Milbourne, Ross D., 454 Miller, David S., 193, 194 Miller, Merton H., 454 Minford, Patrick, 379, 382 minimum state variables (MSVs), 377-79 Mitchell, Wesley Clair, 349 MIT shocks, 164 model-based estimates, 492-95 Modern Monetary Theory, 282, 508 Modigliani-Miller theorem, 507-8 Moll, Benjamin, 183 monetarism, 427-57; on balance sheet control, 317; cash in advance model and, 441-49; control of money sets the price level in, 311; elastic currency and, 316; equilibria and regimes and, 428-29; financial innovation and, 328; fiscal theory and, 354; free market resurgence and, 352; interest elastic money demand and multiple equilibria and, 429-32; interest-paying money and, 330-31; monetary history and, 452-57; money in utility and, 432-39; pruning equilibria and, 439-41; seigniorage and hyperinflation and, 451-52; unpleasant arithmetic and fiscal theory and, 449-51; view of money supply, 6, 7; zero bound and, 461 monetary aggregate-based policy, 353 monetary-control regimes, 487-88 monetary economics, short-run neutrality and, 129 monetary-fiscal coordination: in cash in advance model, 444-45; monetarism and, 429; sticky price model in continuous time and, 175-79 monetary-fiscal interactions, 38-39 monetary friction, price level and, 334-35 monetary history, 452-57 monetary institutions, 325-35; financial innovation and, 327-30; frictionless benchmark and, 334–35; inside money and, 325–27; interest-paying money and the Friedman rule and, 330-32; separating debt from money and, 332-34 monetary model, equilibrium of, 443-44 monetary policy, 30-34, 311-19; balance sheet control and, 316-18; central banks and,

552 INDEX

monetary policy (continued)

- 45–47; composition vs. level of government debt and, 311–12; defined, 33; elastic currency and, 315–16; expected inflation and, 30, 31–32; fiscal policy, inflation, and, 9–11; fiscal policy responses and, 159–60; fiscal policy rule and changing, 15–16; fiscal theory of, 34–39; interest rate targets and, 32–33; open market operations and, 312–15; real bills and, 318–19; shifting inflation and, 70–71; targeting nominal interest rate, 21; trade-offs and, 237; response of inflation to in a frictionless model, 69–71
- monetary policy disturbances, 411–13
- monetary policy rules, 148, 185; responses to in sticky price model with, 147–60
- monetary policy rules, alternative, 257–83; CPI standard, 281–83; fiscal rules, 262–68; inflation target model, 260–62; inflation targets, 257– 60; price level target via indexed debt, 277–81; targeting the spread, 268–77
- monetary policy shocks: defined, 122; interest rate movements and, 133–34; new-Keyesian model and responses to, 120–24, 359–60; with policy rules, 158–59; responses to, 40–42; responses to in modified Sim's model, 180, 181; sticky price new-Keynesian model response to, 397–99; without policy rules, 156–58
- monetary system, alternatives to current, 303–4
- monetary theory, classic doctrines of. *See* classic monetary doctrine
- money, 57–62; after government, 301–6; amount needed, 306–8; backed by assets, 285–86; backing, 299–301; backing theory of, 6–7; as claim to pot of assets, 284, 285–94; in continuous time, 71, 72, 79–80; defined, 508; as form of government debt, 58; frictionless benchmark and, 334–35; hyperinflation and increase in printing, 451–52; inside, 325–27; interestpaying, 330–332; nominal income correlated with, 452–53; seigniorage, fiscal theory, and, 60–62; separating from debt, 332–34; shares as, 291–94; tax payments and value of, 3, 7–8; in theory of inflation, 427; zero bound, 60. *See also* cash in advance model
- money demand: first-order conditions and, 434– 35; interest elastic, 429–32; money supply and, 61–62, 428–29; price level and, 61–62; residual, 386–87; source of, 6–7
- money demand story, 328-29

money dominant regime, 20, 492, 495 money-free system, contemporary, 328, 329 money in utility, 427, 432-39; equilibrium and multiple equilibria and, 435–49; first-order conditions and money demand and, 434-35 money substitutes, inside money and, 327 money supply: control of, 427; elastic, 315-16; end of inflation and increase in, 339-40, 342, 344; monetarist view of, 6, 7; money demand and, 428–29; real bills policy and, 318–19 moral hazard, insurance and, 248 Mulligan, Casey, 188 multiple equilibria, 388-90; in the cash in advance model, 447-49; monetarism and, 429-32; money in utility and, 435-39; in sticky price new-Keynesian model, 402 multiple-equilibrium inflation, 380 multipliers, 472-74 Mussa, Michael, 244

negative nominal rates, threatening, 384–85 Nelson, Edward, 387, 457 neutrality, sticky price model and, 129–31

- new-Keynesian model, 353, 357-90, 424; adding fiscal theory to, 425-26; as DSGE, 116, 357; central bank destabilization and, 363-64; disinflation and, 182; equilibrium selection in, 501; equilibrium section patches and, 376–90; full model and the lower bound, 370-74; hyperinflation and, 362–63; identification and, 364–65; identification patches and, 374-76; inflation responses in, 367-70; inflation targets and equilibrium selection and, 360-62; IS and Phillips curves and, 183-84; IS-LM intuition and, 417-19, 422; modifications toward old-Keynesian model, 474-75; observational equivalence and, 366-67; old-Keynesian model vs., 391-92, 415-22; response to interest rate shock, 35, 38, 39; simplest model, 357–60; Taylor rule and, 420-22; view of zero bound in, 476-77; as "new monetarist", 418
- new-Keynesian sticky price model, 117–26; analytical solution to, 118–20; responses to expected movements in, 124–26; responses to monetary and fiscal shocks in, 120–24
- New York Times (newspaper), 460
- New Zealand, inflation targets in, 257, 258, 259
- Nicolini, Juan Pablo, 524
- Niepelt, Dirk, 509–10

nominal government debt, 245–46; exchangerate peg and, 240; fiscal rules with, 268; fiscal theory and, 262–63; indexed debt peg and, 279; interest rate shock and, 35–36; present value of primary surpluses and value of, 23, 24; present value of surpluses and, 21; real assets and, 286–88; surpluses and, 30

nominal income, money correlated with, 452–53

nominal interest rates: bond price and, 9; bond prices and rise in, 52; effect on inflation, 132; Federal Reserve setting, 48–49; monetary policy and, 9–11, 21

nominal interest rate target, expected inflation and, 32–33

nominal-real interactions, sticky prices and, 116 nonidentification, 374–76; observational

equivalence and, 487, 489; theorem, 356

nonlinear new-Keynesian model, 370–74

non-Ricardian debt sales, 13

non-Ricardian regime, 20, 507

Norway, issuing nominal debt, 245

numeraire: amount needed, 306–7; backing for money as, 285–86; cryptocurrency and, 305; short-term government debt as, 27, 301; value of, 286–87

observational equivalence, 150, 374, 487–501; active *vs.* passive policy and, 498–99; deflation jump and, 468; equivalence and regimes and, 487–88; implications overview, 488–91; inconsistent or undetermined regimes and, 499–500; laugh tests and, 497–98; new-Keynesian model and, 366–67; plausibility and, 495–97; reaction to debt and, 19; regimes and practice and, 500– 501; regime tests and model-based estimates and, 492–95

observational equivalence theorem, 21, 356; in finance, 490; fiscal theory and, 96–97

Obstfeld, Maurice, 382, 438, 440

Occam's razor: fiscal theory and, 511; zero bound and, 462–63

Ohanian, Lee E., 455

old-Keynesian model: new-Keynesian model *vs.,* 391–92, 415–22; old-Keynesian model modifications and, 474–75; view of zero bound in, 476

one-period model of the fiscal theory of the price level, 5–6; intuition of the, 6–8

open market operations, 312-15

open mouth operation, 367, 369, 397 operator notation, 169 optimal policy, central bank, 410-13 Orr, Daniel, 454 orthogonalization issues, multiple shocks and, 94 orthogonal shocks, 159-60 output: fiscal stimulus and, 50; in new-Keynesian model, 117-18, 120, 122-23; surplus-to-GDP ratio and, 187-88; tax revenue and, 189-90 outstanding debt, bond quantities and, 222 paper currency: development of, 247; in Massachusetts Bay Colony, 300 parameter  $\phi$ , 364–65, 374–76, 413–14, 493 parametric models, 185 parametric surplus process, 135-47 partial adjustment dynamic formulation, 171 passive fiscal policy, 499, 507; budget constraints and, 16-18; choice of, 18; debt rule and, 18-20; debt target and, 138–41; interest rate shock and, 39; new-Keynesian model and, 358; in nonlinear model, 141-44 passive regimes, active regimes vs., 498-99 Patinkin, Donald, 508 Payne, Jonathan, 86 pegs, 248-52; currency, 240-44, 247, 252; exchange-rate, 240-44k; foreign currency, 250; zero bound, 463. See also interest rate pegs Peltzman, Sam, 250 pensions, 209 perpetuities, 248; indexed, 292-93 Phelan, Christopher, 509 Phillips curve, 7, 35; deficits and, 85; deflation jump and, 466-67, 468-69; end of inflation and, 345-46; Friedman's prediction about, 456; new-Keynesian, 117, 163-64, 183-84; output from inflation and, 120; output multipliers and, 473 Phillips curve shocks, 118 Piazzesi, Monika, 171 Plante, Michael, 525 Plosser, Charles I., 418 plots of money demand, 453 Poincaré, Henri, 344-45, 346, 347 policy regimes, change in expectations and, 347 policy rules: adaptive expectations responses with, 399-400; deficit shocks with, 153-55; deficit shocks without, 151-53; monetary policy

shocks with, 158–59; monetary policy shocks without, 156–58; sticky price model

554 INDEX

policy rules (continued) in continuous time and, 170-72; parameter evolution in, 516 Poole, William, 33 population demographics/growth, 199-200 portfolio theory, 193 precommitment problem, 470-71 Prescott, Edward C., 352, 418, 455 present value, two-period model of the fiscal theory of the price level and, 8-9 present value formula, 26, 141, 142-43, 217, 354, 497; as an identity, 64 present value Laffer curve, 187-90 present value puzzles, 491 Preston, Bruce, 145, 161, 242-43, 265, 349 price level: bond quantities and, 214-19; compared to stock price, 24-26; discount rate variation and, 497, 498; equilibrium value of, 27-30; general formula to find, 223-24; inside money and determination of, 326; interest rate targets and, 10-11; macroeconomic models built on theories of, 4; monetary friction and, 334–35; money demand, money supply, and, 61-62; real bills policy and, 318-19; response to forward guidance interest rate rise, 212-14 price level dynamics, in money in utility function model, 435-36 price-level jumps, sticky price model in continuous time and, 172-75 price level paths, debt policy and, 224-27 price level target: debt reactions and, 13-15; equilibrium inflation and, 14; via indexed debt, 277 - 81price level target rule, fiscal policy rule and, 15-16 price puzzle, 133-34 primary surplus or deficit, United States and, 82-85; NIPA data on, 86 private currency, 304-6 private debt, credit risk and, 319 profit rebates, 295. See also contingent transfers pruning equilibria, 439-41 put options, government, 209-10 Q theory, 183 quantitative easing (QE), 192, 313; bond supply

and, 313; long-term debt and, 227–32; maturity structure and, 230–32; with a separate Treasury and central bank, 228–30; summary, 232; policy, 226

Rabushka, Alvin, 300 Raffo, Andrea, 470, 474 Rajan, Raghuram G., 250, 251 Ramey, Valerie, 134, 455 rates of return, discount rates vs., 203-4 rational expectations model, 125, 424; associated with stability, 396; fiscal theory and, 38; new-Keynesian, 392; responses to interest rate changes in, 392–95 rational expectations, response of rational expectations model with policy rules, 395-400 rational expectations: fiscal theory plus, 485-86; new-Keynesian models and, 134 rational inattention, 474-75 Reagan, Ronald, 347 Reagan deficits, 82 real bills doctrine, 318-19, 508 reasonable expectations, 377-79 Rebelo, Sergio, 418, 474, 520-21 recapitalization, 295, 296. See also contingent transfers recessions: budget deficits, inflation, and, 85, 88; deficits and disinflation in, 110; growth rates and, 82; inflation in 2008, 458, 460; variations in and shock definitions, 115 recession shock, 108-10 regimes: inconsistent or undetermined, 499-500; monetarism and, 428-29; identification of, 515; tests for, 492-95 regime switching, 517 Reis, Ricardo, 208, 475 reserve requirements, inside money and, 325, 326 residual money demand, 386-87 response, defined, 107 response functions, sticky price model in continuous time, 172-75 revenue: financing deficits with, 90-91; seigniorage, 60-61, 449, 450; tax, 189-90 Revolutionary War debt, 45 r < g, 195–208; aggregate uncertainty and, 204– 7; discount rates vs. rates of return and, 203-4; empirical relevance of r < g, 198–99; flows and the r = g discontinuity, 197–98; liquidity and, 200-3; population demographics and dynamic efficiency and, 199-200; summary, 207-8; sustainability and fiscal theory in risk-free analysis, 195-97 Ricardian debt sales, 13 Ricardian equivalence, 44; bond rain and, 338

shares, as money, 291-94

share split: increase in debt and bond sales and, 43;

index 555

Ricardian regime, 20, 507 Richard, Scott F., 491 right to trade real assets, central banks and, 288–91 risk, 55–57; of government bond returns, 91–94 risk-free analysis, fiscal theory in, 195–97 Robbins, Jacob A., 463 Roberds, William, 97, 98 Rognlie, Matthew, 183 Rogoff, Kenneth, 382, 440 rollover crisis, 218 Romer, Christina, 490 Romer, David, 490 Roosevelt administration, 349; regular and emergency budgets and, 265–66 runs, 248–52; long-term debt and, 217–19

Sannikov, Yuliy, 208

- Sargent, Thomas J., 418, 509; analysis of ends of inflation, 259, 340, 507; analysis of historical episodes and, 523; on budget constraints of central bank, 297; cash in advance models and, 441, 444, 448-49; on Civil War greenbacks, 349; on defaults and inflation in U.S. history, 295; on early U.S. fiscal affairs and European fiscal integration, 522; on ends of inflation, 339-47, 507; game of chicken, 498-99; Hansen, Roberds, and Sargent formula, 97, 98; on interest rate pegs, 321; on joint monetary-fiscal analysis of U.S. history, 510; on monetary innovations during French Revolution, 300; rational expectations and, 417, 432; real bills doctrine and, 508; on Revolutionary War debt, 45, 348; on unpleasant monetarist arithmetic, 180, 346, 427, 449-51, 507; on value of debt, 65, 86
- saving, aggregate uncertainty and precautionary, 204, 206
- Schmitt-Grohé, Stephanie, 131, 245, 321, 383, 386, 419, 460
- Schultz, George P., 347
- Schwartz, Anna Jacobson, 349, 441; monetary history and, 452–53, 455
- secular stagnation, 303, 460, 477
- seigniorage, 33, 57, 60–62; fiscal inflation without, 521; hyperinflation and, 451–52; open market operations and, 312–14
- seigniorage revenue: monetary tightening and, 449, 450; in United States, 60–61
- Sergeyev, Dmitriy, 208
- Seven Year's War, financing of, 348

sale of government debt and, 10 Shiller, Robert J., 63, 98, 103 Shlaes, Amity, 251n shocks: aggregate demand, 108–10; AR(1) monetary policy, 167-68, 397-400; consumption, 93; definitions of, 40, 107, 115, 159-60; deflationary, 177; discount-rate, 111–15; dividend, 130; marginal cost, 118; MIT, 164; offsetting, 412-13; Phillips curve, 118; responses to expected, 124-26. See also deficit shocks; fiscal shocks; inflation shocks; interest-rate shocks; monetary policy shocks short-run elasticities, 314-15 short-run endogenous velocity, 314 short-run nonneutrality, 129 short-term government debt: continuous time and, 71, 73-74; conventional view of, 27; fiscal shocks and, 67; incentive properties of, 249-50; as money, 325; present value formula for, 217 short-term indexed debt, 298-99 Silva, Djanir H., 519 Sims, Christopher A., 163; American Economic Association Presidential Address, 388-90, 522; on central bank holding nominal debt and the price level, 297; on Cleveland and gold reserve, 240-41; on disturbance laglength restrictions, 494; fiscal theory added to backward-looking model and, 425; on Fisherian response, 131; on FTPL, 522; on interest rate increases and inflation, 524; on interest rate peg, 506; "Macroeconomics and Reality" critique, 353, 418; on Mexico and dollarization, 245, 246; on ordering of surprises, 453; on price puzzle, 133-34; residual money demand and, 387; "stepping on a rake" and, 127-28, 180-81, 226 Sleet, Christopher, 216 Smets, Frank, 186, 375 Smith, Adam, 7, 417, 508

social programs, 208, 209, 521

Social Security, 208, 209, 521

sovereign default, 297, 304

speculative inflation, 441

speculative hyperinflation, 431

and, 525

sovereign debt crisis, 26, 27, 251-52

sovereign debt management, fiscal theory

556 INDEX

spread peg, CPI standard and, 282, 283

spread target, 268–77; debt sales with, 275–77; fiscal theory with, 271–75

Srinivasan, Naveen, 379, 382

s-shaped surplus process, 13, 83, 86, 92–94, 162; reasonableness of, 95–97; in continuous time, 167–69

stability: determinancy *vs.*, 415; interest rate peg and, 320–22; meaning of term, 396–97

- stabilizations, equilibrium section patches and, 379–83
- stagflation, 85, 114
- stagnation, secular, 303, 460, 477

"state-contingent default," 95

- Stepping on a rake, 127–28
- sticky price models, fiscal theory in, 116–86, 517; alternative surplus processes, 160–62; continuous time and, 162–82; higher or lower inflation and, 131–35; Leeper and, 505; long-term debt and, 126–28; neutrality and, 129–31; policy rules and responses in, 147–60; review, 182–86; surplus process and, 135–47
- sticky price new-Keynesian model, 117–26, 401– 10; fiscal underpinning of, 404–8; interest rates and inflation and, 401–4; responses to AR(1) monetary policy disturbances, 408–10

sticky prices: central bank liabilities and, 293– 94; effect on interest rate and discount rate, 71; indexed debt target and, 280, 281. *See also* Keynesian models with sticky prices

- stimulus: COVID-19 inflation and, 478–82; Fed's view of, 318; government response to deflation
- and, 14; as response to crisis, 302, 303 stochastic discount factor, 55, 204, 208
- stochastic inflation target, 140

stochastic intercept policy, 408, 411

stock index ETFs, 193

stock price, price level compared to, 24-26

stock splits, 43, 44–45 stocks present value formula as analogy to

government debt valuation equation=, 26

Stokey, Nancy L., 245, 441

Straub, Ludwig, 183, 189

streams of state-contingent surpluses, assets and liabilities as, 208–10 structural adjustment, 190 structural deficits in U.S., 303

structural shocks, 164; defined, 40

Summers, Lawrence, 477

sunspot inflation, 458

sunspots, 476; at the zero bound, 464–66 super-Fisherian response,122, 408–9; in

- new-Keynesian model and, 367, 368–69 supply curve: flat, 47–49; price level equilibrium
- and, 29 surpluses, 10; advantages of backing money with, 301; business cycles, inflation, and, 85; debt sales and, 11–13; discount rate and present value of, 191; fiscal policy and changes in debt and, 42–44; inflation shock and, 104–5; interest rate shock and, 35–36; market expectations of future, 43–44; market value of nominal debt and present value of primary, 53; nominal debt and, 21, 30; nominal debt sales and, 13–15; present value of, 21, 65; procyclical nature of, 92; real value of nominal debt equal to present value of primary, 23, 24; unexpected inflation and changes in present value of fiscal, 31; United States, 81–86
- surpluses, correlation with business cycle and inflation, 88
- surplus process, 86–98, 185; active and passive policy in a nonlinear model, 141–44; alternative, 160–62; choice of particular, 96; debt target, and active vs. passive fiscal policy and, 138–41; financing deficits using, 90–91; generalization, 97–98; inflation and, 87–88 (*See also* s-shaped surplus process); inflation volatility and correlation with deficits, 88–89; mean and risk of government bond returns and, 91–94; parameters, 146–47; reasonableness of, 144–46; reasonableness of s-shaped surplus process, 95– 97; in sticky price models, 135–47; stylized fact summary, 94; surpluses and debt, 89–90 surplus process estimates, 98–102

surplus rule, responses to interest rate shock with a, 175–79

surplus shocks, 111–15; consumption shocks and, 93

surplus-to-GDP ratio, 54, 63–64, 65; output and, 187–88; in postwar United States, 82–83, 84 sustainability, r < g and, 195–97 Sweden: inflation targets in, 257; price-level target in, 259–60

Switzerland, rise in currency value in, 240

Takahashi, Yuta, 379, 382, 510 targeting the spread. *See* spread target

taxes: capital, 189; labor/wages and, 188–89. *See also* Laffer curve

tax payments: two-period model of the fiscal theory of the price level and, 5–6; value of money and, 3, 7–8

tax rates, fiscal policy specified via, 185

tax revenue, output and, 189-90

Taylor, John, 396, 412, 416, 421

Taylor principle, 3, 396; in new- and old-Keynesian model, 415, 416–17; tied to active fiscal policy, 390

Taylor rule disturbance, interest rates and inflation response to, 399–400

Taylor rules, 33, 40, 145, 274, 322–24; central banks and, 396; Federal Reserve behavior and, 14; fiscal equilibrium trimming and, 383, 384; new-Keynesian model and, 420–22; original, 420; as policy rule, 396; stabilizing unstable but determinate economy, 395–96; timing conventions and, 172; weird, 385–86; Woodford and, 382, conventional doctrine and, 322, 323

term financing, 287

tests, 512; armchair laugh, 497–98; causality, 493– 94; regime, 492–95; time series, 489–90, 491; *t*-tests, 102

Tether (cryptocurrency), 305

Thatcher, Margaret, 344, 346, 347

threats, equilibrium section patches and, 379-83

time series tests, 489–90, 491

time-varying expected returns, 71

time-varying interest rate peg, 33

timing of fiscal inflation, 68

Tobin, James, 337, 338, 453, 454

trade deficit, inflation and, 251n, 252

transversality condition: present value formula and, 142–43; price level equilibrium and, 27–29 Traum, Nora, 97, 517, 525

treasury: game of chicken with central banks, 498– 99; inflation targets and, 259; integrated balance sheets with central banks, 295; price level and split on debt between central bank and, 311, 312; role of, 44–47; uniting central bank and treasury balance sheets, 33

Treasury, U.S.: bond characteristics and, 332–33; electronic money, 333; flat supply curve and, 47–49; helicopter drops and, 336, 337, 338; quantitative easing and, 228–30; reputation for paying debt, 44, 45, 47, 50, 115; value of Treasury debt by maturity, 233 Treasury bonds, central banks and sale of, 46 *t*-statistics, 101 *t*-tests, 102

two-period model of the fiscal theory of the price level, 5–6; active vs. passive with a debt rule, 18–20; budget constraints and active vs. passive policies, 16–18; fiscal policy changes monetary policy, 15–16; fiscal policy debt sales and, 11–13; intuition of the one-period model, 6–8; monetary policy, fiscal policy, and inflation and, 9–11; present value and, 8–9

undetermined regimes, 499-500

unemployment, measuring the "natural" rate of, 269

unexpected inflation: equilibrium selection policy and, 360–62; fiscal news and, 34; fiscal policy and, 30–31, 33–34; fiscal policy shock and, 42; policy shocks and parameters of, 150–51

unexpected inflation identity, 63, 65, 72

United Kingdom: economic crises in 1950s through 1970s, 302; financing Napoleonic wars and, 348; financing WWI in, 350; inflation stabilization in, 345–47; microeconomic reform in 1970s and 1980s, 190; perpetuities in, 248

United States: COVID-19 inflation in, 51, 146, 478-86; currency and debt crisis in 1970s, 302; deficits of Social Security and Medicare as fiscal challenge, 521-22; digital payment system in, 306; experiment with money supply target in, 457; financing of war in, 348-50; fiscal reform in 1982 and 1986 in, 346-47; gold standard in, 240-41, 242-43; indexed debt (TIPS) in, 270-71; inflation in, 302; inflation in 1970s in, 68, 84, 415-17, 456-57, 523-24; inflation stabilization in, 345-47; Keynesianism in, 352; large debts and deficits in, 497-98; liquidity trap in, 474; maturity structure in, 70, 71, 248; maturity structure of U.S. debt, 233-34; microeconomic reform in 1970s and 1980s in, 190; monetarism and 1970s inflation in, 456-57; possible restructuring of U.S. debt, 302-3; quantitative easing in, 231; quiet inflation in postwar, 114–15; recession in 1980 and 1982 in, 347; resumption of growth in 1980s in, 524; r < g debate and current fiscal policy issues in, 198-99; seigniorage revenue in, 60-61; short-term interest rates at zero in, 458, 459, 460; structural deficits as central fiscal problem in, 303; structural primary

558 INDEX

United States (continued)

deficits in, 198-99; surplus and unemployment in, 82; surpluses and debt in, 81-86; use of buyouts and stimulus spending in response to crisis in, 302, 303; use of fiscal stimulus in, 50; WWII interest rate peg in, 455-56; zero bound on nominal interest rates in, 145; zero interest rates in, 477. See also Federal Reserve; Treasury, U.S.

unit of account, 27; short-term debt as, 301

Unpleasant Monetarist Arithmetic (Sargent & Wallace), 346, 449-51, 507

Uribe, Martin, 131, 134, 245, 321, 383, 386, 419, 460

utility function model, money in, 432-39

valuation equation, 509; linearized, 62, 63

VAR (vector autoregression), 39; answering causal questions using, 124-25, 126; impulse-response functions of, 103; exogenous shock identification in, 107-8; surplus process estimate using, 98, 99–100, 101–2; surplus shocks to, 111–12; tools, 52 VAR(1) form of a larger model, 36 VAR estimates, price puzzle and, 133-34

Velde, François R., 300, 350, 523

velocity shocks, 457, 461

Vietnam War, 252, 456, 523

Violante, Giovanni L., 183

Volcker, Paul, 347

voters, pain of inflation and, 246-47

wage-price spirals, 416

wages, taxes and, 188-89

Walker, Todd B., 97, 517, 521–22

Wallace, Neil: on early U.S. fiscal affairs and European fiscal integration, 522; game of chicken metaphor and, 498-99; on indeterminancy in overlapping generations setup, 520; on interest rate pegs, 321; Modigliani-Miller theorem, 507-8; rational expectations and, 417, 432; real bills doctrine and, 508; Unpleasant Monetarist Arithmetic, 180, 346, 427, 449-51; 507 Waller, Christopher, 110, 208 Wall Street Journal (newspaper), 461 Walrasian equilibrium, 29, 388, 510, 511; active fiscal policy and, 18

Walras' law, 509

war, fiscal backing and financing, 348-50

wealth effect, 198, 519; aggregate demand and, 27, 415; of consumption, 27; helicopter drop and,

337; over-valued central bank liabilities and, 289

wealth tax, via inflation, 482-83

Weidenmier, Marc D., 350

weighted inflation identity, 72, 79, 157

Werning, Iván, 189, 463, 466, 470-471, 472

Wicksell, Knut, 357, 360, 417

Wieland, Johannes, 421, 472, 474

Willems, Tim, 518

Williams, Rebecca, 259

Williamson, Stephen D., 208

- Woodford, Michael, 386; adaptive expectations model and, 424, 425; on central bank and state variable, 375, 376; on cutting off inflationary equilibria, 382; on how expectations of the future cause action today, 377, 378; on fiscal equilibrium trimming, 383, 384; on forward guidance, 471; Interest and Prices, 506; on maximizing welfare, 411; new-Keynesian model and, 35, 39, 117, 357, 358, 359, 419; new-Keynesian model and zero bound and, 474, 475; on fiscal theory, 506; residual money demand and, 386; on setting short-term interest rate, 49; stopping inflation or disinflation and, 379; on valuation equation as budget constraint, 509; Wicksell and, 417
- World War II: financing of, 348, 350; interest rate pet on long-term bonds and, 455-56 World War I, financing of, 348, 350 Wouters, Raf, 186, 375

Yeltekin, Şevin, 216

zero bound, 60, 373, 458-77; experiment, 458-63; Japan and, 356; on nominal interest rates, 145; Occam's razor and, 462-63; summary and implications, 476–77 zero bound puzzles, 463-75; deflation jump, 466-69; forward guidance, 470-72; frictionless limit, 469-70; literature and patches, 474-75; magical multipliers and Bastiat puzzles, 472-74; removing sunspots, 464-66 zero interest rates, in Japan and the United States, 477; Keynes on, 476 zero lower bound (ZLB), 458 zero money demand, price level equilibrium and, 27-28,29 Zha, Tao, 514