MONEY: A FUNCTIONAL ANALYSIS

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ABSTRACT

Most people currently think of money as government-issued paper certificates or coins that specify units of currency, such as dollars or euros. The advent of digital currencies, which appear abstract because of their intangibility, is therefore confounding almost everyone.

This Article argues that money should also be viewed functionally—as a "right" that serves one or more of the generally accepted functions of money. The Article focuses on two of money's most generally accepted functions: to serve as a medium of exchange to facilitate the sale of goods and services, and to serve as a store of value. To perform these functions, money must be transferable, ideally with low transaction costs, and also must represent something of value.

The implication of this functional analysis is twofold. First, this perspective can enable readers to understand, more intuitively, the changing nature of money and can help to de-mystify digital (that is, electronically evidenced) currencies. For example, the current differences between tangible and digital currencies relate principally to transferability, whereas the current differences among different forms of digital currencies relate principally to value. Second, viewing money functionally also can inform monetary regulation. In addition to the traditional goals of limiting third-party harm, monetary regulation should help to protect money's functions by correcting market failures that impair the low-cost transferability or the stable value of whatever rights are becoming widely used as money. This "functional" approach would expand the proper scope of financial regulation beyond its traditional negative role, protecting against harm, to also include the positive role of helping to promote beneficial business innovations.

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INTRODUCTION

Although we use money every day, few really understand it. Most define it by its most obvious manifestation—government-issued paper certificates or coins that specify units of currency, such as dollars or euros.[1] But that superficial definition does not capture changing forms of money, from the earliest coins to, now, electronically-evidenced (or, "digital") currencies. This variability confounds many members of the media, policymakers, and regulators.[2] The resulting uncertainty can lead to laws that are suboptimal.[3]

From an epistemological and regulatory standpoint, this Article argues that money should also be viewed functionally—as a "right" that serves one or more of the generally accepted functions of money. In particular, I focus on two of money's most generally accepted functions:[4] To serve as a medium of exchange to facilitate the sale

1. Although economists sometimes broadly define money to include banknotes, bank deposit accounts, and credit securities, these are not legally money; they are merely claims for money. István Simon, *Constant and Changing Elements in the Regulation of Money*, 51 ANNALES U. SCI. BUDAPESTINESIS ROLANDO EOTVOS NOMINATAE 263, 266 (2010).
2. *See, e.g.*, Jackie Stewart, *People Confuse FedNow with Digital Dollar. Why That's a Problem.*, AM. BANK. (Nov. 30, 2023), https://perma.cc/XZ5P-ZK47 ("There is a lot of confusion over a possible U.S. central bank digital currency and the FedNow real-time payments network, some of it a result of disinformation."); Sam White, *Regulatory Confusion as the World Wrangles with Crypto*, FIN. MAGNATES (Mar. 22, 2023), https://perma.cc/Q64J-PS65 (describing regulatory policy surrounding digital currencies in the United Kingdom and United States as erratic and confusing); Mu Hui Shi, *Ending the Wild West in Digital Currency—China's NetsUnion Framework*, 48 UCC L.J. 439, at 458 n.47 (2019) ("There is much confusion over digital currencies and digital currency payment systems in different countries. This naming problem has perhaps inhibited extensive comparative research of digital currencies."). *Cf.* Carrie Figdor, *Is Objective News Possible?*, *in* JOURNALISM ETHICS: A PHILOSOPHICAL APPROACH 153, 160-62 (Christopher Meyers ed. 2010) (arguing that competing goals and the inadequacy of traditional journalistic practices undermine objectivity in reporting).
3. *See, e.g.*, Anat R. Admati, *Rethinking Financial Regulation: How Confusion Has Prevented Progress*, *in* PROGRESS AND CONFUSION: THE STATE OF MACROECONOMIC POLICY 61, 67 (Olivier J. Blanchard, Raghuram G. Rajan, Kenneth S. Rogoff, & Lawrence H. Summers eds., 2016) (arguing that "inappropriate, even fallacious, assumptions" by financial regulators can result in "poor policy guidance"); Evan Kwerel, *To Tell the Truth: Imperfect Information and Optimal Pollution Control*, 44 REV. ECON. STUD. 595, 595 (1977) ("In a world of perfect information, optimal regulation of an isolated economic variable would be relatively straightforward. Unfortunately, we do not live in such a world.").
4. Another generally accepted function of money is to serve as a unit of account that can be used to state prices and record debts. Sarah Allen et al., *Design Choices for Central Bank Digital Currency: Policy and Technical Considerations* 9-10 (Nat'l Bureau of Econ. Rsch., Working Paper No. 27634, 2020), https://perma.cc/7H45-AYB7. That, however, is more of a political choice for a nation, which normally uses its internal fiat currency to serve that function.

of goods and services; and as a store of value.[5] To perform these functions, money, in turn, must have two characteristics: It must be transferable, ideally with low transaction costs; and it also must represent something of value.

Law can be integral to achieving these goals.[6] The traditional purpose of financial regulation is to correct market failures and, thereby, increase economic efficiency.[7] That formulation primarily is used to correct externalities, which are viewed as market failures that create inefficiencies by harming third parties, including the public.[8] In contrast, this Article's functional approach proposes that the essential characteristics of transferability and value, which enable money to perform its functions, also should inform monetary regulation. From that standpoint, the functional regulation of money should be designed to increase economic efficiency by also correcting any "market failures" that either (i) impede the low-cost transferability, or (ii) impair the stable value, of the rights that serve to function as money.[9]

The above formulation remains insufficient, though, because it does not differentiate the unbounded innovation of monetary rights from innovations that are becoming widely used. For example, the fact that some use Bitcoin or other generic cryptocurrency rights[10] to function as money does not mean that the law should help correct market failures that can impede that use. Indeed, the law should not facilitate all forms of innovation; some may be misguided or may not otherwise survive in the marketplace of ideas.

This Article argues, instead, that the law should help correct market failures that can impede a monetary innovation that is becoming *widely used*—widespread usage suggesting that the innovation is surviving in the marketplace of ideas and is

5. *See*, *e.g.*, *id.* at 9.

6. *Cf.* Iman Anabtawi & Steven L. Schwarcz, *Regulating* Ex Post*: How Law Can Address the Inevitability of Financial Failure*, 92 TEX. L. REV. 75, 87 (2013) (explaining why the pervasiveness of financial regulation establishes law as an "integral element of the financial system").

7. *See*, *e.g.*, PAUL A. SAMUELSON & WILLIAM D. NORDHAUS, ECONOMICS 756 (15th ed. 1995) (defining market failure as "[a]n imperfection in a price system that prevents an efficient allocation of resources").

8. *Cf.* Gérhard Hertig, *Financial Regulation and Externalities: Efficiency* vs *Politics*, ANNALES DES MINES - RÉALITÉS INDUSTRIELLES (SPECIAL ISSUE) 69, 69 (2019) ("In particular, [the aim of] prudential [financial] regulation [is] to impose the internalization of externalities."); Claire A. Hill, *The Rhetoric of Negative Externalities*, 39 SEATTLE U. L. REV. 517, 517 (2016) ("Negative externalities are costs imposed on third parties."). *Cf. infra* note 14 (summarizing the goals of traditional financial regulation).

9. *Cf. infra* notes 35-38 and accompanying text (further examining those rights).

10. *See infra* note 61 and accompanying text (defining these terms).

perceived as beneficial[11]—in a non-technical sense, becoming a public good.[12] So, the functional regulation of money should be designed to correct any market failures that impede money's functions by either impairing the low-cost transferability or the stable value of the rights that are becoming *widely used* as money.[13]

This "functional" approach would expand the proper scope of financial regulation beyond its traditional negative role (protecting against harm) to also include the positive role of helping to promote beneficial business innovations.[14] Although

11. *Cf.* Peter Tufano, *Financial Innovation*, *in* 1 HANDBOOK OF THE ECONOMICS OF FINANCE 307, 313 (George M. Constantinides et al. eds., 2003) ("[F]inancial innovations are optimal responses to various basic problem or opportunities, such as incomplete markets that prevent risk shifting or asymmetric information."). Because CBDC are government-issued, they represent the easy case of functional regulation; the regulation creating them should, logically, facilitate their low-cost transferability and value.

12. *Cf.* Simon, *supra* note 1, at 278 (discussing money as a public good); ALEXANDER M. BICKEL, THE MORALITY OF CONSENT (1977) (exploring the relationship between morality and law and the importance of moving forward with consensus). Although widespread usage suggests an innovation is perceived as beneficial, that does not establish its benefit. Clearly, the widespread use of slavery was not "beneficial."

13. Regulators should determine which rights are becoming "widely used" as money. Their determination may depend on the context. For example, if Bitcoin eventually becomes "widely used" as a medium of exchange to make wholesale purchases, that does not necessarily mean that it is becoming widely used to make retail purchases. Therefore, functional regulation should not help to correct market failures that impede using Bitcoin to make retail purchases. Nor in that example should functional regulation help to correct market failures that impede using Bitcoin as a store of value. Also, one might question why a right that is becoming widely used as money would be subject to a market failure. The answer is that "widely used" does not necessarily mean "optimally used."

14. This positive role would nonetheless remain subject to the limitations on third-party harm imposed by traditional regulation. See *supra* note 8 and accompanying text. Traditional regulation focuses on controlling risks that might harm third parties including investors, customers, or the public. For example, the smart-regulation model contemplates designing cost-effective regulation to manage new risks of financial innovation; the same-business, same-risks, same-rules model would rely on existing regulation, which presumably cost-effectively controls risk, to the extent an innovation is sufficiently similar to traditional forms of innovation; regulation under the freedom-of-contract model would limit harmful externalities and would protect market participants who do not fully understand the risks of their innovations; regulation under the market-failure model would correct harmful market failures; and the consequentialist model contemplates regulation to reduce the social harm of financial innovation without unduly impeding that innovation. *See generally* Steven L. Schwarcz, *Regulating Financial Innovation: FinTech, Crypto-assets, DeFi, and Beyond*, 79 BUS. LAW. 615 (2024).

limited,[15] there are precedents for a positive role of financial regulation.[16]

For example, because a "neutral, open Internet [would] benefit . . . both consumers and businesses," U.S. Federal Communications Commission Chairman Genachowski has advocated for "establishing rules of the road that incentivize competition, empower entrepreneurs, and grow the economic pie to the benefit of all."[17] The United Kingdom's Financial Conduct Authority ("FCA") has originated the idea of a "regulatory sandbox," creating "a 'safe space' in which businesses can test innovative products, services, business models and delivery mechanisms without immediately incurring all the normal regulatory consequences of engaging in the activity in question."[18] A regulatory sandbox could enable a firm to test financial innovations on a limited number of customers in restricted markets.[19] Other examples of using regulation to promote financial innovation include creating governmental offices or hubs to advance innovations in financial technology ("FinTech") by bringing together regulators and industry representatives, and conducting FinTech research.[20]

Besides innovatively expanding the scope of financial regulation to help promote innovation, the functional approach employed in this Article grafts a normative analysis (how the functional regulation of money should be designed) onto a positive

15. *See*, *e.g.*, *Innovations in Financial Services*, U.S. DEP'T OF THE TREASURY, https://perma.cc/JG2F-4ZB2 (describing efforts by the Department of the Treasury to incentivize the development of "cutting-edge and technology-based financial products."). Although not involving financial regulation, legal scholars of "prioritarianism" advocate regulation that gives extra weight ("priority") to the worse off. *See*, *e.g.*, Matthew D. Adler, *Theory of Prioritarianism*, *in* PRIORITARIANISM IN PRACTICE 37, 38 (Matthew D. Adler & Ole F. Norheim eds., 2022) ("Prioritarianism . . . ranks outcomes according to the pattern of well-being, but so as to give *priority* (hence the term 'prioritarianism') to individuals at lower well-being levels.").

16. These precedents are for the *direct* positive role of financial regulation. They go far beyond the hypothesis that strict regulation can *indirectly* promote innovation by encouraging firms to find innovative ways to comply with the regulation. *Cf.* Michael Porter, *America's Green Strategy*, SCIENTIFIC AM., Apr 1991, at 168 (advancing that argument in the context of strict environmental regulation).

17. Julius Genachowski, *A Speech By FCC Chairman at The Brookings Institution on Preserving a Free and Open Internet: A Platform for Innovation, Opportunity, and Prosperity*, FCC (Sept. 21, 2009), https://perma.cc/UVM7-F9B5.

18. FCA, REGULATORY SANDBOX 1 (Nov. 2015), https://perma.cc/L24F-YY8H.

19. *See*, *e.g.*, Hilary J. Allen, *Regulatory Sandboxes*, 87 GEO. WASH. L. REV. 579, 592 (2019); Dirk A. Zetzsche et al., *Regulating A Revolution: From Regulatory Sandboxes to Smart Regulation*, 23 FORDHAM J. CORP. & FIN. L. 31, 64-77 (2017) (providing an international overview of regulators considering and/or already using regulatory sandboxes and discussing how each designs their sandbox model).

20. *See*, *e.g.*, *How Can Regulators Promote Financial Innovation While Also Protecting Consumers?*, THE PEW CHARITABLE TRUSTS (Aug. 2, 2018), https://perma.cc/S2H7-93DD (discussing these efforts in Hong Kong, Singapore, and Australia).

observation (which rights are becoming widely used as money).[21] First, while this approach may appear inventive, the practice of basing normative analyses on positive observations has strong precedent.[22] The law should be tethered to the reality of what people actually do—in this case, their beginning to widely use certain rights as money.[23] Second, functional regulation supplements, rather than replaces, traditional monetary regulation.[24] Traditional regulation serves as a check on functional regulation, preventing the latter from promoting innovative but harmful realities.[25] One implication of this relationship is that functional regulation would be both broader and more circumscribed than traditional financial regulation. It would be broader insofar as it would promote innovation by correcting market failures that could impede such innovation;[26] it would be more circumscribed, because it is subordinated to traditional financial regulation's restrictions on third-party harm.[27]

This functional perspective can enable readers to understand, more intuitively, the changing nature of money and can help to demystify digital currencies. For example, the current differences between tangible and digital currencies relate principally to transferability; electronic transfer can be quicker and less costly than physical transfer. In contrast, the current differences in the forms of digital money relate principally to value. Value is influenced by who—government or private—issues the money and, in the case of private issuers, by whether or not the money is backed by assets having intrinsic value (the difference, for example, between asset-backed 'stablecoins,' such as Tether, and unbacked digital 'currencies,' such as Bitcoin).[28]

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21. *Cf*. G.E. MOORE, PRINCIPIA ETHICA, 59-63 (Thomas Baldwin ed., 2d ed. 1971) (distinguishing positive observations of what exist from normative analysis of what should be).
22. *See*, *e.g.*, Lucian Arye Bebchuk, *A New Approach to Corporate Reorganizations*, 101 HARV. L. REV. 775, 776-77 (1988) (grafting a normative analysis onto a positive assumption, in this case taking the existence of corporate reorganizations in bankruptcy law as a given to put forth a suggestion to improve the reorganization process).
23. *Cf*. ISAIAH BERLIN, PERSONAL IMPRESSIONS xxi (Henry Hardy, ed., 2001) (arguing that norms are and should be factually based and tethered to reality).
24. *See supra* note 14 and accompanying text.
25. To avoid any doubt, functional regulation is explicitly subordinated to traditional regulation as needed to prevent harm. In the hypothetical discussed *supra* note 13, for example, traditional regulation almost certainly would impose consumer protection laws on, if not otherwise restrict, any retail use of Bitcoin (or of any other cryptocurrencies that have unpredictably fluctuating market values).
26. *But cf*. Schwarcz, *supra* note 14, at 641-42 (suggesting that the market-failure model of financial regulation could also help to promote innovation by correcting market failures that could impair the ability of the financial system to productively fund businesses).
27. *See supra* note 24 and accompanying text.
28. *See*, *e.g.*, Benjamin Geva & Mohammed Muraj, *The Digitization of Money: Stablecoins and CBDC*, 40 BANK. & FIN. L. REV. 115, 119-21 (2024) (discussing the differences between

A functional perspective also can inform lawmaking. In thinking of how to regulate a dynamically changing financial system (e.g., the monetary system),[29] it is more instructive to focus on the system's underlying, and thus less time-dependent, economic functions rather than (as is traditional[30]) merely tying regulation to the system's specific financial architecture[31]—which in the case of money are government-issued paper certificates and coins.[32] In a somewhat analogous context, economists Robert Merton and Zvi Bodie likewise have recognized the utility of focusing on the underlying economic functions of the changing financial system. In order to try to understand how and why the institutional structure of the financial system changes and how it is likely to evolve, they view finance from the perspective of functions rather than institutions.[33] The rationale for their focus supports this Article's perspective: "[f]inancial functions are more stable than financial institutions—that is, functions change less over time."[34]

Furthermore, by adding to the normative framework of traditional regulation, this Article's functional approach would help to further systematize the regulatory process—a process that, in reality, can be ad hoc and influenced by lobbying.[35] It also

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stablecoins and unbacked digital currencies).

29. *Cf.* Steven L. Schwarcz, *Regulating Financial Change: A Functional Approach*, 100 MINN. L. REV. 1441 (2016) (proposing and examining a functional analysis of a changing financial system).

30. *Cf.* Schwarcz, *supra* note 14, at 633 (showing that actual regulatory responses to financial innovations have been somewhat individualized to the particular innovation); LEV MENAND, THE FED UNBOUND: CENTRAL BANKING IN A TIME OF CRISIS (Columbia Global Reports, 1st ed. 2022) (offering policy prescriptions based on the structural landscape of financial markets in the United States).

31. *Cf.* Anabtawi & Schwarcz, *supra* note 6, at 85 (observing that the difficulty with identifying the elements of the financial system by focusing on institutions, rather than functions, "is that it is unlikely to be adaptive when the system is experiencing change" (citing Wulf A. Kaal, *Evolution of Law: Dynamic Regulation in a New Institutional Economics Framework* 3-4 (Univ. of St. Thomas School of Law, Legal Studies Research Paper Series No. 13-17, 2013), https://perma.cc/9CKV-Q93G (describing the dynamic nature of financial regulation)). Professor Anabtawi and I argue for a more functional approach to macroprudential regulation, emphasizing the need for more ex post regulation of the financial system as a system. This approach should not be confused with the philosophical concept of "functionalism". For a thorough analysis of "functionalism" in a philosophical context, see JANET LEVIN, *Functionalism*, in STANFORD ENCYCLOPEDIA OF PHILOSOPHY (Edward N. Zalta & Uri Nodelman eds., 2023), https://perma.cc/9PMC-EDEA.

32. *See supra* note 1 and accompanying text.

33. Robert C. Merton & Zvi Bodie, *A Conceptual Framework for Analyzing the Financial Environment*, in THE GLOBAL FINANCIAL SYSTEM: A FUNCTIONAL PERSPECTIVE 3, 2-4 (Dwight B. Crane et al. eds., 1995).

34. *Id.* at 1.

35. *Cf.* Daniel Awrey, et al., "An Overview of the Legal Theory of Finance" 2 (2014) (unpublished manuscript, on file with author) (finding that financial regulation can be ad hoc insofar as it yields "propositions [that] can serve as a tool kit" for regulatory scrutiny);

could help create an ordering concept, binding the community and directly influencing action, with the goal of improving regulatory coherence, consistency, and predictability.[36]

As an initial matter, it is important to clarify what rights should be viewed as money. The Article takes a pragmatic approach: money should include all rights, in whatever form, that widely serve to function as money in the relevant jurisdiction. This approach confronts the common misconception that money is not legitimate unless it is designated as a so-called legal tender.[37]

Consistent with such an approach, many jurisdictions, including the United States, do not limit the medium of legal payment, allowing the use of any commercially reasonable and widely accepted medium.[38] Furthermore, the very concept of legal tender is technically vague. For example, although legal tender is sometimes recognized as money for the payment of public and private debts,[39] a person offered legal tender is not always obligated to accept it.[40] This vagueness contrasts with the

George J. Stigler, *The Theory of Economic Regulation*, 2 BELL J. ECON. & MGMT. SCI. 3, 5 (1971) (discussing the concept of regulatory capture, where regulators fall sway to pressure from the industries they regulate).

36. Frederic R. Kellogg, *Comparing Natural and Normative Inquiry: The "Real" and the "Right" as Ordering Concepts* 5 (Geo. Wash. Univ., Working Paper, 2011), https://perma.cc/P23B-5T32; *cf.* Lorenz Kähler, *The Influence of Normative Reasons on the Formation of Legal Concepts, in* CONCEPTS IN LAW 81, 90 (Jaap C. Hage & Dietmar von der Pfordten eds., 2009) (citing D. Patterson, *Dworkin on the Semantics of Legal and Political Concepts*, 26 OXFORD J. LEG. STUDS. 552, 553 (2006) to explain how normative analysis benefits legal reasoning).

37. *Cf.* THOMAS H. GRECO, JR., MONEY: UNDERSTANDING AND CREATING ALTERNATIVES TO LEGAL TENDER 5 (2001) (differentiating between the creation of "money" by private banks in the form of credit and the production of "legal tender" by the Federal Reserve).

38. *See, e.g.*, Herman Oliphant, *The Theory of Money in the Law of Commercial Instruments*, 29 YALE L.J. 606, 610 (1920) ("The utility of a particular thing as a medium of exchange in a given locality is measured by the degree to which it approaches universal acceptability in exchange in [that] area."); *but cf.* P.M. T. Masela, *Digital Currency Initiatives on the African Continent*, *in* THE (NEAR) FUTURE OF CENTRAL BANK DIGITAL CURRENCIES 131, 137 (Nicola Bilotta & Fabrizio Botti eds., Lorenzo Kamel series ed., 2021) (observing that in some African nations, money may need to be designated as "legal tender" in order to "reassure users, merchants and service providers that they will always be able to exchange it for value with other users, merchants, service providers and participants in the conventional payment system").

39. *Cf.* David G.W. Birch, *Digital Cash as Legal Tender?*, FORBES (Jan. 4, 2021), https://perma.cc/5YGV-37KM ("[A]s far as I am concerned what is or isn't accepted for the payment of taxes is a much better measure of what is or isn't a currency than outdated concepts of legal tender!").

40. In the United States, if a person refuses to accept legal tender as payment of a debt, that debt remains unpaid. *See Is It Legal For a Business in the United States to Refuse Cash as a Form of Payment?*, FED. RSRV. (Jul. 21, 2020), https://perma.cc/BVJ3-SEV7 ("Private businesses are free to develop their own policies on whether to accept cash unless there is a state law that says otherwise."); *but cf.* Franco Passacantando, *The Digital Euro: Challenges and Opportunities*, in THE (NEAR) FUTURE OF CENTRAL BANK DIGITAL CURRENCIES,

flexibility of parties to agree on the kind of payment, or money, they are willing to accept "according to cost, needed technology, or risk."[41]

The Article proceeds as follows: Part I examines the transferability of money, in order (along with value) to effectively serve as a medium of exchange to facilitate the sale of goods and services. Part II then examines the value of money, in order (along with transferability) to effectively serve as a store of value. Parts III and IV show how the analytical framework of this Article can guide policymakers and regulators to design laws that appropriately protect the monetary system's essential functions. Part V examines the political economy of those laws. Finally, Part VI sets out the Article's conclusions.

I. THE TRANSFERABILITY OF MONEY

To serve as a medium of exchange to facilitate the sale of goods and services, money must not only be valuable but also transferable, ideally with low transaction costs.[42] This can facilitate trade between different economic actors.[43] The use of money as a medium of exchange can also, itself, reduce transaction costs by avoiding the challenges of a barter system. Consider how the transferability of money has changed throughout history.

A. Ancient Money and Coinage

In ancient societies, precious metals, such as gold, silver, and bronze, were effectively used in their native form as money. However, the transfer of those metals was awkward and costly, because it involved weighing the metals and determining their purity.[44] The invention of coinage helped to facilitate the transfer.

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supra note 38, at 113–14 (observing that in some European countries, legal tender "cannot be refused when presented to discharge a monetary obligation").

41. Massimo Cirasino, *CBDC in the Broad Context of National Payments System Development*, *in* THE (NEAR) FUTURE OF CENTRAL BANK DIGITAL CURRENCIES , *supra* note 38, at 50.

42. *Cf.* Jens Mattke, Christian Maier & Lea Reis, *Is Cryptocurrency Money? Three Empirical Studies Analyzing Medium of Exchange, Store of Value and Unit of Account*, *in* SIGMIS-CPR,'20: PROCEEDINGS OF THE 2020 COMPUTERS AND PEOPLE RESEARCH CONFERENCE 26, 28 (Sven Laumer et al. eds., 2020) (serving as a medium of exchange means that parties to a transaction are willing to accept money in exchange for goods and/or services that they are trading).

43. *Id.*

44. *Cf.* CATHERINE EAGLETON & JONATHAN WILLIAMS, MONEY: A HISTORY 39 (2d ed. 2007) (discussing an early form of Roman money, in the form of bronze bullion measured by weight). In ancient China, silk also was used as a form of money; *see* Helen Wang, *Textiles as Money on the Silk Road?*, 23 J. ROYAL ASIATIC SOC'Y 165, 168 (2013) ("there was a high cost attached to making and distributing low-value coins, and there were issues with counterfeiting").

Money first took the form of coins around 630 B.C.E. in the Kingdom of Lydia.[45] The coins were essentially pieces of electrum, a precious metal formed from a gold-silver alloy, which were stamped to show a lion's head.[46] By standardizing the coins, the Lydians avoided the need for merchants to verify the quality and weight of the precious metal,[47] thereby reducing transaction costs.[48] Rome adopted standardized coinage much later, around 300 B.C.E.[49]

Although standardized coinage represented a significant innovation, shortcomings remained. First, coins are heavy, especially when exchanged in large numbers. Second, coins are easily subject to theft. Third, the transfer of coins requires face-to-face exchanges. These shortcomings incentivized the development of paper currencies.

B. Paper Currencies

The Song Empire in Dynastic China is credited with creating "the world's first viable paper currency" in the early eleventh century.[50] To be useful, a paper currency should have three characteristics.[51] First, it should be easy to transfer on the spot between parties.[52] Second, it should have a "round" denomination, meaning it should not be fractionally denominated.[53] Third, it should include small enough

45. FRANK L. HOLT, WHEN MONEY TALKS: A HISTORY OF COINS AND NUMISMATICS 43 (2021); *but cf.* Eagleton & Williams, *supra* note 44, at 23 (suggesting that Lydian coins were in the Western tradition).

46. Holt, *supra* note 45, at 43.

47. *See id.* (observing that the adoption of coins "simplified the exchange of bullion for anyone willing to accept the stamp's guarantee *prima facie* rather than reweighing and retesting the lump every time it was traded," so merchants "could set aside their cumbersome scales, weights, and touchstones to accelerate their transactions by counting out, not weighing out, this new form of currency").

48. *But cf.* EAGLETON & WILLIAMS, *supra* note 44, at 25 (suggesting that Lydian coins were not completely standardized because the proportions of gold and silver, as well as lead additives, in their electrum sometimes varied; around 550 B.C.E., Lydia began switching from electrum to silver and gold coins).

49. *Id.* at 39. Later societies sometimes used a combination of coins and native-form precious metals as money; *cf.* Jane Kershaw, *An Early Medieval Dual-Currency Economy: Bullion and Coin in the Danelaw*, 91 ANTIQUITY 173, 174 (2017) (discussing that combination used by Vikings in the 9th century and describing their "hack-silver hoards containing silver ingots, ornaments and foreign coin, deliberately cut into small pieces").

50. Richard von Glahn, *Monies of Account and Monetary Transition in China, Twelfth to Fourteenth Centuries*, 53 J. ECON. & SOC. HIST. ORIENT 463, 465 (2010).

51. Dror Goldberg, *Paper Money, 1450–1850*, *in* THE ATLANTIC WORLD 471, 472 (D'Maris Coffman, Adrian Leonard & William O'Reilly eds., 2014).

52. *Id.*

53. *See id.* Bills of exchange and IOUs would not, for example, satisfy these conditions: the former often require taking the bill to a third party for payment, whereas the latter often

denominations to facilitate the exchange of goods and services.[54] Most countries have paper currencies that meet these conditions.

The shift to paper money reduced the weight problem of coinage, but has not yet provided a panacea: like coins, paper money is easily subject to theft and its transfer requires face-to-face exchanges. The advent of digital currencies helps to address these deficiencies.

C. Digital Currencies

Today, there is a partial shift from coins and paper money to intangible, or digital, money. Three approaches to digital money have emerged with varying levels of governmental and private sector support: generic cryptocurrencies, stablecoins, and central bank digital currencies ("CBDCs"). The common theme of these approaches is to enhance the transferability of money.

Cryptocurrencies refer to digital currencies that are electronically evidenced using secure cryptography.[55] The most generic form, exemplified by Bitcoin,[56] is privately issued and not backed by any underlying valuable assets.[57] Stablecoins are a subset of cryptocurrencies that are backed by assets having intrinsic value[58] (often referred to as "reference assets"[59]). CBDC can be either token-based or account-based. In a token-based CBDC, the central bank would issue the units of currency, typically called tokens or digital coins.[60] Token-based CBDC thus represent yet another subset of cryptocurrencies—in this case, issued by government central banks.[61] In an "account-based" CBDC, the currency represents a deposit—that is, an electronically registered

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have denominations that are both fractional and too large to exchange for goods and services.

54. *See id*.

55. *Cryptocurrency*, OXFORD ENGLISH DICTIONARY (3d ed. 2009).

56. *See* Satoshi Nakamoto, *Bitcoin: A Peer-to-Peer Electronic Cash System*, BITCOIN (2008), https://perma.cc/KC32-DSH3.

57. Maria Teresa Chimienti et al., *Understanding the Crypto-Asset Phenomenon, Its Risks and Measurement Issues*, EUR. CENTRAL BANK (May 2019), https://perma.cc/7CYU-DJ6R.

58. Fin. Stability Bd., Regulation, Supervision and Oversight of "Global Stablecoin" Arrangements 9 (2020), https://perma.cc/X85P-NDVG.

59. *See FEDS Notes: The Stable in Stablecoins*, FED. RESERVE (last visited June 23, 2024), https://perma.cc/H2FG-2VPS.

60. Steven L. Schwarcz, Regulating Digital Currencies: Towards an Analytical Framework, 102 B.U. L. REV. 1037, 1047 (2022).

61. The lack of universally recognized terminology can be confusing. The Bank of England, for example, argues that its proposed digital pound CBDC (*see infra* notes 155–57 and accompanying text) would not be a cryptocurrency merely because it would not be privately issued. *See The Digital Pound*, BANK OF ENGLAND (last visited June 23, 2024), https://perma.cc/JMJ3-C5DC.

claim[62]—against the central bank or its agent bank.[63]

Transferability facilitates the day-to-day use of money. A significant portion of the "wholesale" currency transfers among businesses and financial institutions already occur digitally, without the need for cash.[64] The current emphasis is therefore on developing digital currencies that have a low transfer cost, to facilitate *retail* consumer payments.[65]

II. THE VALUE OF MONEY

To serve as a store of value, money must not only be transferable but also have—or at least be widely perceived to have—value. That value needs to be stable enough, avoiding dramatic fluctuations, to enable holders of the money to maintain long-term purchasing power.[66] Consider how the value of money evolved throughout history.

A. Currencies Backed By Precious Commodities

Ancient societies often valued money in the form of precious commodities. As discussed, precious metals such as silver, gold, and bronze were first used in their native form.[67] To increase their transferability and reduce transaction costs, these metals were later incorporated into standardized coins.[68]

Even with the subsequent shift to paper currencies, most such currencies originally represented rights to redeem the paper for precious metals or other inherently valuable commodities. The paper money issued by the Chinese Song Empire,[69] for example, was originally backed by goods, such as salt and tea, which

62. Although an ordinary bank deposit account represents a claim for money, not money per se, see *supra* note 1, a claim against a central bank (or its agent) should represent money. The logic for this distinction is that the former is a claim against a private entity (a commercial bank) whereas the latter is a claim against the money-issuing government entity (the central bank).

63. To transfer an account-based CBDC, the central bank or its agent bank will debit all or part or the transferor's claim and credit the amount to the transferee's account. BIS, CENTRAL BANK DIGITAL CURRENCIES: SYSTEM DESIGN AND INTEROPERABILITY 4 (2d ed. 2021); an account-based CBDC could even use existing electronic funds transfer systems. Schwarcz, *supra* note 60, at 1054.

64. *Fedwire Funds Service*, FED. RSRV. SYS., https://perma.cc/YA8T-WVP8.

65. *See*, *e.g.*, Anneke Kosse & Ilaria Mattei, *Making Headway—Results of the 2022 BIS Survey on Central Bank Digital Currencies and Crypto*, BIS PAPERS, no. 136, 2022, at 5-6 (discussing a 2022 survey of national banks, which emphasized the development of retail CBDCs).

66. Mattke, Maier & Reis, *supra* note 42, at 26, 28-29.

67. *See supra* note 44 and accompanying text.

68. *See supra* notes 45–47 and accompanying text.

69. *See supra* note 50 and accompanying text.

were controlled by government monopolies.[70] Likewise, until the late 1960s, many dollar bills, called silver certificates, were redeemable for silver.[71] Also, until 1971, U.S. dollars technically were convertible into gold—and other currencies technically were convertible into U.S. dollars—at fixed exchange rates under the Bretton-Woods system.[72]

B. "Fiat" Paper Currencies

In 1971, the United States effectively ended the Bretton-Woods system by suspending the convertibility of U.S. dollars into gold.[73] Since then, most government-issued paper money is no longer backed by precious commodities or other assets having intrinsic value. Rather, most such money represents fiat currency in the form of promissory notes in which the issuing government, or its central bank, is the obligor.[74] Because the value of a fiat currency depends on perception, the exchange rates among different fiat currencies tend to fluctuate.[75]

The perceived value of a fiat currency generally derives from a common belief that the government stands behind the currency—whatever that means. Originally, that belief was compelling. In the thirteenth century, Kublai Khan, a Mongol ruler during the Yuan dynasty, decreed the issuance of "fiat" paper currency backed by the penalty of death for anyone refusing to accept it.[76] Today, that belief is partly based on an expectation that the government will use monetary policy to attempt to stabilize the

70. Peter St. Onge, *How Paper Money Led to the Mongol Conquest: Money and the Collapse of Song China*, 22 INDEP. REV. 223, 230 (2017).

71. *See Silver Certificate*, MERRIAM-WEBSTER, https://perma.cc/6WJ6-9L92 (defining "silver certificate" as "a certificate formerly issued against the deposit of silver coin as legal tender in the U.S. and its possessions").

72. For a detailed overview of the Bretton-Woods system, *see generally* Michael D. Bordo, *The Bretton Woods International Monetary System: A Historical Overview*, *in* A RETROSPECTIVE ON THE BRETTON WOODS SYSTEM: LESSONS FOR INTERNATIONAL MONETARY REFORM 3 (Michael D. Bordo & Barry Eichengreen eds., 1993).

73. The events leading up to this decision are recounted in JEFFREY E. GARTEN, THREE DAYS AT CAMP DAVID: HOW A SECRET MEETING IN 1971 TRANSFORMED THE GLOBAL ECONOMY 139-241 (2021).

74. *See* Richard Sylla, Political Economy of Supplying Money to a Growing Economy: Monetary Regimes and the Search for an Anchor to Stabilize the Value of Money, 11 THEORETICAL INQ. L. 1, 24-25 (2010) (explaining how post-Bretton Woods fiat currency operates).

75. *Cf.* Krzysztof Przybyszewski & Tadeusz Tyszka, *Emotional Factors in Currency Perception*, 30 J. CONSUMER POL'Y 355, 363 (2007) ("Prices can . . . appear to be higher when given in a currency that people feel emotionally attached to.").

76. PEET VAN BILJON & ALEXANDRA REED LAJOUX, MAKING MONEY: THE HISTORY AND FUTURE OF SOCIETY'S MOST IMPORTANT TECHNOLOGY 18 (2021).

currency's value.[77]

Another source of the value associated with money is the common belief that a sufficient number of others will likewise value a fiat currency. This is a shared perception that a given unit of a fiat currency will be tradable, in practice, for a reasonably predictable quantity of goods or services.[78] Given this perception, the fiat currency need not (as next explained) even be issued by a government.

The power of this shared perception and its implications are exemplified by the British East India Company, which was formed in the late seventeenth century as a joint-stock company to engage in the spice and goods trade. At that time, the region in which it operated, comprising modern-day India, Pakistan, Bangladesh, and Burma, had hundreds of currencies in use with uncertain values.[79] To achieve a degree of uniformity and strengthen its control over the monetary system, the Company issued a silver rupee which became widely adopted, even by communities outside of the Company's territorial operations.[80] Although that rupee was partly backed by precious metal (silver), its real value also depended on a shared perception of its stability in value.[81]

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77. *Cf.* Bd. Govs. Fed. Reserve System, *Monetary Policy: What Are Its Goals? How Does It Work?*, Monetary Policy Principles and Practice (Jul. 29, 2021) (stating that one of those goals is stabilizing prices), https://perma.cc/JT3L-HMZ6.

78. *Cf.* Kimberly A. Houser & Colleen Baker, *Sovereign Digital Currencies: Parachute Pants or the Continuing Evolution of Money*, 18 N.Y.U. J.L. & BUS. 527, 532 (2022) (observing that to serve as money, it "was not required that the token have an intrinsic value, just that the community agreed that it had value in serving as a token"); Brendan Greeley, *Let's All Please Stop Calling Dollars 'Fiat Money'*, FIN. TIMES (July 3, 2021), https://perma.cc/FR3H-RABX (arguing that money has value because the community is willing to accept it in exchange for goods or services).

79. EAGLETON & WILLIAMS, *supra* note 44, at 122.

80. *Id.* To some extent, the British East India Company is unique, having raised its own military to effectively conquer and rule the territories in which it operated. *See* IAN BARROW, THE EAST INDIA COMPANY, 1600-1858: A SHORT HISTORY WITH DOCUMENTS (2017) (describing the ascent of the East India Company as an economic, military, and political power in South Asia). To that extent, it can be seen to be a de facto government. EAGLETON & WILLIAMS, *supra* note 44, at 122; *cf.* THOMAS POWNALL, THE RIGHT, INTEREST, AND DUTY OF GOVERNMENT, AS CONCERNED IN THE AFFAIRS OF THE EAST INDIES 5-8 (1773) ("The exercise of the sovereignty of populous and extensive dominions in the East Indies, have come into the hands of the East India company . . . [*T*]*he merchant is become the sovereign . . .*" (emphasis added)).

81. *See* Ian Barrow, *The Rupee: The Making and Unmaking of a Global Currency*, 1 ASIAN STUD. 34, 36 (2022) ("The [British East India] Company's coins were not debased, meaning that they had consistent and high gold, silver, and copper content and were therefore accepted by money changers and others even in areas outside of the Company's expanding territories.").

C. Digital Currencies

Today's partial shift from tangible forms of money to digital money is largely due to the latter's transferability. The value of the digital money radically changes, however, based on the approach—whether generic cryptocurrencies, stablecoins, or CBDC.

Recall that generic cryptocurrencies, like Bitcoin, typically are privately issued and are not usually backed by anything having intrinsic value. Accordingly, their market value can fluctuate wildly, making them highly speculative and, therefore, not widely suitable as a store of value.[82] The speculative nature of generic cryptocurrencies also can make them unsuitable as a medium of exchange, at least on a retail basis.[83]

Stablecoins are also privately issued, but they are (by definition) backed by reference assets having intrinsic value. The nature of those assets influences the value of the stablecoin. For example, a stablecoin backed one-to-one by U.S. dollars or euros should be highly stable; a stablecoin backed by a basket of different fiat currencies (depending on the nature of those currencies) would be less stable; a stablecoin backed by securities of less than the highest short-term creditworthiness would be even less stable.[84]

Recall that CBDC are government-issued (typically, central bank-issued) digital currencies.[85] Although the degree of transferability of CBDC could differ depending on whether they are cryptocurrency or account-based,[86] their value should be identical to that of the fiat currency issued by the relevant government in paper form.[87]

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82. *See*, *e.g.*, Houser & Baker, *supra* note 78, at 534 (observing that Bitcoin "does not function well as a store of value because its volatility puts it at risk of being worth less in the future").

83. Dirk G. Baur & Thomas Dimplf, *The Volatility of Bitcoin and Its Role as a Medium of Exchange and a Store of Value*, EMPIRICAL ECON. 2663, 2677-78 (2021).

84. The European Union recently promulgated its Markets in Crypto-Assets (MiCA) regulation that begins to address stablecoins, among other crypto-assets. MiCA became effective in June 2023. MiCA distinguishes between stablecoins that purport to maintain a stable value by referencing the value of a single official currency (such as euros or U.S. dollars) and those that purport to maintain a stable value by referencing another value or right or a combination thereof, including a basket of official currencies. EUROPEAN SEC. & MKT. AUTH., *Markets in Crypto-Assets Regulation (MiCA)*, Digital Finance and Innovation, https://perma.cc/L4WL-M3HW.

85. *See supra* notes 62-64 and accompanying text.

86. *Cf. supra* notes 61-63 and accompanying text (distinguishing cryptocurrency and account-based CBDC).

87. *See* Jeremy Hunt & Andrew Bailey, *The Digital Pound: A New Form of Money for Households and Businesses?* 13 (Bank of England and HM Treasury, Working Paper 2023), https://perma.cc/LZD6-KE2X ("It should be seamless to exchange digital pounds for cash and bank deposits and vice versa. This would enable people to move money between accounts: £10 of cash or bank deposits could be exchanged for £10 of digital pounds and £10 of digital pounds could be exchanged for £10 of bank deposits or cash.").

III. DESIGNING FUNCTIONAL REGULATION

Based on the foregoing discussion of transferability and value, this Article next proposes an analytical framework to help guide policymakers and regulators to design laws that protect the monetary system's critical functions. From a functional perspective, recall that monetary regulation should be designed to correct any "market failures" that (i) impede the low-cost transferability, or (ii) impair the stable value, of the rights that are becoming widely used as money.[88]

A. Reducing Impediments to Low-Cost Transferability

In the first instance, the transferability of digital currencies depends on how the currencies are evidenced. If they are account-based, their transferability will depend on the creation of electronic networks to facilitate their transfer. The U.S. government has already created such networks, such as Fedwire and FedNow, to facilitate the transfer of wholesale digital payments.[89] There also are industry-created electronic networks, such as CHIPS and SWIFT, that facilitate those transfers.[90] Regulators should examine how to adapt these types of networks to the low-cost transferability of retail digital currency payments.

Cybersecurity is a risk embedded in the adoption of electronic networks. Cyberattacks can impair the function of these electronic networks. For example, hackers can insert malicious software (sometimes called malware) into a computer's files, systems, or networks to disrupt the transmission of information, in the digital currency context thereby interrupting the transmission of funds.[91] Due to broader

88. *See supra* notes 7–8 and accompanying text.

89. *Fedwire Funds Services*, FED. RESERVE (last visited April 10, 2024), https://perma.cc/B2HF-VZ8G ("The Federal Reserve Banks provide the Fedwire Funds Service, a real-time gross settlement system that enables participants to initiate funds transfer that are immediate, final, and irrevocable once processed."); *FedNow Service*, FED. RESERVE (last visited April 10, 2024), https://perma.cc/QJU9-ZQ9C ("[FedNow] is a flexible, neutral platform that supports a broad variety of instant payments. At the most fundamental level, the service provides interbank clearing and settlement that enables funds to be transferred from the account of a sender to the account of a receiver in near real-time and at any time, any day of the year.").

90. *See About CHIPS*, CLEARING HOUSE (last visited April 10, 2024), https://perma.cc/3FJG-UQ57 ("The CHIPS® network is the largest private sector USD clearing system in the world, clearing and settling $1.8 trillion in domestic and international payments each business day."); *About Us*, SWIFT (last visited April 10, 2024), https://perma.cc/5YU6-WK98 (describing SWIFT's goal of facilitating transfers between financial institutions).

91. Hackers sometimes do this as blackmail, demanding a ransom payment to re-enable transmissions. *See, e.g.*, *Ransomware Annex to G7 Statement*, U.S. DEP'T OF THE TREASURY (Oct. 13, 2020), https://perma.cc/U36F-DK88.

concerns over cybersecurity, governments are already studying how to protect against cyberattacks generally.[92]

In addition to cybersecurity risks are environmental risks. The costs of transferring cryptocurrency-based digital currencies, especially those involving blockchain,[93] are currently extraordinarily high—at least in environmental impact. Functional regulation should focus on how to decrease this cost, especially because environmental harm poses a cost to society generally.[94]

To put this cost into perspective, verifying transactions and creating new blocks on the blockchain are extremely energy intensive. To be added to the blockchain, transfers must go through a verification method. The still dominant method, proof of work,[95] involves so-called "mining," where the first computer to solve a math puzzle is rewarded with the currency.[96] This requires intense processing power.[97] For Bitcoin alone, the University of Cambridge Digital Assets Programme "estimates that by mid-September 2022 (21/09/2022), approximately 199.65 $MtCO_2e$ (million tonnes of carbon

92. *See generally Cybersecurity*, DEP'T OF HOMELAND SEC., https://perma.cc/3UV3-ZWTL (last visited Jun. 16, 2024) (summarizing efforts by the federal government to protect against cyberattacks).

93. A blockchain is a database, typically called a "ledger" as in accounting, spread across multiple computers that connect via the internet. The term "blockchain" refers to the ledger that represents all transactions on the network. The ledger, or database, is organized as a chain of "blocks," where each block contains one or more transactions. Lindsay Sain Jones, *Beyond the Hype: A Practical Approach to CryptoReg*, 25 VA. J.L. & TECH. 175, 186-87 (2022). Once the computers set the order of specific transactions, that order becomes fixed. Wolfgang K. Härdle et al., *Understanding Cryptocurrencies*, 18 J. FIN. ECON. 181, 185 (2020).

94. *Cf.* Jon Truby, Decarbonizing Bitcoin: Law and Policy Choices for Reducing the Energy Consumption of Blockchain Technologies and Digital Currencies, 44 ENERGY RSCH. & SOC. SCI. 399, 406 (2018) (observing that, "given the enormity of the problem and the likelihood of it getting worse as the [cryptocurrency] sector expands, and its threat to energy supplies and climate change, the market has evidently failed, which justifies, and indeed necessitates, [government] intervention").

95. Professor Buckley notes, however, that many cryptocurrencies are shifting from proof of work to a less energy intensive proof-of-stake consensus model for mining. With "The Merge," for example, "Ethereum shifted from proof of work to proof of stake precisely to address these obscene environmental impacts [the Article] highlight[s]." E-mail from Ross Buckley, Scientia Professor, University of New South Wales (UNSW), Sydney, to the author (Apr. 27, 2024) (on file with author).

96. Some contemporary archaeologists see the mining of Yapese stone disks as a precursor to the 'mining' of Bitcoin. Laborers would mine stone disks from a quarry, and the community would then decide who would be deemed to own portions of the disks. PEET VAN BILJON & ALEXANDRA REED LAJOUX, MAKING MONEY: THE HISTORY AND FUTURE OF SOCIETY'S MOST IMPORTANT TECHNOLOGY 7 (2020).

97. Devika Rao, *The Environmental Cost of Cryptocurrency*, THE WEEK (Dec. 15, 2022), https://perma.cc/ZFY8-VD9L.

dioxide equivalent) can be attributed to the Bitcoin network since its inception."[98] Furthermore, "research from the White House Office of Science and Technology Policy (OSTP) found that cryptocurrency in general," measured by kilowatt-hours per year, "exceeds the total energy use of Argentina or Australia and accounts for between 0.4 percent to 0.9 percent of global energy usage. It also currently accounts for approximately 0.3 percent of global annual greenhouse gas emissions."[99] Although that seems like a small percentage, some worry that "[t]he rapid development of blockchain technology and the cryptocurrency market may undermine global efforts to curb climate change."[100]

B. Preventing Impairment of Stable Value

From a functional perspective, monetary regulation should be designed to prevent the impairment of a currency's stable value. This should be irrelevant to generic cryptocurrencies, which are not intended to have stable value; it also should be irrelevant to CBDC, which (as observed) would have the same value as the fiat currency issued by the relevant government in paper form.[101] However, regulation to prevent the impairment of a currency's stable value would be directly relevant to stablecoins.

If a stablecoin issuer defaulted on its redemption obligation, the public would lose confidence in that stablecoin, impairing its value. Parties even could lose confidence in a stablecoin, impairing its value, if the public merely questions the issuer's ability to satisfy its redemption obligations. Furthermore, speculations regarding one stablecoin could spread to other stablecoins, impairing the value of stablecoins more generally. The design of functional regulation should focus on protecting those redemption rights, perhaps from three different dimensions:[102] assuring that stablecoin issuers maintain sufficient assets to perform their redemption obligation at all times; protecting any assets held for that purpose from claims of the issuer's creditors; and protecting the issuer from business and operational risks that could impair its financial condition.

98. Alexander Neumueller, *A Deep Dive Into Bitcoin's Environmental Impact*, UNIV. OF CAMBRIDGE (Sept. 27, 2022), https://perma.cc/N3GG-MEWX.

99. Rao, *supra* note 97.

100. Dongna Zhang et al., *Implications of Cryptocurrency Energy Usage on Climate Change*, 187 TECH. FORECASTING & SOC. CHANGE 122219, 122219 (2023).

101. *See supra* notes 85-86 and accompanying text.

102. Functional regulation and more traditional financial regulation would merge to the extent regulation focuses on protecting the redemption rights of a widely used global stablecoin whose impairment in value could systemically threaten the financial system.

C. *Assuring that Stablecoin Issuers Maintain Sufficient Assets to Perform Their Redemption Obligation*

Functional regulation should create assurance that stablecoin issuers can perform their redemption obligation at all times. Such regulation, for example, could require stablecoin issuers to maintain at least sufficient amounts of reference assets—or at least cash and interest-bearing short-term securities to enable them to purchase sufficient amounts of reference assets—to timely satisfy the redemption rights. As an illustration, some recommend that stablecoin issuers be required to hold 100% reserves, plus an additional cushion, in cash or high-quality cash equivalents such as U.S. treasuries.[103] Alternatively, a stablecoin issuer could be required to collateralize its redemption obligation, or to hedge the risk with derivatives or other guarantees.[104]

Those regulatory requirements would certainly be costly.[105] They could also be imperfect. For example, if stablecoin issuers hold reserves in various currencies, it would create exchange risk. If they hold reserves in non-cash assets, it would create liquidity risk.[106] And whether it would be feasible to hedge the redemption risk with derivatives or other guarantees would depend on market factors. As another example and in another context, the derivatives market was not deep enough to provide a sufficient hedge for an affordable price.

Alternatively, stablecoin issuers could be limited to banks, and regulation could make the stablecoins the equivalent of insured deposits.[107] If a bank failed to satisfy its redemption obligation, the central banking entity that guarantees deposits would perform the redemption.[108] This approach, of course, would require a political decision and also would likely require banks to pay the type of insurance premiums they typically pay for government deposit insurance.[109] This is not to mention that the

103. Christian Catalini & Jai Massari, *Stablecoins and the Future of Money*, HARV. BUS. REV. (Aug. 10, 2021), https://perma.cc/YS77-GV64.

104. Steven L. Schwarcz, *Regulating Global Stablecoins: A Model-Law Strategy*, 75 VAND. L. REV. 1729, 1759 (2022).

105. *See* Craig Calcaterra, Wulf A. Kaal & Vadhindran Rao, *Stable Cryptocurrencies: First Order Principles*, 3 STAN. J. BLOCKCHAIN L. & POL'Y 62, 64 (2020).

106. Randal K. Quarles, Vice Chair for Supervision, Fed. Rsrv. Bd., Remarks at the 113th Annual Utah Bankers Association Convention: Parachute Pants and Central Bank Money 8 (June 28, 2021), https://perma.cc/A5UY-XMBA.

107. *Cf.* Arthur E. Wilmarth, Jr., *It's Time to Regulate Stablecoins as Deposits and Require Their Issuers to Be FDIC-Insured Banks*, BANK. & FIN. SERVS. REP., Feb. 2022, at 1 (arguing that stablecoins should be issued and distributed only by FDIC-insured banks).

108. Schwarcz, *supra* note 104, at 1761-62.

109. The U.S. Federal Deposit Insurance Corporation (FDIC) guarantees account holders' balances at insured banks for up to $250,000 per account. Although the FDIC guarantee is ultimately backed by the full faith and credit of the U.S. government, the FDIC charges the banks insurance premiums. *See* James Lee & David Wessel, *How Does Deposit Insurance Work?*, BROOKINGS (Mar. 21, 2023), https://perma.cc/T9D6-4THE.

failure of a bank that issues large quantities of stablecoins could have a systemic impact on the stablecoin system. Diversifying stablecoin issuers, as next discussed, could reduce that risk.[110]

In a more innovative approach, regulators might wish to consider the possibility of creating strategic public-private partnerships to protect redemption rights.[111] There are possible synergies to both the government and the private sector. Say, for example, that the reference asset for a stablecoin is a government's fiat currency. The government could offer the stablecoin issuer some protection against the redemption risk. This could significantly reduce the issuer's cost of assuring it could satisfy its redemption obligation. In return, the issuer could permit the government to control the issuance of new stablecoins to the extent needed to manage monetary policy.[112]

D. Protecting Reference Assets Held for Redeeming Stablecoins From Claims of the Issuer's Creditors

To assure holders that stablecoin issuers can perform their redemption obligation at all times, functional regulation should legally insulate any assets needed to satisfy an issuer's redemption obligation from claims of the issuer's creditors. Protecting against this type of "intermediary risk" is not entirely novel; it has precedent in commercial law.[113] With the advent of the indirect holding system for securities, investors no longer receive physical possession of paper certificates evidencing the securities. Rather, they purchased undivided interests in the securities held by brokers (or other securities intermediaries), who themselves held undivided interests in the securities.[114] This created concern that an intermediary's creditors could claim against securities held by the intermediary for investors.[115] § 8-503 of the Uniform Commercial Code (UCC) was enacted to provide that those securities are legally insulated from those creditor claims.[116] Similar regulation should be enacted to protect stablecoin

110. Yesha Yadav, Jose Fernandez da Ponte & Amy Davine Kim, *Payments and the Evolution of Stablecoins and Central Bank Digital Currencies in the Global Economy* 34–37 (Vand. L. Sch., Working Paper, 2023), https://perma.cc/Q6P6-LTLU.

111. *Cf.* Schwarcz, *supra* note 60, at 1069-70 (introducing this concept).

112. *Cf.* Scott A. Wolla, *A New Frontier: Monetary Policy with Ample Reserves*, PAGE ONE ECON. (May 2019), https://perma.cc/6GWT-4E5C (discussing how Federal Reserve affects monetary policy by conducting open market operations to manage the money supply); Team Circle, *Circle Partners with Bolivarian Republic of Venezuela and Airtm to Deliver Aid to Venezuelans Using USDC*, CIRCLE (Nov. 20, 2020), https://perma.cc/AG55-89DG (discussing how government used stablecoin to carry out financial intervention).

113. *Cf.* Steven L. Schwarcz, *Intermediary Risk in a Global Economy*, 50 DUKE L. J. 1541, 1545-64 (2001) (examining that risk).

114. *Id.* at 1543.

115. *See id.* at 1545.

116. *Id.* at 1556.

holders.[117]

E. Protecting the Issuer from Business and Operational Risks

Even if a stablecoin issuer otherwise could satisfy its redemption obligation, business and operational risks could impair its ability to do so. To counter that, regulators may wish to consider imposing capital requirements or ring-fencing measures on stablecoin issuers.

Capital requirements effectively require firms to maintain certain levels of equity that are designed to buffer them against a financial crisis by absorbing losses.[118] For example, after the 2008 global financial crisis, the United States and many other nations imposed capital requirements on systemically important financial institutions.[119]

Ring-fencing requirements are designed to protect firms. One way the requirements protect firms is by limiting their ability to engage in risky behavior.[120] In the UK, retail banks are ring-fenced in this way—being required to separate core retail banking services from their investment and international banking activities to limit a firm from engaging in risky activities.[121] In the United States, critical utilities are

117. Interestingly, the EU's MiCA (Markets in Crypto-Assets) regulation seeks to protect stablecoin holders by requiring stablecoins to be backed at all times by reference assets that are legally segregated from the issuer's estate. *See* EU Regulation 2023/1114, art. 36, 2023 O.J. (L 150) 40, 94 ("Issuers of asset-referenced tokens shall ensure that the reserve of assets is operationally segregated from their estate, as well as from the reserve of assets of other tokens.").

118. Steven L. Schwarcz, *Systemic Risk*, 97 GEO. L. REV. 193, 210 (2008) ("[C]apital adequacy requires banks to hold minimum levels of capital, a requirement intended to limit excessive risk taking and buffer against financial crisis"); *What Is the Difference Between a Bank's Liquidity and Its Capital?*, BD. OF GOVERNORS OF FED. RSRV. SYS. (Dec. 31, 2019), https://perma.cc/M39V-HLUZ ("Capital is the difference between all of a firm's assets and its liabilities. Capital acts as a financial cushion to absorb losses.").

119. *See Post-2008 Financial Crisis Reforms*, FIN. STABILITY BD. (Aug. 16, 2024), https://perma.cc/46WJ-D7B7 ("Following the 2008 financial crisis, the G20 committed to fundamental reform of the global financial system given the significant economic and social damage that it caused . . . [including] better regulatory capital requirements, strengthened risk management practices and better aligned compensation structures will build more resilient financial institutions.").

120. *Cf.* Steven L. Schwarcz, *Ring-Fencing*, 87 S. CAL. L. REV. 69, 81-82 (2013) ("[R]ing-fencing has at least four uses: to protect a firm from becoming subject to liabilities and other risks associated with bankruptcy; to help ensure that a firm is able to operate on a standalone basis even if its affiliated firms fail; to protect a firm from being taken advantage of by affiliated firms, thereby preserving the firm's business and assets; and to limit a firm from engaging in risky activities.").

121. Additionally, "[a]s of 1 January 2019 the largest UK banks are required by UK law to separate core retail banking services from their investment and international banking activities. This is known as ring-fencing." *See Ring-Fencing*, BANK OF ENGLAND (Jun. 2, 2024), https://perma.cc/6P95-3TZT.

similarly ring-fenced.[122] Regulators might consider whether to require the ring-fencing of stablecoin issuers—or, at least those that issue systemically important amounts of stablecoins.

This Article's proposal of functional regulation is, admittedly, somewhat novel. Financial regulators generally should be cautious because premature or unnecessary regulation could restrict innovation and impose transaction costs without effectively controlling harm.[123] These costs could include the expenses of preparing and implementing a supervisory program, developing employee expertise, and updating examination and training manuals as well as databases for receiving, analyzing, and storing information.[124] New regulation therefore should be based on evidence of problems that actually require new regulatory solutions.[125]

IV. FUNCTIONAL REGULATION AS A SUPPLEMENT TO TRADITIONAL REGULATION

Recall that this Article's functional approach is intended to supplement, not replace, traditional regulatory approaches.[126] Traditional financial regulation focuses relatively narrowly on protecting against risks arising from financial innovation that might harm parties, including investors, customers, or the public.[127] In the context of money, traditional regulation typically focuses on protecting against financial crimes, protecting consumers and privacy, and protecting monetary integrity and financial stability.

Consider, next, how functional regulation could supplement this traditional regulation. The following analysis explains that in the context of examining how to regulate the innovation in digital currencies.

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122. *See generally* Steven Ferrey, *Ring-Fencing the Power Envelope of History's Second Most Important Invention of All Time*, 40 WM. & MARY ENV'T. & POL'Y REV. 1 (2015) (discussing the growing ring-fencing of energy-generating utilities).

123. *Cf*. Carlos Cantú, Jon Frost & Thomas M. Noone, *Some Perspectives on the Regulation of Stablecoins*, 87 LAW & CONTEMP. PROBS. (forthcoming 2025, on file with author) (urging this caution). *Also cf*. Mervyn King, Deputy Governor, Bank of England, Balancing the Economic See Saw (Apr. 14, 2000) (saying that "our ambition at the Bank of England is to be boring").

124. Cantú, Frost & Noone, *supra* note 1233.

125. The central bankers co-authoring that article also argue that where new regulation is needed, policymakers initially might consider more principles-based than rules-based regulation, deferring granular decisions about implementation to the regulators. Because that can be controversial—entrusting unelected officials "with choices that could have significant consequences for an industry, its customers, and perhaps the broader economy"—they argue that a "first choice facing policymakers is whether regulation should wait until it is truly needed." Cantú, Frost & Noone, *supra* note 1233.

126. *See supra* note 25 and accompanying text.

127. *See supra* note 14 and accompanying text.

A. Using Functional Regulation to Supplement Protecting against Financial Crimes

Financial crimes epitomize the potential for third-party harm. Functional regulation would tie into this insofar as the crime might impair monetary value.

Widespread counterfeiting could have that impact. In the context of digital currencies, counterfeiting risk may vary depending on whether a digital currency is token-based or account-based, or whether the currency is issued on a decentralized blockchain or by a central authority. There are two possible ways to counterfeit an account-based CBDC, although both also could be classified as fraud: by double spending, and by making transfers involving an unverified account.[128] Double spending can occur when a payor uses the same money in an account to make two purchases before the transactions clear in the payment system.[129] Transfers involving an unverified account can occur when a payee causes the bank to credit money from a phantom account, which only appears to exist, to the payee's account and then quickly withdraws the money.[130]

To the extent an account-based CBDC makes use of existing banking technology and systems, the counterfeiting risks should be comparable to—and thus deterred by the laws regulating—counterfeiting risks in current wholesale digital banking.[131] A digital currency recorded through a decentralized blockchain[132] should have a relatively lower risk of counterfeiting because of the immutability of the blockchain and the difficulty of manipulating transactions; a user would need to control a majority of the computer power in the network to manipulate transactions and double-spend

128. *See Central Bank Digital Currencies*, BANK FOR INT'L SETTLEMENTS 4 (2018), https://perma.cc/432G-X7XX (observing that form of verification needed differs between token-based and account-based money).

129. *See id.* at 4 n.5 (observing double spending problem for digital tokens). This Article's reference to double spending includes, of course, any multiple spending of the same money in an account.

130. *See*, *e.g.*, Lily Hay Newman, *How Hackers Pulled Off a $20 Million Mexican Bank Heist*, WIRED (Mar. 15, 2019), https://perma.cc/LSQ7-URR3 (discussing transfer initiated by hackers from phantom account to real account within bank).

131. The security threat caused by a possible centralization of accounts in the central bank would still need to be considered.

132. A decentralized blockchain enables digital currency transfers by utilizing smart contracts to conduct peer-to-peer trades. Decentralization avoids intermediaries, thereby (in principle) lowering transaction costs; end users simply interact directly with each other. In contrast, centralized cryptocurrency exchanges enable digital currency transfers by utilizing an "order book-based system" to enable the transfers. Technical delays or server outages on that system can disrupt or delay transactions. Centralized exchanges also may become subject to government oversight, increasing the security surrounding transactions but creating potential compliance delays. *See* Sascha Hägele, *Centralized Exchanges vs. Decentralized Exchanges in Cryptocurrency Markets: A Systematic Literature Review*, 34 ELEC. MARKETS 33, at 14 (2024).

currency.[133] The unverified accounts risk could be minimized by improving account verification.[134]

Functional regulation would have less applicability to the financial crimes of money laundering and terrorist financing because neither should directly impact transferability or value. Nations are already following the recommendations of the Financial Action Task Force (FATF), a G-7 initiated intergovernmental organization that sets global standards for anti-money-laundering ("AML") and anti-terrorist financing laws.[135] The FATF is considering how it should expand its recommendations to include cryptocurrencies that facilitate real-time anonymous payments.[136] Specifically, the task force has recommended that stablecoin issuers, as well as institutional intermediaries that conduct stablecoin exchange, transfer, or safekeeping services, be regulated and subject to monitoring systems that ensure AML and similar compliance.[137] To the extent stablecoin transfers involve peer-to-peer exchanges that bypass institutional intermediaries, those exchanges could avoid regulation; but that threat should be no greater than is posed by today's large numbers of cash transactions.[138]

B. Using Functional Regulation to Supplement Protecting Consumers and Privacy

Functional regulation would have little direct applicability to consumer protection and privacy concerns, again because neither directly impacts transferability or value. More traditional regulation, however, could protect consumers by limiting their liability for unauthorized transactions, ensuring that parties involved with issuing and intermediating digital currencies inform consumers of their rights (and are prevented from forcing consumers to waive those rights), protecting consumers from being charged excessive fees, and giving consumers a means of redressing erroneous transactions.

The digital currencies industry is beginning to take privacy concerns seriously.

133. In such a system, a bad actor would need to control greater than 51% of the network's computing power to successfully manipulate a transaction. Kelly Mahoney, Comment, *Cryptocurrency: Regulate or Facilitate? How States' Approaches to Cryptocurrency Can Be Applied on a Federal Level*, 43 J. NAT'L ASS'N ADMIN. L. JUDICIARY ISS. 2 (2023).

134. Ori Jacobovitz, BLOCKCHAIN FOR IDENTITY MANAGEMENT 2 (2016), https://www.cs.bgu.ac.il/~frankel/TechnicalReports/2016/16-02.pdf (discussing using digital IDs stored on a blockchain and attached to every stablecoin transaction).

135. FATF, INTERNATIONAL STANDARDS ON COMBATING MONEY LAUNDERING AND THE FINANCING OF TERRORISM & PROLIFERATION 7 (2021), https://perma.cc/2V6L-9XKV [hereinafter FATF Recommendations]; *What We Do*, The FATF, https://perma.cc/NZH9-TFL4.

136. FATF RECOMMENDATIONS, *supra* note 135, at 17.

137. *Id.*

138. *Id.* at 7-8.

Because blockchain security relies on a public ledger and public verification of transactions, users can freely inspect all transactions.[139] To mitigate this concern, the issuers of some cryptocurrencies, such as Monero, have implemented technologies to hide information associated with transactions.[140]

Some fear that powerful social networks or other types of data-sharing firms could become digital currency issuers.[141] Regulation—although not functional regulation per se—should at least require issuers to be transparent about how they protect the privacy of persons using those currencies.[142]

CBDCs pose additional privacy concerns, particularly if a CBDC-issuing central bank engages in mass surveillance or misuses data.[143] Carefully structuring the CBDC's issuance can mitigate these concerns. For example, a central bank that deals directly with consumers could get access to private financial information.[144] However, utilizing a hybrid structure would reduce government access to consumer information.[145] As discussed, such a structure would be administered by non-governmental banks or approved non-bank firms acting as the central bank's agents to interface with consumers.[146]

139. Ittay Eyal, *Blockchain Technology: Transforming Libertarian Cryptocurrency Dreams to Finance and Banking Realities*, 50 COMPUTER 38, 46 (2017).

140. Simon Dyson, William J. Buchanan & Liam Bell, *The Challenges of Investigating Cryptocurrencies and Blockchain Related Crime*, 1 J. BRITISH BLOCKCHAIN ASS'N 1, 1-6 (2018).

141. *See FTC Imposes $5 Billion Penalty and Sweeping New Privacy Restrictions on Facebook*, FED. TRADE COMM'N (July 24, 2019), https://perma.cc/XVZ8-3L6L (reporting that Facebook agreed to pay a penalty of $5 billion to settle charges that it "violated a 2012 FTC order by deceiving users about their ability to control the privacy of their personal information"); Spencer Bokat-Lindell, *Can We Trust Facebook to Run a Bank?*, N.Y. TIMES (Oct. 24, 2019), https://perma.cc/WBK3-3SZ5 (discussing privacy concerns over Libra).

142. *Cf.* Natasha Lomas, *Libra, Facebook's Global Digital Currency Plan, Is Fuzzy on Privacy, Watchdogs Warn*, TECHCRUNCH (Aug. 5, 2019), https://perma.cc/43D5-XR9W (noting the lack of detailed information on Libra's privacy protections and describing the concerns of international privacy watchdogs).

143. Jiaying Jiang, *Privacy Implications of Central Bank Digital Currencies*, 54 SETON HALL L. REV. 69, 109 (2023). In the United States, for example, the House of Representatives has passed a bill in response to concerns that the issuance of a CBDC could "threaten Americans' right to financial privacy." *House Passes CBDC Anti-Surveillance State Act*, HOUSE FIN. SERV. COMM'N (May 23, 2024), https://perma.cc/VB8G-D238 (preventing the Executive Branch from creating a CBDC without explicit authorization from Congress).

144. *See* Jiang, *supra* note 143, at 109.

145. *Id.* at 108.

146. *Cf. infra* notes 158-160 and accompanying text (discussing a hybrid CBDC structure).

C. Using Functional Regulation to Supplement Protecting Monetary Integrity and Financial Stability

Functional regulation is intimately tied to these protections to the extent of protecting digital currency transferability and value. Cyberattacks can undermine transferability by impairing the electronic networks in which digital currencies are transferred. As observed, governments are already studying how to protect against cyberattacks generally.[147]

This Article already has discussed how functional regulation can protect a digital currency's value by protecting its redemption rights. Such protection would also serve to protect financial stability.

A major stability risk would occur, for example, if parties lost confidence in a widely used stablecoin. The primary reason they might lose that confidence would be the issuer's inability to redeem the stablecoin for its underlying reference asset. That inability would resemble a classic bank run if, for example, the issuer is unable to obtain sufficient reference assets to satisfy correlated demands by stablecoin holders.[148] If the stablecoin is widely used as a common store of value—which might be especially likely to occur in emerging markets and developing economies—even a moderate variation in its value might cause significant fluctuations in holders' wealth.[149] Then if that fluctuation is sizeable enough to affect spending decisions and economic activity, it could impair the real economy. Protecting the stablecoin's redemption rights would prevent holders from losing confidence, thereby assuring financial stability.

V. POLITICAL-ECONOMY IMPLICATIONS

Next consider the political economy of functional regulation. This discussion focuses, in turn, on CBDC, stablecoins, and generic cryptocurrencies.

A. Central Bank Digital Currencies, Including the Proposed Digital Pound

The pursuit of central bank digital currencies has become something of a fad, with 134 countries and currency unions now engaged in various forms of exploration.[150]

147. *See supra* note 92 and accompanying text.

148. In a bank run, the bank's depositors panic, converging on the bank to quickly withdraw their monies. Because banks keep only a small fraction of their deposits on hand as cash reserves, a bank may have insufficient cash to pay all withdrawal demands, causing it to default and ultimately fail. R. W. HAFER, THE FEDERAL RESERVE SYSTEM: AN ENCYCLOPEDIA 25, 145 (2005) (observing that a bank's cash reserves are often less than 5% of its deposits).

149. Allen et al., *supra* note 4, at 12–13.

150. Only three countries—The Bahamas, Jamaica, and Nigeria—however, have fully issued a retail CBDC to date. *Central Bank Digital Currency Tracker*, ATL. COUNCIL, https://perma.cc/CN74-QU3L.

Governments are pursuing the development of CBDCs for several reasons that intertwine political and social considerations. Politically, especially for the United States[151] and the EU, development of a robust CBDC could help to maintain the dominance of the dollar and the strength of the euro, which will increasingly have to compete with other government digital currencies (especially China's digital yuan) and privately issued stablecoins.[152] The key to achieving those political goals is functional.

A CBDC would increase the transferability of government fiat currencies,[153] thereby potentially lowering transaction costs, especially for cross-border payments. This would make the currency, such as the dollar and the euro, more competitive and thus more widely used. As observed, a government's CBDC should have the same value as its paper fiat currency. In other words, a CBDC dollar should have the same value as a paper dollar; the only difference would be its transferability.[154]

From a social justice standpoint, a CBDC could increase financial inclusion. As mentioned, the current emphasis is on developing digital currencies that have a low transfer cost, to facilitate retail consumer payments.[155] This is especially important for consumers with low income or from communities of color or who are remotely located. They may lack access to affordable banking services and to a full range of payment options.[156] This can be both expensive (fostering reliance on prepaid cards or check cashing services) as well as time-consuming and unsafe (waiting in line to get or pay

151. Despite these political benefits, U.S. Federal Reserve Chairman Jerome Powell testified before Congress in March 2024 that "[p]eople don't need to worry about a central bank digital currency, nothing like that is remotely close to happening anytime soon." Pete Schroeder, *Powell Says Fed Not "Remotely Close" to a Central Bank Digital Currency*, REUTERS (Mar. 7, 2024), https://perma.cc/8M3F-4M26. Powell's testimony appears to have been motivated to address concerns that the government would use a CBDC to track consumer activity. To further allay these concerns, Powell stated that if a CBDC were ever created, private banks would manage people's accounts. Jesse Hamilton, *U.S. Fed Chair Powell Says 'Nowhere Near' Pursuing CBDC, Won't Spy on Americans*, COINDESK (Mar. 7, 2024), https://perma.cc/SDM3-3ZJY. *Cf. supra* notes 143-146 and accompanying text (discussing this type of hybrid CBDC to address privacy concerns).

152. Although a government might try to prohibit a domestic stablecoin that threatens the strength of its fiat currency, that prohibition might be ineffective against the creation of a black market in that stablecoin. Furthermore, any such prohibition would likely be less effective against a widely used global stablecoin.

153. *Cf.* ROLAND FRANK, GREGOR SCHUMACHER & ANDREAS TAMM, *Falling Transaction Costs and the New Network Economy*, *in* CLOUD TRANSFORMATION: THE PUBLIC CLOUD IS CHANGING BUSINESSES 169, 169-201 (Ann-Kristen Wiegmann ed. 2023) (arguing that digitization reduces transaction costs between firms).

154. On the margin, its greater transferability might even cause investors to value a CBDC dollar slightly higher than a paper dollar.

155. *See supra* note 65 and accompanying text.

156. Yadav, Fernandez & Kim, *supra* note 110, at 8-9.

cash and carrying around sums of money).[157]

The United Kingdom, for example, is in the process of developing, although it has not yet made a final decision whether to introduce, a retail CBDC known as the digital pound.[158] Referred to as a "platform model," the currently proposed digital pound appears to resemble a hybrid account-based CBDC. Although issuances of the currency would be recorded on a "core ledger" at the Bank of England, transfers would be recorded in accounts which are administered by banks or approved non-bank firms[159] acting as agents of the Bank of England. The digital pound would clearly be a fiat currency—a direct claim on the Bank of England.[160]

B. Stablecoins

As stablecoins become more widely used, and also to the extent global stablecoins develop,[161] they raise at least three political economy concerns: impairing governmental control over monetary policy;[162] significantly reducing bank deposits; and uncertainty about managing gradients of stablecoin riskiness. The first concern is that a significant shift from a government's fiat money to stablecoins could impair the government's control over monetary policy. This concern would be especially real for countries whose fiat currencies are less stable than accessible stablecoins.[163]

Although the euro is a highly stable fiat currency, the European Union itself is cautious that a strong global stablecoin might impair its monetary policy. Its recent

157. *See id*. Sub-Saharan Africa illustrates how digital banking can increase access to financial services. Before the introduction of mobile financial applications—sometimes called "m-money"—consumers in countries like Kenya had to rely on costly, and sometimes unreliable, intermediaries to transfer money. By allowing any consumer with mobile phone access to transfer money easily, a large body of literature suggests that m-money has helped to facilitate economic growth in countries where access to traditional financial services is limited. *See*, *e.g.*, Jenny C. Aker & Isaac M. Mbiti, *Mobile Phones and Economic Development in Africa*, 24 J. ECON. PERSPS. 207, 221-22 (2010) ("Wire transfers via Western Union are secure but often prohibitively expensive, and are not always available in remote rural areas. Sending money via transport services or friends and relatives is more accessible, but carries a high risk of theft.").

158. *Central Bank Digital Currency Tracker*, *supra note* 150.

159. They would be called Payment Interface Providers (PIPs) or External Service Interface Providers (ESIPs).

160. Hunt & Bailey, *supra note* 87, at 13.

161. Global stablecoins are stablecoins that are widely used internationally. *See* Schwarcz, *supra* note 104, at 1734.

162. *See supra* note 112 and accompanying text (discussing, among other things, how the Federal Reserve affects monetary policy by managing the money supply).

163. *Cf*. Nitin Gaur, *Blockchain — A Platform for Disintermediation*, INFOCAST, https://perma.cc/7LDV-4VNG (discussing this in the context of disintermediation).

MiCA regulation, which governs markets in stablecoins and other crypto-assets,[164] provides, for example, that "Competent authorities shall also refuse authorization [to a prospective crypto-asset issuer] if the ECB or, where applicable, the central bank gives a negative opinion . . . on the grounds of a risk posed to the smooth operation of payment systems, monetary policy transmission, or monetary sovereignty."[165]

This Article also has suggested that public-private partnerships could create synergies whereby the government helps to protect a stablecoin's redemption rights in return for gaining control over the issuance of new stablecoins to the extent needed to manage monetary policy.[166] To manage global stablecoins that have foreign issuers, however, nations will need to seek more international solutions.[167]

The second political economy concern is disintermediation: the threat that the widespread use of stablecoins could significantly reduce bank deposits. That reduction could force commercial banks to rely on more expensive sources of funding, which would increase the cost of business loans.[168] Again, this would be especially likely to occur in countries whose fiat currencies are less stable than accessible stablecoins.[169] Regulators could help to protect against disintermediation in various ways, including by limiting stablecoin issuance to banks[170] and prohibiting stablecoins from bearing

164. *See supra* note 84.

165. *See* EU Regulation 2023/1114, art. 21(4), 2023 O.J. (L 150) 40, 83. MiCA article 24(3) similarly provides that "Competent authorities shall limit the amount of an asset-referenced token to be issued or impose a minimum denomination amount in respect of the asset-referenced token when the ECB or, where applicable, the central bank . . . issues an opinion that the asset-referenced token poses a threat to the smooth operation of payment systems, monetary policy transmission or monetary sovereignty . . . ." EU Regulation 2023/1114, art. 24(3), 2023 O.J. (L 150) 40, 85.

166. *See supra* note 111-112 and accompanying text. *Cf. supra* note 77 and accompanying text (observing that the value of a fiat currency is at least partly based on an expectation that the government will use monetary policy to attempt to stabilize the currency's value).

167. The traditional, more formal approach to agree to international solutions has been to enact a treaty or multilateral convention, under which each nation agrees to adhere to the convention's requirements without requiring further action by its legislative body. By contrast, a more modern and flexible approach is to create a model law for governments to uniformly enact within their respective jurisdictions. Given the speed with which global stablecoins develop, it may be more effective to regulate global stablecoins using the model-law approach. *See* Schwarcz, *supra* note 104, at 1737-39.

168. Alexander Kriwoluzky & Chi Hyun Kim, *Public or Private? The Future of Money*, EUR. PARLIAMENT 15 (Dec. 2019), https://perma.cc/ZN5X-KQHX.

169. *See* Gaur, *supra* note 163 (defining "disintermediation" as "reduction in the use of intermediaries between producers and consumers, for example by investing directly in the securities market rather than through a bank").

170. *Cf. supra* notes 107-110 and accompanying text (discussing the pros and cons of limiting stablecoin issuance to banks). *Also cf.* Stablecoin Classification and Regulation Act of 2020, H.R. 8827, 116th Cong. §§ 3(a)(5), 3(aa)(2)(D)(i), 52(a)(1) (2020) (proposing similar changes by adding "stablecoins issued by such bank or savings association" to the definition of the term "deposit" in the Federal Deposit Insurance Act (12 U.S.C. § 1813) and amending

interest.[171] Furthermore, to the extent disintermediation occurs, regulators could consider taking steps to alleviate its effects, such as by encouraging the emergence of other platforms to support low-cost business lending.

The third political economy concern is uncertainty about the extent to which regulators should attempt to manage gradients of stablecoin riskiness.[172] Depending on the nature of their reference assets and how those assets back the currency, some stablecoins will be riskier than others.[173] To address this concern, regulators may need to engage in trial and error. The EU's MiCA regulation begins to grapple with this by imposing "light touch" restrictions on more traditional stablecoins but "overly burdensome rules" on potentially riskier types of stablecoins.[174]

C. Generic Cryptocurrencies

As discussed, these are privately-issued digital assets that are not backed by anything of intrinsic value.[175] And they are not widely used, at least for retail payments.[176] Rather than facilitating their use, governments should subject their use—or, at least, their retail use—to consumer protection laws to avoid misleading the public. This again follows the caution that traditional regulation should serve as a check to prevent the expansion of harm.[177]

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§ 1811 of that Act to limit stablecoin issuance to "insured depository institution[s] that [are] member[s] of the Federal Reserve System").

171. Interest-bearing stablecoins can make disintermediation more likely to occur. *Cf.* Gary B. Gorton & Jeffrey Y. Zhang, *Taming Wildcat Stablecoins*, 90 U. CHI. L. REV. 909, 911 (2023) ("[O]wners of stablecoins can pledge them in decentralized finance (DeFi) platforms that (allegedly) provide interest rates that far exceed the yield that retail investors can obtain via traditional means, like a bank savings account. As a result, the market for stablecoins has grown rapidly.").

172. This concern goes beyond the important redemption rights issue. *Cf. supra* Parts III.B–III.E. (with discussion exploring the redemption issue).

173. *Cf. supra* note 84 and accompanying text (observing that a stablecoin backed one-to-one by, for example, U.S. dollars would be highly stable, whereas it may be less stable if backed by less creditworthy types of reference assets).

174. Dirk Zetzsche & Julia Sinning, *The EU Approach to Digital Currencies* 7-23 (L. & Contemp. Probs., Working Paper 2024), https://perma.cc/W9WK-95RH. A particularly risky form of stablecoin is the so-called algorithmic stablecoin, which does not offer buyers redemption rights; instead, the issuer engages in algorithm-based market-making to try to ensure a stable price. *See, e.g.*, Haseeb Qureshi, *A Visual Explanation of Algorithmic Stablecoins*, MEDIUM (Apr. 27, 2021), https://perma.cc/68AM-TDA2.

175. *See supra* note 57 and accompanying text.

176. *See, e.g.*, David Yermack, *Is Bitcoin a Real Currency? An Economic Appraisal*, *in* HANDBOOK OF DIGITAL CURRENCY: BITCOIN, INNOVATION, FINANCIAL INSTRUMENTS AND BIG DATA 31, 37 (Kuo Chen & David Lee eds., 2015) (noting that most Bitcoin transactions occur between speculative investors and not for the purchase of goods and services).

177. *See supra* note 25 and accompanying text.

VI. CONCLUSION

This Article proposes a functional approach to monetary regulation by viewing money not only as bills and coins but also as a "right" that serves as a medium of exchange to facilitate the sale of goods and services and as a store of value. From that standpoint, regulation should help to correct market failures that impede the low-cost transferability, or that impair the stable value, of the rights that are becoming widely used as money. Such functional regulation would supplement, and thus broaden the focus of, traditional monetary regulation, which has tended to focus more narrowly on controlling risks that might harm third parties.

A functional approach would provide an important perspective to regulating the dynamic and constantly changing monetary system by focusing on the system's underlying, and less time-dependent, economic functions. Furthermore, it would help to further systematize the regulatory process, which can be ad hoc and influenced by lobbying.

Focusing on money's functions can also increase general understanding amongst academics, practitioners, and the general public. Money is a complicated idea, and its complexity has only compounded with the advent of digital currencies. Despite this, when the function of money is distilled down to the two key characteristics of transferability and value,[178] the idea of money becomes more intuitively clear[179]—even, hopefully, to everyday consumers.

178. Recall that those functions are to serve as a medium of exchange to facilitate the sale of goods and services and to serve as a store of value. *See supra* note 5 and accompanying text.

179. Recall that the current differences between tangible and digital money relate largely to transferability, which is influenced by how the money is evidenced—by paper, or electronically; and that the current differences in the forms of digital money relate largely to value, which is influenced by who—government or private—issues the money and, in the case of private issuers, by whether or not the money is backed by assets having intrinsic value. *See supra* Introduction.