

This PDF includes a chapter from the following book:

# **Distributed Ledgers**

## **Design and Regulation of Financial Infrastructure and Payment Systems**

© 2020 Massachusetts Institute of Technology

### **License Terms:**

Made available under a Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International Public License

<https://creativecommons.org/licenses/by-nc-nd/4.0/>

### **OA Funding Provided By:**

The open access edition of this book was made possible by generous funding from Arcadia—a charitable fund of Lisbet Rausing and Peter Baldwin.

The title-level DOI for this work is:

[doi:10.7551/mitpress/13382.001.0001](https://doi.org/10.7551/mitpress/13382.001.0001)

---

# Preface

Distributed ledgers have the potential to transform economic organization and financial structure. Yet the subject is embroiled in controversy, hype, and terminological inconsistencies. Rather than get waylaid by alternative possible definitions of distributed ledgers (also known as decentralized ledgers), we focus more broadly on an economic analysis of what distributed ledgers can do. We proceed by analyzing key individual components. We also compare and contrast the economic framework with the frameworks of computer science and data management disciplines to clarify the technology and take steps to combine these disciplines.

The familiar but key components of distributed ledgers discussed in this book are ledgers as financial accounts, e-messages and e-value transfers, cryptography, and contracts including multiparty mechanisms. Each component is evaluated and illustrated through the context of historical and contemporary economies, with featured applications in both developed economies and emerging-market countries. These use cases are a hallmark of the book. A recurrent focus is the general equilibrium impact of innovations and welfare gains from innovations featuring key components. This does not require that all components be introduced at the same time.

Contract theory is used to derive optimal arrangements, constrained only by obstacles to trade, featuring how the various aspects of ledgers can deepen infrastructure. Mechanism design and monetary theory are used to study public versus partitioned ledgers and improvements in payment systems. Prudential regulation, rather than being a barrier to innovation, can be improved with the use of distributed ledger technologies.

The goal is to provide blueprints for the *ex ante* optimal design and regulation of financial systems, including not only choices at the end points of the spectrum—of centralized versus decentralized systems, as in the hype—but the choice of hybrid forms in between. Each key component is assessed from both computer science and economic perspectives, and syntheses are offered. Overall, the book provides a vision for where we are heading, being clear about obstacles along the way.