# **SPRINGER NATURE** Link

**Search** 

Home > Business Transformation through Blockchain > Chapter

# Blockchain Economic Networks: Economic Network Theory—Systemic Risk and Blockchain Technology

Chapter | First Online: 22 December 2018

pp 3–45 | <u>Cite this chapter</u>

## **Business Transformation through**

## Your privacy, your choice

We use essential cookies to make sure the site can function. We, and our 94 **partners**, also use optional cookies and similar technologies for advertising, personalisation of content, usage analysis, and social media.

By accepting optional cookies, you consent to allowing us and our partners to store and access personal data on your device, such as browsing behaviour and unique identifiers. Some third parties are outside of the European Economic Area, with varying standards of data protection. See our **privacy policy** for more information on the use of your personal data. Your consent choices apply to springer.com and applicable subdomains.

You can find further information, and change your preferences via 'Manage preferences'. You can also change your preferences or withdraw consent at any time via 'Your privacy choices', found in the footer of every page.

We use cookies and similar technologies for the following purposes:

- > Store and/or access information on a device
- Personalised advertising and content, advertising and content measurement, audience research and services development

Accept all cookies

**Reject optional cookies** 

Manage preferences

the replication of network statistical behavior in cryptographic networks indicates the robust (not merely anecdotal) adoption of blockchain systems. Part II addresses balance sheet network analysis (ongoing obligations over time), first from the classical sense of central bank balance sheet network analysis developed by Castrén (2009, 2013), Gai and Kapadia (2010), and Chan-Lau (2010), and then proposes how blockchain economic networks might help solve systemic risk problems. The chapter concludes with the potential economic and social benefits of blockchain economic networks, particularly as a new technological affordance is created, algorithmic trust, to support financial systems.

This is a preview of subscription content, log in via an institution [2] to check access.

Access this chanter

## Your privacy, your choice

i

We use essential cookies to make sure the site can function. We, and our 94 **partners**, also use optional cookies and similar technologies for advertising, personalisation of content, usage analysis, and social media.

By accepting optional cookies, you consent to allowing us and our partners to store and access personal data on your device, such as browsing behaviour and unique identifiers. Some third parties are outside of the European Economic Area, with varying standards of data protection. See our **privacy policy** for more information on the use of your personal data. Your consent choices apply to springer.com and applicable subdomains.

You can find further information, and change your preferences via 'Manage preferences'. You can also change your preferences or withdraw consent at any time via 'Your privacy choices', found in the footer of every page.

We use cookies and similar technologies for the following purposes:

#### Store and/or access information on a device

Accept all cookies
Reject optional cookies
Manage preferences



## Your privacy, your choice

We use essential cookies to make sure the site can function. We, and our 94 **partners**, also use optional cookies and similar technologies for advertising, personalisation of content, usage analysis, and social media.

By accepting optional cookies, you consent to allowing us and our partners to store and access personal data on your device, such as browsing behaviour and unique identifiers. Some third parties are outside of the European Economic Area, with varying standards of data protection. See our **privacy policy** for more information on the use of your personal data. Your consent choices apply to springer.com and applicable subdomains.

You can find further information, and change your preferences via 'Manage preferences'. You can also change your preferences or withdraw consent at any time via 'Your privacy choices', found in the footer of every page.

We use cookies and similar technologies for the following purposes:

#### Store and/or access information on a device

Accept all cookies
Reject optional cookies
Manage preferences

Albert, R., & Barabási, A. (2002). Statistical mechanics of complex networks. *Reviews of Modern Physics*, 74(1), 47–97.

#### Article Google Scholar

Aldasoro, I., & Alves, I. (2016, September). *Multiplex interbank networks and systemic importance: An application to European data* (Working Paper No 1962). European Central Bank.

#### **Google Scholar**

Armknecht, F., Karame, G. O., Mandal, A., Youssef, F., & Zenner, E. (2015). *Ripple: Overview and outlook* (pp. 163–180). New York: Springer.

**Google Scholar** 

## Your privacy, your choice

We use essential cookies to make sure the site can function. We, and our 94 **partners**, also use optional cookies and similar technologies for advertising, personalisation of content, usage analysis, and social media.

By accepting optional cookies, you consent to allowing us and our partners to store and access personal data on your device, such as browsing behaviour and unique identifiers. Some third parties are outside of the European Economic Area, with varying standards of data protection. See our **privacy policy** for more information on the use of your personal data. Your consent choices apply to springer.com and applicable subdomains.

You can find further information, and change your preferences via 'Manage preferences'. You can also change your preferences or withdraw consent at any time via 'Your privacy choices', found in the footer of every page.

We use cookies and similar technologies for the following purposes:

### Store and/or access information on a device

Accept all cookies
Reject optional cookies
Manage preferences

Brandes, U., Robins, G., McCranie, A., & Wasserman, S. (2013). What is network science? *Network Science.*, *1*, 1–15.

## Article Google Scholar

Brunswicker, S., Matei, S., Zentner, M., Zentner, L., & Klimeck, G. (2016). Creating impact in the digital space: Digital practice dependency in communities of digital scientific innovations. *Scientometrics*, *110*(1), 417–442.

## Article Google Scholar

Buck, J. (2017). Ethereum ppgrade Byzantium is live, verifies first ZK-Snark proof. *Coin Telegraph*. <u>https://cointelegraph.com/news/ethereum-upgrade-byzantium-is-</u>

## Your privacy, your choice

We use essential cookies to make sure the site can function. We, and our 94 **partners**, also use optional cookies and similar technologies for advertising, personalisation of content, usage analysis, and social media.

By accepting optional cookies, you consent to allowing us and our partners to store and access personal data on your device, such as browsing behaviour and unique identifiers. Some third parties are outside of the European Economic Area, with varying standards of data protection. See our **privacy policy** for more information on the use of your personal data. Your consent choices apply to springer.com and applicable subdomains.

You can find further information, and change your preferences via 'Manage preferences'. You can also change your preferences or withdraw consent at any time via 'Your privacy choices', found in the footer of every page.

We use cookies and similar technologies for the following purposes:

### Store and/or access information on a device

Accept all cookies	
Reject optional cookies	
Manage preferences	

Chaturvedi, M. (2017). Contagion in financial (balance sheets) networks. *Viewpoints which matter* blog.

https://chaturvedimayank.wordpress.com/2016/06/22/contagion-in-financialbalance-sheets-networks/

Chinsky, M. (2017). Symbiont wins "Best Distributed-Ledger Technology Project" category at Waters Technology's Buy-Side Technology Awards for second consecutive year. *Business Wire*.

https://www.businesswire.com/news/home/20171103005598/en/Symbiont-Wins-%E2%80%9CBest-Distributed-Ledger-Technology-Project%E2%80%9D-Category

Dale, B. (2017). Investors commit \$100 million to tZERO ICO. *Coindesk*. <u>https://www.coindesk.com/investors-commit-100-million-first-day-funding-</u>

## Your privacy, your choice

We use essential cookies to make sure the site can function. We, and our 94 **partners**, also use optional cookies and similar technologies for advertising, personalisation of content, usage analysis, and social media.

By accepting optional cookies, you consent to allowing us and our partners to store and access personal data on your device, such as browsing behaviour and unique identifiers. Some third parties are outside of the European Economic Area, with varying standards of data protection. See our **privacy policy** for more information on the use of your personal data. Your consent choices apply to springer.com and applicable subdomains.

You can find further information, and change your preferences via 'Manage preferences'. You can also change your preferences or withdraw consent at any time via 'Your privacy choices', found in the footer of every page.

We use cookies and similar technologies for the following purposes:

### Store and/or access information on a device

Accept all cookies
Reject optional cookies
Manage preferences

Embree, L., & Roberts, T. (2009). *Network analysis and Canada's large value transfer system* (Discussion Paper No. 2009-13). Bank of Canada.

#### **Google Scholar**

Erdos, P., & Rényi, A. (1959). On random graphs I. *Publicationes Mathematicae*, 6, 290–297.

#### Article Google Scholar

Friedman, S. (2017). IRS uses tech to track bitcoin transactions. *GCN*. <u>https://gcn.com/articles/2017/08/31/irs-bitcoin.aspx</u>

## Your privacy, your choice

We use essential cookies to make sure the site can function. We, and our 94 **partners**, also use optional cookies and similar technologies for advertising, personalisation of content, usage analysis, and social media.

By accepting optional cookies, you consent to allowing us and our partners to store and access personal data on your device, such as browsing behaviour and unique identifiers. Some third parties are outside of the European Economic Area, with varying standards of data protection. See our **privacy policy** for more information on the use of your personal data. Your consent choices apply to springer.com and applicable subdomains.

You can find further information, and change your preferences via 'Manage preferences'. You can also change your preferences or withdraw consent at any time via 'Your privacy choices', found in the footer of every page.

We use cookies and similar technologies for the following purposes:

#### Store and/or access information on a device

Accept all cookies
Reject optional cookies
Manage preferences

blockchain. *Coindesk*. <u>https://www.coindesk.com/jpmorgan-launches-interbank-payments-platform-quorum-blockchain/</u>

Hurd, T. R. (2015). The construction and properties of assortative configuration graphs. *arXiv*:1512.03084.

**Google Scholar** 

Inaoka, H., Ninomiya, T., Taniguchi, K., Shimizu, T., & Takayasu, H. (2004). *Fractal network derived from banking transaction—An analysis of network structures formed by financial institutions* (Working Paper No. 04-E-04). Bank of Japan.

**Google Scholar** 

## Your privacy, your choice

We use essential cookies to make sure the site can function. We, and our 94 **partners**, also use optional cookies and similar technologies for advertising, personalisation of content, usage analysis, and social media.

By accepting optional cookies, you consent to allowing us and our partners to store and access personal data on your device, such as browsing behaviour and unique identifiers. Some third parties are outside of the European Economic Area, with varying standards of data protection. See our **privacy policy** for more information on the use of your personal data. Your consent choices apply to springer.com and applicable subdomains.

You can find further information, and change your preferences via 'Manage preferences'. You can also change your preferences or withdraw consent at any time via 'Your privacy choices', found in the footer of every page.

We use cookies and similar technologies for the following purposes:

#### Store and/or access information on a device

Accept all cookies
Reject optional cookies
Manage preferences

König, M. D., & Battiston S. (2009). From graph theory to models of economic networks. A tutorial. In A. K.Naimzada, S. Stefani, & A. Torriero (Eds.), *Networks, topology and dynamics* (Lecture Notes in Economics and Mathematical Systems, vol. 613). New York: Springer.

#### **Google Scholar**

Lagerstrom, R., Baldwin, C., MacCormack A., & Dreyfus, D. (2013). *Visualizing and measuring enterprise architecture: An exploratory BioPharma case* (Working Paper No. 13-105). Harvard Business School.

### **Google Scholar**

## Maesa, D. D. F., Marino, A., & Ricci, L. (2017). Data-driven analysis of bitcoin

## Your privacy, your choice

We use essential cookies to make sure the site can function. We, and our 94 **partners**, also use optional cookies and similar technologies for advertising, personalisation of content, usage analysis, and social media.

By accepting optional cookies, you consent to allowing us and our partners to store and access personal data on your device, such as browsing behaviour and unique identifiers. Some third parties are outside of the European Economic Area, with varying standards of data protection. See our **privacy policy** for more information on the use of your personal data. Your consent choices apply to springer.com and applicable subdomains.

You can find further information, and change your preferences via 'Manage preferences'. You can also change your preferences or withdraw consent at any time via 'Your privacy choices', found in the footer of every page.

We use cookies and similar technologies for the following purposes:

### Store and/or access information on a device

Accept all cookies
Reject optional cookies
Manage preferences

Proceedings on Privacy Enhancing Technologies, 2016(4), 436–453.

Article Google Scholar

Moreno-Sanchez, P., Modi, N., Songhela, R., Kate, A., & Fahmy, S. (2018, April 23–27). Mind your credit: Assessing the health of the Ripple credit network. In *IW3C2 (International World Wide Web Conference Committee), WWW 2018*, Lyon, France.

#### **Google Scholar**

Murphy, A. C., Muldoon, S. F., Baker, D., Lastowka, A., Bennett, B., Yang, M., et al. (2018). Structure, function, and control of the human musculoskeletal network. *PLoS Biology*, *16*(1), e2002811.

## Your privacy, your choice

We use essential cookies to make sure the site can function. We, and our 94 **partners**, also use optional cookies and similar technologies for advertising, personalisation of content, usage analysis, and social media.

By accepting optional cookies, you consent to allowing us and our partners to store and access personal data on your device, such as browsing behaviour and unique identifiers. Some third parties are outside of the European Economic Area, with varying standards of data protection. See our **privacy policy** for more information on the use of your personal data. Your consent choices apply to springer.com and applicable subdomains.

You can find further information, and change your preferences via 'Manage preferences'. You can also change your preferences or withdraw consent at any time via 'Your privacy choices', found in the footer of every page.

We use cookies and similar technologies for the following purposes:

## Store and/or access information on a device

Accept all cookies	
Reject optional cookies	
Manage preferences	

Ripple. (2017a). *Ripple insight*. <u>https://ripple.com/insights/federal-reserve-task-force-ripple-improves-speed-transparency-global-payments/</u>

Ripple. (2017b). *Company press release*. <u>https://ripple.com/ripple\_press/ripples-blockchain-network-now-100-strong/</u>

Roos, S., Moreno-Sanchez, P., Kate, A., & Goldberg, I. (2017). *Settling payments fast and private: Efficient decentralized routing for path-based transactions. arXiv*:1709.05748. Preprint appearing at NDSS 2018.

### **Google Scholar**

Rubinov, M., & Sporns, O. (2010). Complex network measures of brain

## Your privacy, your choice

We use essential cookies to make sure the site can function. We, and our 94 **partners**, also use optional cookies and similar technologies for advertising, personalisation of content, usage analysis, and social media.

By accepting optional cookies, you consent to allowing us and our partners to store and access personal data on your device, such as browsing behaviour and unique identifiers. Some third parties are outside of the European Economic Area, with varying standards of data protection. See our **privacy policy** for more information on the use of your personal data. Your consent choices apply to springer.com and applicable subdomains.

You can find further information, and change your preferences via 'Manage preferences'. You can also change your preferences or withdraw consent at any time via 'Your privacy choices', found in the footer of every page.

We use cookies and similar technologies for the following purposes:

#### Store and/or access information on a device

Accept all cookies
Reject optional cookies
Manage preferences

Swan, M. (2017). Anticipating the economic benefits of blockchain. *Technology Innovation Management Review*, 7(10), 6–13.

Article Google Scholar

Swan, M. (2018a). Blockchain economics: Ripple for ERP. *European Business Review*. Feb-Mar:24–7.

**Google Scholar** 

Swan, M. (2018b-In Review). U.S. foreign policy toward blockchain technology. *Georgetown Journal of International Affairs*.

**Google Scholar** 

## Your privacy, your choice

We use essential cookies to make sure the site can function. We, and our 94 **partners**, also use optional cookies and similar technologies for advertising, personalisation of content, usage analysis, and social media.

By accepting optional cookies, you consent to allowing us and our partners to store and access personal data on your device, such as browsing behaviour and unique identifiers. Some third parties are outside of the European Economic Area, with varying standards of data protection. See our **privacy policy** for more information on the use of your personal data. Your consent choices apply to springer.com and applicable subdomains.

You can find further information, and change your preferences via 'Manage preferences'. You can also change your preferences or withdraw consent at any time via 'Your privacy choices', found in the footer of every page.

We use cookies and similar technologies for the following purposes:

## Store and/or access information on a device

Accept all cookies	
Reject optional cookies	
Manage preferences	

# **Author information**

## **Authors and Affiliations**

## Purdue University, West Lafayette, IN, USA

Melanie Swan

## **Corresponding author**

Correspondence to Melanie Swan.

# **Editor information**

## **Editors and Affiliations**

Department of International Management, MODUL University Vienna,

## Your privacy, your choice

We use essential cookies to make sure the site can function. We, and our 94 **partners**, also use optional cookies and similar technologies for advertising, personalisation of content, usage analysis, and social media.

By accepting optional cookies, you consent to allowing us and our partners to store and access personal data on your device, such as browsing behaviour and unique identifiers. Some third parties are outside of the European Economic Area, with varying standards of data protection. See our **privacy policy** for more information on the use of your personal data. Your consent choices apply to springer.com and applicable subdomains.

You can find further information, and change your preferences via 'Manage preferences'. You can also change your preferences or withdraw consent at any time via 'Your privacy choices', found in the footer of every page.

We use cookies and similar technologies for the following purposes:

## Store and/or access information on a device

Accept all cookies
Reject optional cookies
Manage preferences

Palgrave Macmillan, Cham. https://doi.org/10.1007/978-3-319-98911-2\_1

<u>.RIS↓</u> <u>.ENW↓</u> <u>.BIB</u>↓

DOIPublishedPublisher Namehttps://doi.org/10.1007/978-3-222 December 2018Palgrave Macmillan, Cham319-98911-2\_1Frint ISBNOnline ISBNeBook Packages978-3-319-98910-5978-3-319-98911-2Business and Management (RO)

## **Publish with us**

Policies and ethics [7

## Your privacy, your choice

We use essential cookies to make sure the site can function. We, and our 94 **partners**, also use optional cookies and similar technologies for advertising, personalisation of content, usage analysis, and social media.

By accepting optional cookies, you consent to allowing us and our partners to store and access personal data on your device, such as browsing behaviour and unique identifiers. Some third parties are outside of the European Economic Area, with varying standards of data protection. See our **privacy policy** for more information on the use of your personal data. Your consent choices apply to springer.com and applicable subdomains.

You can find further information, and change your preferences via 'Manage preferences'. You can also change your preferences or withdraw consent at any time via 'Your privacy choices', found in the footer of every page.

We use cookies and similar technologies for the following purposes:

#### Store and/or access information on a device

Accept all cookies
Reject optional cookies
Manage preferences

## Your privacy, your choice

We use essential cookies to make sure the site can function. We, and our 94 **partners**, also use optional cookies and similar technologies for advertising, personalisation of content, usage analysis, and social media.

By accepting optional cookies, you consent to allowing us and our partners to store and access personal data on your device, such as browsing behaviour and unique identifiers. Some third parties are outside of the European Economic Area, with varying standards of data protection. See our **privacy policy** for more information on the use of your personal data. Your consent choices apply to springer.com and applicable subdomains.

You can find further information, and change your preferences via 'Manage preferences'. You can also change your preferences or withdraw consent at any time via 'Your privacy choices', found in the footer of every page.

We use cookies and similar technologies for the following purposes:

#### Store and/or access information on a device

Accept all cookies
Reject optional cookies
Manage preferences