

is sometimes a little short and abstract, such that in order to actually work with these concepts, the reader might have to consult additional sources providing more detailed coverage. Quite naturally, the selection of the material covered in the book is driven by the research experience and agenda of the authors of the different chapters. To act as an encompassing reference volume for the field, a more extensive treatment of recent developments and work in agent-based computational economics outside the group of contributors would have been needed. Nevertheless, this is an interesting and timely book providing an overview over important developments in this growing field of research.

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## E Macroeconomics and Monetary Economics

*The Structural Foundations of Monetary Policy*. Edited by Michael D. Bordo, John H. Cochrane, and Amit Seru. Stanford: Stanford University Press, Hoover Institution Press, 2018. Pp. ix, 309. ISBN 978-0-8179-2134-7, cloth; 978-0-8179-2136-1, EPUB; 978-0-8179-2137-8, Mobi; 978-0-8179-2138-5, PDF.  
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If a newly minted PhD economist were joining the research department at a central bank, I would hand them a copy of this volume, which summarizes the proceedings from the 2017 Hoover Institution conference, “The Structural Foundations of Monetary Policy.” This book quickly brings readers up to speed about some of the issues currently facing policy makers around the world, many of which are too new or too specialized for coverage in standard graduate curricula.

The volume poses three main questions. First, are the models developed over the last three decades still useful guides for policy makers? This question applies to statistical models aimed at estimating the natural rate of interest, simple policy rules that prescribe the conduct of monetary policy and structural models that explicitly define the interactions between households, firms, and the government. Second, how should a central bank set up its balance sheet and policy implementation framework in order to best

achieve price stability and maximum employment? Finally, what does the emergence of digital currencies imply for the payment system and the central bank’s price stability mandate? At first glance, these issues may seem quite disconnected from one another. However, the interactions between these areas imply that policy makers cannot answer these questions in isolation; changes in the economy and financial market landscape have implications for a given policy maker’s preferred model of the economy and their choice of policy implementation framework. To answer these questions, the conference draws on the views and work from a number of current and former Federal Reserve officials as well as leading academic economists.

On the first question, the volume presents a balanced view on the merits of formal models as a guide for policy makers. Chapter two introduces readers to the natural rate of interest, known as  $r^*$ . The essays and general discussion highlight the potential benefits and pitfalls of this important theoretical concept. Volker Wieland highlights the difficulty in estimating this unobservable object and Richard Clarida (prior to joining the Federal Reserve Board) acknowledges the communication issues for policy makers if  $r^*$  varies over time (pp. 52 and 129). In chapter 3, John Cochrane and Martin Eichenbaum provide an enjoyable point-counterpoint discussion about the modeling and policy implications of the relatively stable inflation during the “quiet zero lower bound” period. Eichenbaum advocates the use of a robustness principle, in which policy makers should “take seriously only model implications that are robust to at least small deviations from rational expectations” (p. 105).

In a similarly balanced view, chapter 1 provides readers with a valuable analysis of the potential choices with regard to a central bank’s balance sheet and its policy implementation framework. To provide additional accommodation to the economy at the zero lower bound, the Federal Open Market Committee (FOMC) undertook several rounds of large-scale asset purchases, which flooded the banking system with excess reserves. As the economy has recovered and the FOMC has begun to shrink its balance sheet, policy makers face numerous decisions regarding the appropriate size, composition, and use of its

balance sheet. Former President of the Federal Reserve Bank of Philadelphia, Charles Plosser, provides a great summary of these issues and highlights the potential institutional and governance issues of maintaining a large balance sheet. Plosser reminds us of a key insight: even in a “floor” system with abundant reserves, the setting of short-term policy rates is not independent of the size of the balance sheet. If a large balance sheet is providing some monetary accommodation, then the central bank’s short-term policy rate may need to be higher than it would be with a smaller balance sheet and fewer excess reserves. Recent work by Hakkio and Smith (2017) formalizes this view and highlights the link between asset purchases, term premiums in bond yields, and the natural rate of interest. Arvind Krishnamurthy argues that operating a large balance sheet could help enhance the stability of the financial system.

Chapter 4 provides a wide range of insights into how the emergence of digital currencies could affect the payment system and the conduct of monetary policy. Laurie Simon Hodrick introduces readers to the distributed ledger technology while Jesús Fernández-Villaverde and Daniel Sanches show us the implications of competition between private digital currencies for price stability. Michael Bordo and Andrew Levin explore the idea of central bank digital currency and how it could easily circumvent the zero lower bound constraint through the introduction of negative interest rates. Many participants at the conference argued that the Federal Reserve should play a leading role in the development of digital currencies.

While I enjoyed reading the volume, I found two minor shortcomings. First, while the exposition is clear and concise and the mathematics are left to a minimum, readers probably need some familiarity with the central bank’s balance sheet and the plumbing of the financial system to understand parts of the volume. Thus, the book is probably most appealing to academic economists and policy makers, rather than the general public. Second, due to the timely nature of the topics discussed in the volume, some parts of the discussion have become a bit stale, even in the relatively short time since the conference. For example, all three papers in chapter 1 discuss the benefits and

issues associated with the Fed’s overnight reverse repurchase agreement facility. Throughout 2018, the interactions between financial market participants and this facility have fallen dramatically, which likely assuages many of the issues raised in the volume. Despite this issue, however, the rapid changes in the financial system and policy landscape underscore the need for conference volumes like this to provide important analysis about the issues currently facing policy makers.

## REFERENCES

Hakkio, Craig S., and A. Lee Smith. 2017. “Bond Premiums and the Natural Real Rate of Interest.” *Federal Reserve Bank of Kansas City Economic Review* 102 (1): 5–40.

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*Blockchain and the Law: The Rule of Code.*

By Primavera De Filippi and Aaron Wright. Cambridge and London: Harvard University Press, 2018. Pp. 300. \$35.00. ISBN 978–0–674–97642–9, cloth. JEL 2018–0943

DeFilippi and Wright’s *Blockchain and the Law: The Rule of Code* is easy to read and provides a nice introduction to the potential scope and importance of blockchains. The coverage is also extensive: from “automated governance” to “Zcash,<sup>1</sup>” it is hard to think of an important aspect of the topic that is not discussed. In this review, though, I will focus on three parts of the book that are of significant economic interest.

The first chapter of the book—and my first topic—is a description of blockchain technology. While this provides a good first overview to those unfamiliar with blockchains, technology is not the comparative advantage of the authors (who are legal scholars.) As a result, the authors oversimplify certain critical aspects associated with blockchains and digital currencies.

For example, while blockchains facilitate exchange on decentralized systems without central authorities, they are not “tamper-proof boxes,” as the authors write on page 2. Importantly, the

<sup>†</sup>The views expressed herein are solely those of the author and do not reflect the views of the Federal Reserve Bank of Kansas City or the Federal Reserve System.

<sup>1</sup>Zcash is a digital currency. They are commonly referred to as cryptocurrencies.