

Incomplete Data, Imperfect Markets

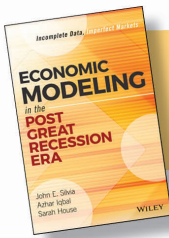
ECONOMIC MODELING

in the

**POST
GREAT
RECESSION
ERA**

John E. Silvia
Azhar Iqbal
Sarah House

WILEY



From *Economic Modeling in the Post Great Recession Era*.
Full book available for purchase [here](#).

Contents

Preface/Justification xiii

Acknowledgments xxi

Chapter 1 Setting the Context 1

- The Problem with Uncritical Assumptions in a
Less-Than-Perfect Economy 2
- The Problem with Models in an Imperfect Economy 3
- Four Characteristics of a Less-Than-Perfect Economy 4
- Economic Policy Inconsistencies—The Parable of
Strange Bedfellows 13

Chapter 2 Dynamic Adjustment in an Economy: Frictions Matter 15

- Introduction 16
- Quantifying Frictions: Is the Long-Run Average a
Useful Guide for the Future? 32
- Modeling Dynamic Adjustment due to Economic Frictions:
Decision Making in an Evolving World 49
- Dynamic Economic Adjustment: An Evolution unto Itself 67

Appendix 68

- A Case for the Multiple Markets: 1983–2008 68
- The Labor Market: 1983–2008 70

Chapter 3 Information: Past Imperfect, Present Incomplete, Future Uncertain 73

- Story Behind the Numbers 76
- Conclusion 103

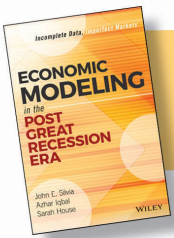
Chapter 4 Price Adjustment and Search for Equilibrium 105

- What Barriers Are There to Perfectly Flexible Prices? 107
- Implications 112
- Finding Dynamic Adjustment in the Data 116
- Conclusion 121

Chapter 5	Business Investment: This Time Is Different	123
	Drivers of Business Spending	125
	Putting It All Together: Explaining Slow Recovery in Capital Investment	134
Chapter 6	Corporate Profits: Reward, Incentive, and That Standard of Living	135
	Introduction: Profits as Essential Partner	136
	The Role of Profits in the Economic Cycle: Five Drivers	137
	The Role of Profits: Incentives and Rewards	140
	Concluding Remarks: Modeling Profits	167
Chapter 7	Labor Market Evolution: Implications for Private-Sector and Public-Policy Decision Makers	169
	Part I: Labor Market Imperfections	171
	Part II: Heterogeneity in the Labor Market	182
	Part III: How Do Secular Labor Market Trends Impact Economic Policy?	196
Chapter 8	Inflation: When What You Get Isn't What You Expect	205
	Introduction	206
	What Is Inflation?	207
	Why Does Inflation Matter?	208
	What Determines Inflation?	212
	Inflation after the Great Recession	219
	Application: Predicting if Central Banks Can Achieve Price Stability	230
Chapter 9	Interest Rates and Credit: Capital Markets in the Post-Great Recession World	235
	Imperfect Guidance in an Uncertain World	236
	A Look at Actual History over the Long Run	247
	Credit and Administered Rates	250
	Imperfect Information and Credit	255
	Conclusion: Shift from Historical Benchmarks	280
Chapter 10	Three-Dimensional Checkers: Open Economy, Capital Flows, and Exchange Rates	281
	Newton's Third Law	282
	Introducing a New Price to the Analysis: The Role of Exchange Rates	289

Three-Dimensional Checkers on an International Playing Field	295
A Perfect Model in an Imperfect World	298
Concluding Remarks: Future Looks Different	330
Chapter 11 Assessing Economic Policy in an Imperfect Economy	331
Generalized Policy Model	333
Rules and Reputation: Beyond Economic Benchmarks	338
Confronting Our Three Market Imperfections	340
Economic Policy in the Context of an Imperfect Economy	359
About the Authors	361
Index	363

From *Economic Modeling in the Post Great Recession Era: Incomplete Data, Imperfect Markets*, by John E. Silvia, Azhar Iqbal, and Sarah House. Copyright © 2017, SAS Institute Inc., Cary, North Carolina, USA. ALL RIGHTS RESERVED.



From *Economic Modeling in the Post Great Recession Era*.
Full book available for purchase [here](#).

CHAPTER 1

Setting the Context

Returning from holiday on September 3, 1928, Alexander Fleming began to sort through petri dishes containing colonies of *Staphylococcus*, a bacterium that causes boils and sore throats.

Fleming noticed something unusual, imperfect, on one dish. The dish was dotted with colonies of bacteria, save for one area where a blob of mold was growing. The zone immediately around the mold—later identified as a rare strain of penicillin—was clear, as if the mold had secreted something that inhibited bacterial growth.

Fleming found that his “mold juice” was capable of killing a wide range of harmful bacteria. Such was the beginning of penicillin and a better life for all of us here.

In economics, it is the unusual, the imperfect, that provides the clues about the way forward—stagnation in the 1970s, tax policy and deregulation in the 1980s, and the financial crisis and subsequent reforms over the past 10 years.

THE PROBLEM WITH UNCRITICAL ASSUMPTIONS IN A LESS-THAN-PERFECT ECONOMY¹

Yet in empirical work, economists are too frequently guided by a number of uncritical assumptions on how the world works. First, as economists, we must recognize and discourage straw man arguments that improperly identify the false choices in economic decisions or portray the outcomes of such decisions only in the context of an idealized economic model.

Second, we must be more critical of arguments that fail to recognize the assumption—or violation—of *ceteris paribus* when the outcomes of economic decisions are quite different when those *ceteris paribus* assumptions do not apply.

Third, we must be more critical of the simplistic view of the efficient market hypothesis—both information and foresight are not perfect.

Fourth, we must be more critical of the argument that economic markets discount all available current information, but fail to distinguish that markets are not clairvoyant for all future information.

¹ John E. Silvia, *Dynamic Economic Decision Making* (Hoboken, NJ: John Wiley & Sons, 2011) contains an extensive review of these challenging assumptions in Chapters 3, 4.

Fifth, we must be more critical to distinguish that private market failures do not automatically imply that government can do better or do something at all.²

Finally, following the line of reasoning of Captain Barbosa, economic rules are more like guidelines rather than rules.³

THE PROBLEM WITH MODELS IN AN IMPERFECT ECONOMY

Economic outcomes rarely come about as seamlessly as predicted by theories and models. As economists, we should be more critical on overly simplistic models that assume away the complexities of the modern economy.

As economists, we should be more critical of irrelevant models that solve problems that no one is seeking to address.

As economists, we should be more critical of models that assume away the essential problem to achieve precise mathematical results in an imprecise world.

As economists, we should be more critical of essays that claim—with surprise—that no one before has looked at this problem.

As economists, we should be more critical about models that assume supply and demand balance out rapidly and unfailingly and that perfect competition reigns in markets.

As economists, we should be more critical of models that cannot assign a probability to a critical event and then rule out that critical event when that event is crucial to a fair assessment of risks. Low-probability events, with high costs, are still very expensive.

As economists, we should be more critical about models that exclude almost all consequential diversity and uncertainty of households and firms—characteristics that in many ways are fundamental to the outcomes of the actual economy. This also includes the failure to include an extensive financial sector in many models.

² James Buchanan, *Democracy in Deficit* (Cleveland, OH: Academic Press, 1977). Government has its own pattern of rent seeking that is often not in the public interest of the broader society.

³ *Pirates of the Caribbean*, Walt Disney Pictures, 2003.

As economists, we should be more critical of models that are useful only in a trend economy where they are estimated—when recessions, financial instability, and periods of the unusual are the real challenge to examine.

FOUR CHARACTERISTICS OF A LESS-THAN-PERFECT ECONOMY

Dynamic Adjustments—Things Take Time

First, we are familiar with the proposition that monetary policy acts with lags, often long and variable. In theory, we have also begun to appreciate that the efficiency of countercyclical fiscal policy has been diminished by the significant recognition of policy implementation lags since the 1960s. Unfortunately, however, the distinction between temporary and permanent policy changes has been continuously lost in policy making in recent years. Milton Friedman won his Nobel Prize for the permanent income hypothesis, but the failure of the 1968 tax surcharge appears to have been forgotten by today's policy makers. Temporary, lump-sum tax rebates are simply timing changes—not permanent action—and do not jump-start the economy. Cash for clunkers is a classic recent example. As a result, countercyclical fiscal policy has fallen by the wayside and now the focus of fiscal policy is more on long-run growth—incentives and disincentives for labor, capital, technology, and innovation.

Identifying permanent or temporary changes in economic policy has been made particularly difficult by the significant political election turnovers during the past 20 years. This has led to inconsistent economic policy and a significant shortening of time horizons for decision makers—especially for long-lived investment. In contrast to the Eisenhower vision on infrastructure—the interstate highway system—the focus today is on isolated, one-off, pork barrel projects to jump-start the economy; consider, then, the experience of Japan.

Moreover, one must think critically of the marginal cost/marginal benefit trade-off of individual infrastructure projects, not the blanket adoption of poorly specified spending programs. There must be a distinction between what we want and what we can afford, what is nice to have, and what can be justified by economic choices. Economists make choices—politicians make promises.

Second, dynamic adjustments are not symmetric across sectors of the economy. Capital moves faster than labor, cash moves faster than capital—a lesson in the current economic expansion. Asymmetric liquidity and credit constraints have limited consumption choices despite fiscal stimulus and monetary easing in the current recovery. A 10 percent increase in asset prices does not elicit an equal and opposite reaction as a 10 percent decline in asset prices within the economy. Going down stairs does not elicit the same amount of effort as going up stairs.

Third, adjustments occur not simply to new information, but when that information is different from what was expected. Markets are forward looking and discount expected future outcomes. Changes in asset prices are driven by the difference between expected and realized earnings, employment gains, inflation, and personal income patterns. Earnings, interest rates, oil prices, or regulatory actions by federal agencies or even the Supreme Court, for example, when different from market expectations, elicit significant reactions, and the movements are distinctly asymmetric.

Fourth, prices often overshoot—whether we are looking at exchange rates, interest rates, or commodity prices—oil prices in particular. Overshooting reflects the interaction between a complex of economic forces—not mere speculation. Expectations are not static; they evolve, reflecting the new information that is constantly appearing on our computer screens and the differentials between prices across markets.⁴

Therefore, our economy is seldom at equilibrium. Instead, there is a steady over/undershooting of prices, as illustrated in Figures 1.1 and 1.2 for inflation and 10-year U.S. Treasury rates since 1982.

However, in many cases, prices are not allowed to completely adjust due to public policy. This creates tension and persistent disequilibrium in the markets—most recently illustrated by Greece. Exchange rates are commonly not allowed to be free—they are often managed—see the recent experience in China. Since exchange rates do not completely adjust, interest rates, inflation, and growth do not completely adjust either—a continued disequilibrium—which often leads to a sudden break such as illustrated by the European Exchange Rate Mechanism (ERM)/British pound in 1992 and the Swiss franc/euro movements in 2015 (Figures 1.3 and 1.4).

⁴ Rudiger Dornbusch, “Expectations and Exchange Rate Dynamics,” *Journal of Political Economy* 84 (December 1976): 1161–1176.

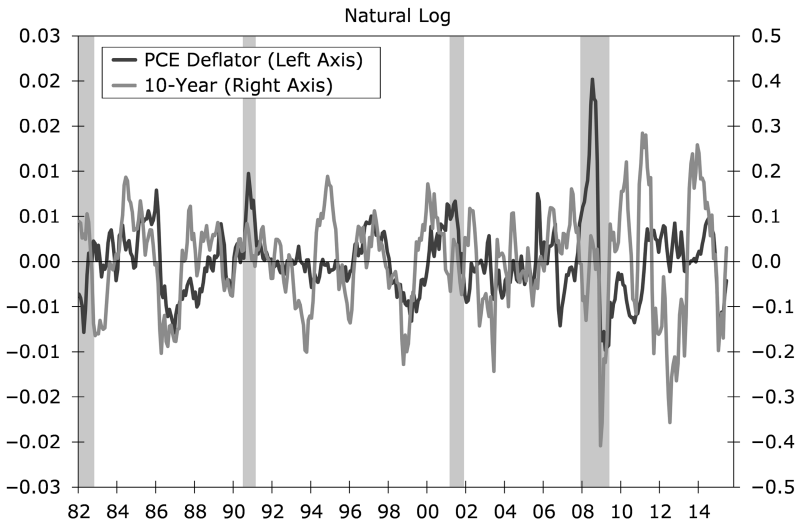


Figure 1.1 Deviation from the Long-Run Trend
 Source: U.S. Department of Commerce and Federal Reserve Board

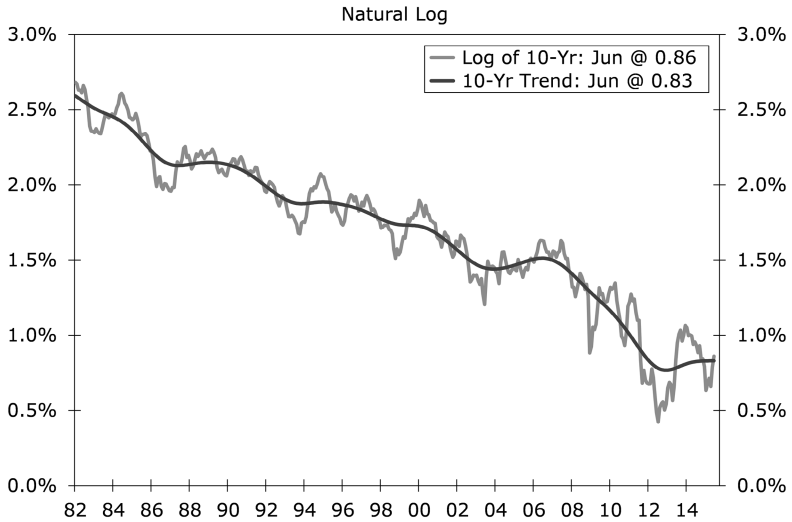


Figure 1.2 10-Year Treasury Yields
 Source: Federal Reserve Board

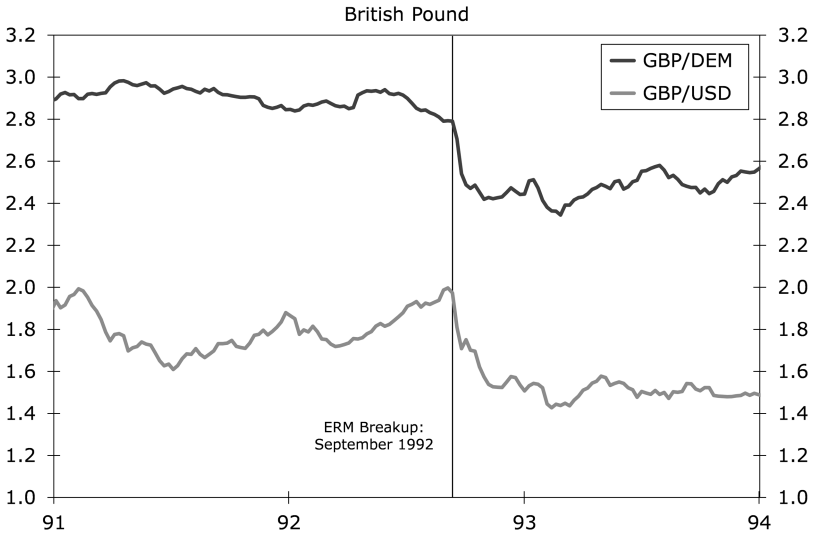


Figure 1.3 ERM Breakup
 Source: Bloomberg LP

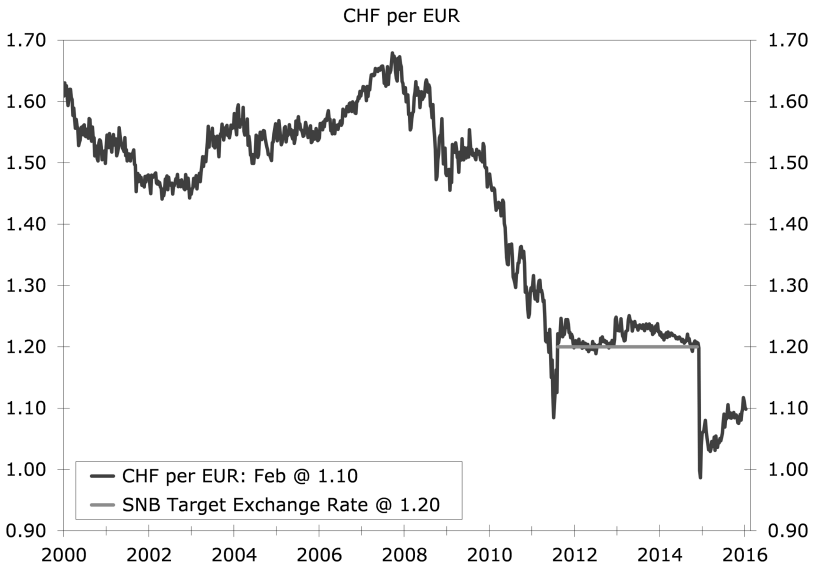


Figure 1.4 Swiss Exchange Rate
 Source: Bloomberg LP



Figure 1.5 The Beveridge Curve
Source: U.S. Department of Labor

In addition, capital is not perfectly mobile—think of Japan in the 1980s and China today—and that limits the ability of interest rates, exchange rates, and the real return on physical capital to adjust and results in pent up demand/supply imbalances in capital flows over time.

Finally, we recognize that many economic series are not mean reverting, as illustrated by the outward shift in the Beveridge Curve more than six years after the labor market began to recover (Figure 1.5) and the U-6 unemployment rate (Figure 1.6).

Imperfect Information—What You See Is Not What You Get

In recent years, we have witnessed a series of examples where the information we see is not quite the reflection of reality. In mid-2014, there was an instance where the Institute for Supply Management (ISM), a key economic indicator, was released, re-released, and then re-rereleased again in the same morning to correct a series of errors. This sequence created confusion in the markets, and no doubt, many

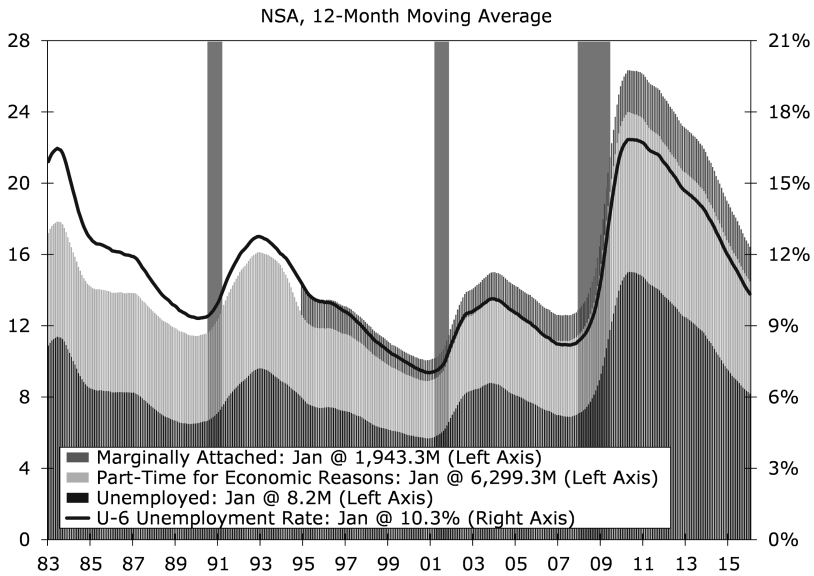


Figure 1.6 U-6 Unemployment
 Source: U.S. Department of Labor

missed trades and consequent capital gains and losses that would not have occurred if the correct number had been initially released.

We are also very aware that, despite the monthly Bureau of Labor Statistics (BLS) releases and explanations, the public remains confused about the differences between the establishment and household surveys. How can there be more jobs and a rise in the unemployment rate in the same month? Moreover, how come the number of jobs can be revised for prior months but not the unemployment rate? Additional series, such as retail sales, are also continuously revised—information remains imperfect.

An Eagle That Chases Two Fish Catches Neither

In public policy and in public discussions, there is persistent confusion between relative and absolute prices. Media coverage does not make the distinction between real and nominal values—weak nominal retail sales can coexist with solid real consumer spending. As illustrated by Lucas in his 1972 paper, decision makers cannot distinguish if a price

change reflects a relative price change or a change in the aggregate price level.⁵

Public and professional discussion continues the confusion between real and nominal prices—real wages, real interest rates, and real exchange rates drive real behavior in multiple markets, yet we continuously cite changes in nominal wages, nominal interest rates, and nominal exchange rates as drivers of economic activity.

Economic information is only one example of imperfect information. Tax and spending policy, and often nonpolicy in Washington, reflects a constant changing of the rules and rent-seeking behavior that reduces the efficiency of the economy. Tax and spending policy is constantly being changed. Uncertainties about highway funding make long-term decision making impossible. Tax cuts are phased-in and can easily be altered along the way. Obamacare, Dodd-Frank, and the many Basel Accords all generate rules—often vague and in bits and pieces—reducing the certainty of long-run credit and financial allocation decisions. Imperfect information generates imperfect decisions.

In monetary policy, the price we pay for committee-based policy making is imperfect information on the direction of monetary policy. There is a trade-off between more voices and greater transparency. There are practical trade-offs and weighing problems with multiple goals.

In labor markets, the search costs for information, as illustrated by research by Mortenson⁶ and Phelps,⁷ reflect reality in many economic sectors and the reality that nominal values can impact real economic variables—imperfect information is not neutral.

To illustrate, Figure 1.7 gives visual evidence about the ongoing debate about the persistently weak reported real gross domestic product (GDP) in the first quarter relative to the rest of the quarters since 1985. Figure 1.8 illustrates the mixed message of the discrepancy between GDP and gross domestic income (GDI).

⁵Robert E. Lucas, "Expectations and the Neutrality of Money," *Journal of Economic Theory* 4 (April 1972): 103–124.

⁶Dale T. Mortensen, "Job Search and Labor Market Analysis," in *Handbook of Labor Economics*, vol. 2 ed. Orley Ashenfelter and Richard Layard (Amsterdam: Elsevier, 1986), 849–919.

⁷Edmund S. Phelps, "Money-Wage Dynamics and Labor Market Equilibrium," *Journal of Political Economy* 76 (Part 2, July/August 1968): 678–711.

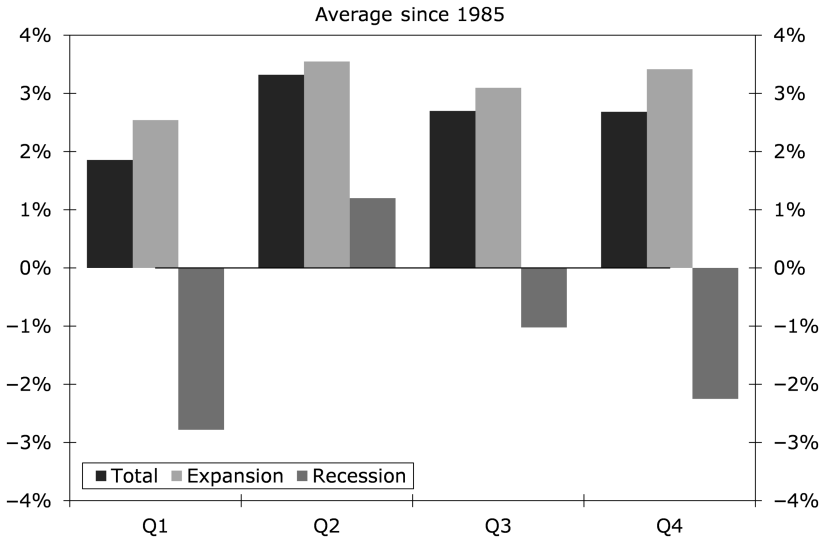


Figure 1.7 Real GDP Changes—CAGR
 Source: U.S. Department of Commerce

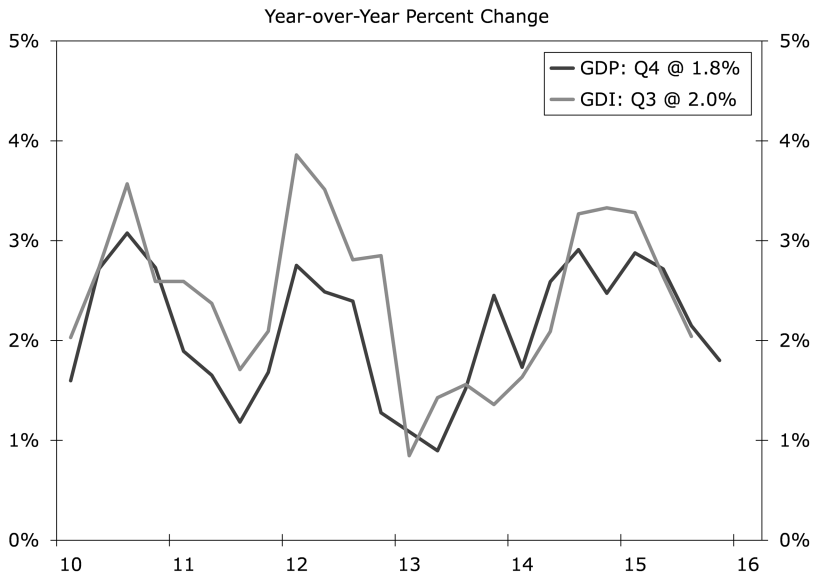


Figure 1.8 Gross Domestic Product vs. Income
 Source: U.S. Department of Commerce

Imperfect information is obvious when we analyze the labor market. Which unemployment rate is the focus of monetary policy and financial markets? If the unemployment rate is the focus, then what added value is there to having a labor market index? Should we read the existence of a labor market index as suggesting that the unemployment rate is imperfect—as both the target of policy and a fair reading of the labor market? Our analysis indicates that the labor market index does provide some additional guidance on credit quality in the increasingly complex labor market of the twenty-first century.⁸

State-Dependent Pricing

Evidence suggests that economic agents follow a strategy of state-dependent pricing such that there is no simple pricing rule, but that pricing reflects the perceived state of the economy and is not simply dependent on time. What is interesting is that this is the type of pricing policy currently being followed by the Federal Reserve with respect to the federal funds rate.⁹ Target pricing, rather than optimal pricing, appears to more often explain market behavior. This same pattern appears consistent with monetary policy and indicates that monetary policy, under certain conditions, can have real economic effects when price adjustments are not uniform and instantaneous.

Inflation inertia in price adjustments allows for monetary policy shocks to have long-lasting effects when some prices are predetermined. Once again, if prices are initially predetermined, but not all firms adjust prices in response to a monetary shock due to sticky information, then real economic effects are the result.¹⁰ Sticky information results from the observation that it is costly to obtain and process information—so firms do not continually update prices—they choose a path for prices. This allows for the real effects of changes in monetary policy in the short run.

⁸ John E. Silvia and Azhar Iqbal, “Measuring the State of the Labor Market: A New Index,” Wells Fargo Special Commentary, October 28, 2013.

⁹ Andrew S. Caplin and Daniel F. Spulber, “Menu Costs and the Neutrality of Money,” *Quarterly Journal of Economics* 102 (November 1987): 703–725.

¹⁰ N. Gregory Mankiw and Ricardo Reis, “Sticky Information versus Sticky Prices: A Proposal to Replace the New Keynesian Phillips Curve,” *Quarterly Journal of Economics* 117 (June 2002): 358–374.

ECONOMIC POLICY INCONSISTENCIES—THE PARABLE OF STRANGE BEDFELLOWS

Policy inconsistencies reflect a frequent conflict between economic and political objectives and validate the volatility in the index of economic policy uncertainty (Figure 1.9). Moreover, policy by polling is a growing phenomenon, and yet we view many of these polls as counterproductive. Frequent political polls indicate that Congress is held in low esteem and yet most congressmen are reelected—a disconnect. Such polls tell us little about the actual economic value or effectiveness of policy since the polling sample so often reflects the self-selected viewing or listening audience itself.

Moreover, the actual policy put in place reflects the influence of an entire policy influence industry—lobbyists, D.C.-based news correspondents, Fed watchers, and D.C.-based political consultants—often involved in rent-seeking behavior that may have little positive influence on real economic growth.

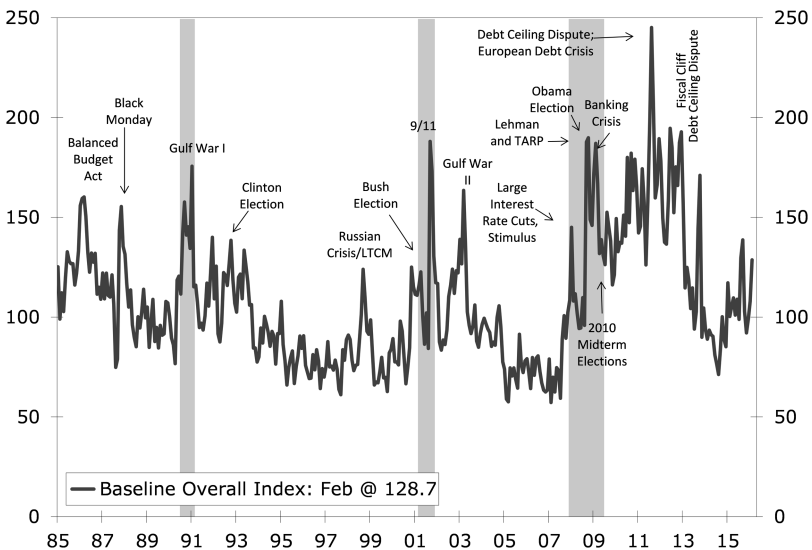


Figure 1.9 Index of Economic Policy Uncertainty

Source: Baker, Bloom and Davis¹¹

¹¹ Scott Baker, Nicholas Bloom, and Steven Davis, Measuring Economic Policy Uncertainty, NBER working paper No. 21633, October 2015, www.policyuncertainty.com/.

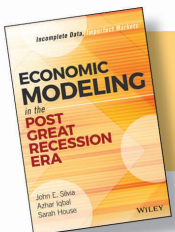
Furthermore, policy initiatives, such as the Affordable Care Act, are subject to frequent changes that limit the ability of private actors to respond to any tentative but unclarified elements of the original legislation. Fiscal tax policy is subject to perennial revisions every legislative session. Trade and environmental policies are altered by federal agencies, and the initial legislation is regularly revised in action, thereby increasing the level of uncertainty of the impacts of legislation, limiting the willingness of the private sector to react to any initial legislation, and dragging out the response of economic actors. The long history of tariff policy in the United States has been a study of politics above economics.

Meanwhile, for fiscal policy, the continual alteration of tax laws undermines the ability of private actors to invest for the long term. Federal spending is often reflective of relative political power rather than economic rationale.

As for trade policy, Paul Krugman at a recent policy conference focused on the marginal costs/marginal benefit of an additional trade deal.¹² This reflects a more thoughtful approach to trade policy and a good benchmark for infrastructure spending rather than the absolute black-and-white approach to many policy issues. What is the balance between the marginal benefit/marginal cost of the next trade deal? What is the balance for the next infrastructure project?

¹²“TPP: No Bi-Dea?” NABE Policy Conference, March 10, 2015.

From *Economic Modeling in the Post Great Recession Era: Incomplete Data, Imperfect Markets*, by John E. Silvia, Azhar Iqbal, and Sarah House. Copyright © 2017, SAS Institute Inc., Cary, North Carolina, USA. ALL RIGHTS RESERVED.



From *Economic Modeling in the Post Great Recession Era*.
Full book available for purchase [here](#).

About the Authors

JOHN E. SILVIA

John Silvia is managing director and the chief economist for Wells Fargo. Prior to his current position, John worked on Capitol Hill as senior economist for the U.S. Senate Joint Economic Committee and chief economist for the U.S. Senate Banking, Housing, and Urban Affairs Committee. Before that, he was chief economist of Kemper Funds and managing director of Scudder Kemper Investments, Inc. John was formerly president and a director of the National Association for Business Economics (NABE) and was former president of the Charlotte Economics Club. He has also served on economic advisory committees for the Federal Reserve Bank of Cleveland, the Federal Reserve Bank of Chicago, and the Public Securities Association.

John was awarded a NABE Fellow Certificate of Recognition in 2011 for outstanding contributions to the Business Economics Profession and Leadership among Business Economists to the Nation. For the second time in three years, he was awarded the best overall forecast by the Federal Reserve Bank of Chicago, as well as the best unemployment rate forecast for 2011. John has been awarded the Adolph Abramson award for the best article in economics published in *Business Economics* for a given year. John holds BA and PhD degrees in economics from Northeastern University in Boston and has a master's degree in economics from Brown University. John's book *Dynamic Economic Decision Making* was published by Wiley in August 2011. John's co-authored book, *Economic and Business Forecasting: Analyzing and Interpreting Econometric Results*, was published by Wiley in March 2014.

AZHAR IQBAL

Azhar Iqbal is a director and econometrician at Wells Fargo, responsible for providing quantitative analysis to the Economics group and modeling and forecasting of macro and financial variables. He is based in Charlotte, North Carolina.

Before joining Wells Fargo in 2007, he was an economist and course instructor at the University of Karachi in Pakistan. He has also worked as an economist on funded projects at the United Nations.

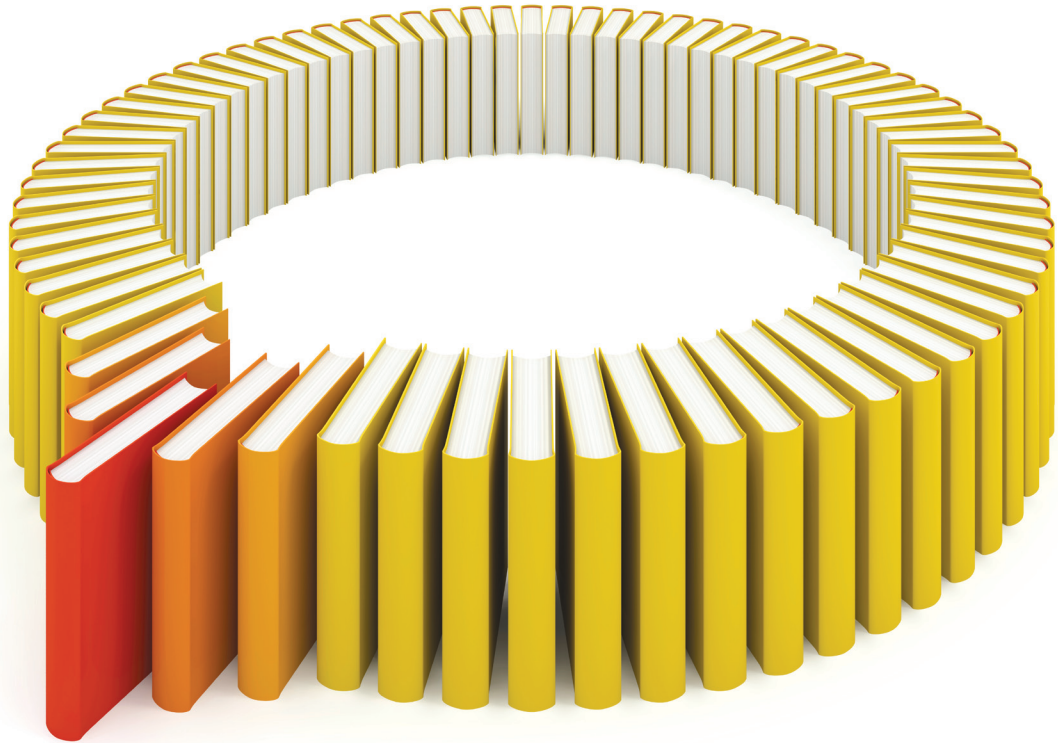
Azhar has three master's degrees. He earned his master's degree in economic forecasting from the University at Albany, State University of New York. He also has master's degrees in applied economics from the University of Karachi, and in econometrics and mathematics from the University of the Punjab in Lahore, Pakistan.

Azhar won the 2012 and 2014 NABE Contributed Paper Award as well as the 2010 Edmund A. Mennis Contributed Paper Award for best papers from the National Association of Business Economics (NABE). A strong supporter of education, Azhar teaches a graduate course, Advanced Business and Economic Forecasting, at the University of North Carolina at Charlotte. Azhar's co-authored book, *Economic and Business Forecasting: Analyzing and Interpreting Econometric Results*, was published by Wiley in March 2014.

His interests focus on forecasting, time series, panel data, and macroeconomics. Azhar has presented research papers at the American Economic Association, Econometric Society meetings, the Panel Data Conference, and other international conferences. He has published over two dozen papers in the *Canadian Journal of Economics*, *Global Economy Journal*, *Business Economics*, *Journal of Business Forecasting*, and others refereed journals.

SARAH WATT HOUSE

Sarah House is an economist with Wells Fargo Securities. She received her BA in economics and political economy from Tulane University and her MSc from the London School of Economics. Sarah is a member of the National Association of Business Economics and Charlotte Economics Club.



Gain Greater Insight into Your SAS[®] Software with SAS Books.

Discover all that you need on your journey to knowledge and empowerment.

 support.sas.com/store/books
for additional books and resources.


THE POWER TO KNOW.®