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FinTech and The Law & Economics of Disintermediation

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Fatjon Kaja
University of Amsterdam and ACLE
Edoardo D. Martino
University of Amsterdam and ACLE
Alessio M. Pacces
University of Amsterdam, ACLE and ECGI

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Abstract

As FinTech promises to increase competition for both banks and investment firms, we consider the market failures that emerge from its existence, particularly as they relate to issues of financial stability and investor protection. This chapter discusses the wave of technology-enabled disintermediation of financial services, asking how regulation should cope with the risks associated with disintermediating finance. While regulation of financial intermediaries has been embraced because the industry is particularly prone to market failures, disintermediation has the potential to make current frameworks obsolete. The law & economics problem is twofold: 1) potential market failures, and 2) the issue of enforcement. This chapter discusses the foundations of financial intermediation and the traditional regulatory approaches to both banks and other providers of financial services. Our analysis establishes a distinction between FinTechs working outside and inside the blockchain. For the former, the crucial regulatory trade-off is between efficiency gains from innovation and regulatory arbitrage. For the latter, our analysis suggests that regulating the convertibility of cryptocurrencies into fiat money is a promising strategy not only to safeguard financial stability, but also to attract financial services to the regulatory perimeter, whenever it is efficient to do so.

Keywords: Law & economics, disintermediation, fintech, financial stability, asymmetric information

JEL Classification: G21, G23, K22

Fatjon Kaja
University of Amsterdam and ACLE

Edoardo D. Martino
University of Amsterdam and ACLE

Alessio M. Pacces
University of Amsterdam, ACLE and ECGI

UNIVERSITY OF AMSTERDAM

AMSTERDAM CENTER FOR LAW & ECONOMICS

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FinTech and The Law & Economics of Disintermediation

Fatjon Kaja, Edoardo D. Martino, Alessio M. Pacces[†]

ABSTRACT

As FinTech promises to increase competition for both banks and investment firms, we consider the market failures that emerge from its existence, particularly as they relate to issues of financial stability and investor protection. This chapter discusses the wave of technology-enabled disintermediation of financial services, asking how regulation should cope with the risks associated with disintermediating finance.

While regulation of financial intermediaries has been embraced because the industry is particularly prone to market failures, disintermediation has the potential to make current frameworks obsolete. The law & economics problem is twofold: 1) potential market failures, and 2) the issue of enforcement. This chapter discusses the foundations of financial intermediation and the traditional regulatory approaches to both banks and other providers of financial services. Our analysis establishes a distinction between FinTechs working outside and inside the blockchain. For the former, the crucial regulatory trade-off is between efficiency gains from innovation and regulatory arbitrage. For the latter, our analysis suggests that regulating the convertibility of cryptocurrencies into fiat money is a promising strategy not only to safeguard financial stability, but also to attract financial services to the regulatory perimeter, whenever it is efficient to do so.

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1. Financial Technology and Disintermediation

Are banks dead? Or are the reports greatly exaggerated? Boyd and Gertler's title article has managed to stay coherent after a quarter of a century, pushing one to rethink the dimensions of the banking industry and its future.[1] Boyd and Gertler's dismissal of the growing consensus according to which disruptive financial innovation, such as securitization, was about to erase the need of banks as financial intermediaries was novel and unorthodox, but time shows us that they were right; the reports were greatly exaggerated, as the banking industry exhibited resilience and adaptiveness to technological developments.[2]

History does not repeat itself, though we cannot help but note some similarities with the current fever for FinTech and financial applications of the blockchain technology. However, the two waves of innovations differ in scale and in scope. In fact, the current technological step forward is arguably bigger, and its target is financial intermediation as a whole.

This chapter will discuss the wave of technologically-enabled disintermediation of financial services, which is broadly referred to as FinTech. We take a law & economics approach, consisting of two questions. First, what market failures does FinTech involve? Second, how can FinTech regulation cope with such market failures?[3]

Financial intermediation refers to a heterogeneous set of financial services that facilitate the efficient allocation of funds and are carried out through professional intermediaries. Financial intermediation is costly. Despite financial and technological innovation this cost has remained relatively constant over the past 130 years.[4] A broad distinction can be drawn between bank and non-bank intermediation. Banks perform Qualitative Asset Transformation (QAT) via the balance-sheets, turning their short-term, liquid and safe liabilities into long-term, illiquid and risky assets.[5] Non-bank financial intermediaries provide a variety of services to facilitate participation in financial markets, matching sellers and buyers without transforming their claims.[6]

FinTech can be defined as the use of information technology to provide financial services alternative to those that financial intermediaries offer.[7] Huge technological developments have created the possibility to provide services that were not even imaginable until a few years ago: from digital wallets for payment (e.g. PayPal), to cryptocurrencies (e.g. Bitcoin), to investment advice through automated algorithms (e.g. "Robo advice") and many more.

Information technology can achieve significant efficiency improvements compared to traditional financial intermediation. First, it can reduce transaction costs, making financial exchange more efficient. Think, for instance, of faster and cheaper money transfers via digital wallets and lower operating costs of Peer to Peer (hereinafter "P2P") and Peer to Business

[1] John H Boyd and Mark Gertler, 'Are Banks Dead? Or Are the Reports Greatly Exaggerated?' (National Bureau of Economic Research 1995).
[2] This adaptiveness had costs attached to it. See Gary Gorton and Andrew Metrick, 'Securitized Banking and the Run on Repo' (2012) 104 Journal of Financial economics 425.
[3] Alessio M. Pacces, 'A law and economics perspective on normative analysis', in Sanne Taekema et al. (ed), *Facts and Norms in Law* (Edward Elgar Publishing, 2016).
[4] Thomas Philippon, 'Has the US Finance Industry Become Less Efficient? On the Theory and Measurement of Financial Intermediation' (2015) 105 American Economic Review 1408.
[5] Sudipto Bhattacharya and Anjan V Thakor, 'Contemporary Banking Theory' (1993) 3 Journal of financial Intermediation 2.
[6] Franklin Allen and Anthony M Santomero, 'What Do Financial Intermediaries Do?' (2001) 25 Journal of Banking & Finance 271.
[7] Anjan V Thakor, 'Fintech and Banking: What Do We Know?' (2020) 41 Journal of Financial Intermediation 100833, 1.

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(hereinafter "P2B") lending platforms compared to bank loans. Second, information technology can reduce information asymmetries, exploiting the growing computation powers and the amount of available data, for instance in the case of big-data automated credit scores.[8] Third, information technology can provide some liquidity advantages, notably by improving the efficiency of the payment system and the transmission of monetary policy.[9]

This chapter focuses on the risks associated with disintermediating finance via FinTechs. Financial intermediaries are regulated because the industry is particularly prone to market failures.[10] Disintermediation potentially challenges this regulation.

Financial regulation pursues two goals in general: 1) financial stability; and 2) investor protection.[11] On the one hand, regulation deals with the negative externalities that the instability of financial institutions, banks in particular, cause. Qualitative Asset Transformation, while fostering lending and thus economic development, makes banks inherently fragile and exposed to runs on short-term, money-like debt.[12] Moreover, banks are leveraged and interconnected institutions, so that the failure of one can trigger contagion and generate large adverse consequence for the whole financial system and the real economy, as the failure of Lehman Brothers in 2008 exemplified.[13] On the other hand, investor protection regulation addresses problems of asymmetric information between investors, intermediaries and borrowers which in many cases means between unsophisticated and professional market participants. If investors fear that their funds are not safe and that there is potential for fraud, then they will avoid investing in the first place.[14]

Therefore, the first law & economics question addressed in this chapter is: will technology-enabled financial innovations generate market failures or worsen existing ones? Without the ambition to answer this question conclusively, this chapter focuses on two types of intermediation, one related to banks and the other to investment services. FinTech promises to increase competition for both banks and investment firms. More competition is usually welcomed as it fosters innovation, improves quality, and reduces prices. However, in the financial industry, more competition may undermine financial stability and investor protection.[15] This can happen both directly through FinTechs, and indirectly through the adjustments incumbent intermediaries implement to maintain their competitive edge. This brings to the second law & economics question: is the current regulatory framework efficient?

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[8] One of the main reasons for the existence of financial intermediaries is to cope with the information asymmetry problem, where perspective lenders cannot reliably distinguish good from bad borrowers. See, Richard Brealey, Hayne E Leland and David H Pyle, 'Informational Asymmetries, Financial Structure, and Financial Intermediation' (1977) 32 The Journal of Finance 371. Another issue related to intermediaries and information asymmetry relates to relationship banking and its benefits. See Arnoud WA Boot and Anjan V Thakor, 'Can Relationship Banking Survive Competition?' (2000) 55 The Journal of Finance 679. These aspects will be better detailed in Section 2.

[9] The net contribution of FinTechs to liquidity is unclear, as many technological applications (e.g. cryptocurrencies) seem to dramatically increase volatility.

[10] See Markus Konrad Brunnermeier and others, *The Fundamental Principles of Financial Regulation*, vol 11 (ICMB, Internat Center for Monetary and Banking Studies 2009).

[11] John Armour and others, *Principles of Financial Regulation* (Oxford University Press 2016) ch 3.

[12] Douglas W Diamond and Philip H Dybvig, 'Bank Runs, Deposit Insurance, and Liquidity' (1983) 91 Journal of political economy 401.

[13] For a functional overview of the main cornerstones of financial regulation see Brunnermeier and others (n 10).

[14] For a comprehensive introduction, see Armour and others (n 11) ch 5.

[15] Notably, the UK Financial Conduct Authority has promotion of competition in the financial sector as an additional goal to the aforementioned ones. Whether these objectives are compatible and how to strike the appropriate balance between them remains an open question. Stephen Dickinson, David Humphry, Paolo Siciliani, Michael Straughan, and Paul A Grout, 'The Prudential Regulation Authority's secondary competition objective' (2015) Bank of England Quarterly Bulletin, Q4.

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This chapter will articulate the theoretical framework to answer these questions, highlighting the role financial regulation plays and making recommendations on the legal tools and strategies to determine the optimal level of disintermediation. The scope of the analysis is particularly broad. Therefore, we do not strive to be exhaustive. This chapter will only lay down the analytical foundations to discuss different FinTechs and their regulatory implications.

This chapter is structured as follows. Section 2 discusses disintermediation of banking services. It highlights the crucial features of banking intermediation and focuses on two distinct cases of disintermediation: P2P Lending and cryptocurrencies. Section 3 discusses disintermediation of investment services and focuses on the opportunities and challenges of disintermediating non-banking services. Section 4 presents the law & economics analysis in two parts: first, the market failures of FinTechs, and, second, a regularity strategy towards FinTechs. Section 5 concludes.

2. Disintermediation of Banking

2.1 What Banks Do and Why is it Special?

Banks are known to be a special type of firm. As any financial intermediary, banks collect funds from economic units with a surplus, typically households, and allocate these funds to economic units with funding needs.[16] Yet, differently from any other intermediaries, banks perform this task following a special business model.

Banks are highly leveraged institutions whose funding comes predominantly from short-term liabilities, such as demand deposits. On the other side of the balance-sheet, commercial banks' assets mainly consist of long-terms loans and other illiquid assets.[17] Banks perform Qualitative Asset Transformation (QAT), which is to say, they turn liquid, short-term and safe claims into illiquid, long-term and risky assets.[18] This characteristic makes banks inherently fragile, prone to runs and panics because assets cannot be liquidated quickly enough to honour the short-term liabilities at once.[19]

The long-lasting success of banks depends on their unique ability to perform QAT.[20] In a world without banks, lenders and borrowers would meet in the marketplace. Information on the creditworthiness of borrowers is unknown to prospective lenders. Private, more accurate, information can be produced at a cost through screening and monitoring the perspective borrowers. Many lenders are unwilling to bear the cost of monitoring, so they decide to delegate it to economic actors that are willing to invest in such activities.[21] In this view, banks act as

[16] Allen and Santomero (n 6) 273.
[17] Financial innovations that happened over the past decades incentivized banks to move from relational to transactional banking. See Boot and Thakor (n 8) 681. Nonetheless, this contingency does not alter the basic representation of banks, seen as firms performing transformations activities. On this, see Armour and others (n 11) ch 13.
[18] Bhattacharya and Thakor (n 5) 15.
[19] Hyun Song Shin, 'Reflections on Northern Rock: The Bank Run That Heralded the Global Financial Crisis' (2009) 23 Journal of economic perspectives 101.
[20] For a thorough overview, see Gary Gorton and Andrew Winton, 'Financial Intermediation', *Handbook of the Economics of Finance*, vol 1 (Elsevier 2003) 437–461.
[21] Douglas W Diamond, 'Financial Intermediation and Delegated Monitoring' (1984) 51 The review of economic studies 393.

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delegated monitors on behalf of depositors, who entrust the bank with their money, and in return the bank promises to lend only to creditworthy borrowers.[22]

Therefore, bank intermediation solves a problem of information asymmetry as many other intermediaries can do.[23] But, performing asset transformation makes banking especially valuable for borrowers and lenders (depositors), as both categories get the type of financial contract that suit them best. Crucially, banks lend long against short-term deposits but also against a fraction of equity so to limit risk-taking incentives; equity operates both as a curb on the size of banking and to counter moral hazard.[24]

On the asset side of the balance sheet, banks engage in costly monitoring, gaining private information on their borrowers. The information becomes even more valuable in case of repeated interaction, the so-called "relationship banking". The cost of monitoring decreases over time and the long-term relationship provides the bank with flexibility to adjust the terms to the ever-evolving situation.[25] Competition and innovation have progressively driven banks away from pure relational lending toward a more transaction-based banking. Handling portfolio risk through monitoring is costly and financial innovations, such as securitization, made market solution cheaper at the expense of financial stability.[26] Section 2.2 discusses whether technology-enabled solutions can exacerbate this problem.

On the liability side of the balance sheet, banks offer their depositors safety and liquidity. Modern finance treats these concepts separately, but they are related.[27] Safety implies liquidity: if tomorrow's value of an asset is known with certainty, one could sell it today for a given amount of cash (market liquidity). Otherwise, one could borrow the same amount of cash using the asset as collateral (funding liquidity).[28] Liquidity is valuable to the extent that there is uncertainty and economic agents want to retain the option to liquidate their assets before maturity. Deposits are as liquid as money because these are funds repayable on demand: depositors can withdraw the face value of their claim anytime.[29] Banks are unique providers of such safe and liquid assets. However, other institutions may too issue liabilities carrying the promise to convert into a given amount of cash on demand.[30] These institutions are called shadow banks.[31] Because shadow banking is not fundamentally different from banking and

[22] Ibid. Diamond also shows that in equilibrium, delegated monitoring represents a commitment device to solve the problem of "monitoring the monitor". This way, banks disincentive depositors to simultaneously withdraw their money, triggering a run. This latter aspect is modelled in Diamond and Dybvig (n 12).

[23] See Section 3.

[24] In this context, moral hazard means the incentives to take on more risks than socially efficient, expecting that someone else bears the downside of the risk. See, Jihad Dagher and others, *Benefits and Costs of Bank Capital* (IMF Staff, International Monetary Fund 2016).

[25] Joseph G Haubrich, 'Financial Intermediation: Delegated Monitoring and Long-Term Relationships' (1989) 13 Journal of Banking & Finance 9; Arnoud WA Boot, Stuart I Greenbaum and Anjan V Thakor, 'Reputation and Discretion in Financial Contracting' [1993] The American Economic Review 1165. On the hold-up problems that may suggest having multiple banking relationships or to resort to the market, see Xavier Freixas, 'Deconstructing Relationship Banking' (2005) 29 investigaciones económicas 3.

[26] Hyun Song Shin, 'Securitisation and Financial Stability' (2009) 119 The Economic Journal 309.

[27] Armour and others (n 11) ch 13.

[28] Markus K Brunnermeier, 'Deciphering the Liquidity and Credit Crunch 2007-2008' (2009) 23 Journal of Economic perspectives 77.

[29] Similarly, Pistor defines liquidity as the ability to sell any asset at will. See Katharina Pistor, 'A Legal Theory of Finance' (2013) 41 Journal of Comparative Economics 315, 316.

[30] The question, however, is whether the promise is credible. As Minsky puts it, "everyone can create money; the problem is to get it accepted". *See* Hyman P Minsky, 'Stabilizing an Unstable Economy' [1986] Yale UP, New Haven, 225.

[31] Hossein Nabilou and Alessio M Pacces, 'The Law and Economics of Shadow Banking', in Iris Chiu and Iain MacNeil (ed.), *Research Handbook on Shadow Banking* (Edward Elgar Publishing 2018), 8.

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does not depend on technology, this chapter will only discuss it to the extent that FinTech relates to it.

In the aftermath of the global financial crisis, research showed that investors have a preference for safe assets beyond what the theory on portfolio diversification can explain.[32] Another reason why bank deposits and other short-term liabilities are able to satisfy the increasing demand for safety is the regulatory safety net.[33] First, deposit guarantee schemes cover demand deposits, making depositors insensitive to the bank's riskiness. Moreover, banks have access to the liquidity central banks as lenders of last resort (LOLR) offer. Finally, banks traditionally benefit from the implicit government guarantee on their solvency in the event of a systemic crisis, although regulation has recently tried to limit the extent of this guarantee. The last two features apply to shadow banking too.

Liquidity and safety make bank liabilities a suitable medium for exchange, a key aspect of monetary policy transmission and one of the pillars of the payment system.[34] Section 2.3 discusses the attempt of FinTechs to provide such service in a different way, particularly by way of cryptocurrencies.

2.2 Disintermediating Lending

The most prominent example of technologically enabled financial services, alternative to bank lending, is P2P lending. The idea behind P2P lending is to provide a platform where lenders and borrowers are matched without an intermediating bank.[35] As will be further discussed in Section 4, FinTech and financial disintermediation are very heterogeneous concepts that do not necessarily involve blockchain technology. P2P lending represents a paradigmatic example in this sense. In fact, the first P2P lending platforms started to gain traction in the aftermath of the global financial crisis, when trust in traditional banks was at its lowest point.[36]

P2P lending does not amount to a full disintermediation of lending. Rather, it uses technology to gain and process information substituting "heavy" bank intermediation with a "light" platform intermediation. Prospective borrowers apply for a loan to the platform, which screens the creditworthiness of borrowers and assigns them a "loan grade" according to the project's riskiness. The investors (lenders) bid on the projects and then the platform pools together the bids and originates the loan.

As opposed to banking intermediation, the platform itself does not invest in the loan and the platform doesn't issue any debt: the whole amount of the loan is a direct investment of the lenders. Therefore, there is no QAT and no possibility of withdrawal. The investors' capital is locked in the project and its safety only depends on the probability of default of the borrower.

A P2P lending platform is not, however, a machine automatically matching lenders and borrowers, but a corporation acting as an agent of both. To illustrate this point, it is interesting

[32] Gary Gorton, Stefan Lewellen and Andrew Metrick, 'The Safe-Asset Share' (2012) 102 American Economic Review 101, 105. The safety-premium has been estimated in 27 basis points, meaning that investors are willing to accept lower returns for an increase in safety. See Arvind Krishnamurthy and Annette Vissing-Jorgensen, 'The Aggregate Demand for Treasury Debt' (2012) 120 Journal of Political Economy 233, 259.
[33] See Gorton, Lewellen and Metrick (n 32) 102.
[34] Jeffrey M Lacker, 'Clearing, Settlement and Monetary Policy' (1997) 40 Journal of Monetary Economics 347.
[35] Thakor (n 7) 3.
[36] Jefferson Duarte, Stephan Siegel and Lance Young, 'Trust and Credit: The Role of Appearance in Peer-to-Peer Lending' (2012) 25 The Review of Financial Studies 2455.

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to analyse the compensation scheme of the platform. Platform compensation is fee-based.[37] First, the platform charges a fee for loan origination, and typically a fee for late repayments. Moreover, they earn a percentage of borrower repayments (usually 1%) in the form of a service fee.[38] P2P lending platforms are, therefore, profit-maximising entities, not just computer codes. As they take discretionary decisions that can be opaque, for instance by setting up the algorithm to screen the loan applications, trust of borrowers and investors is of essence.

P2P lending is a form of bank disintermediation that can achieve efficiency gains in terms of operating costs of a loan.[39] To properly assess these efficiency gains, one should also consider the possible costs in terms of financial stability concerns. As mentioned before, P2P platforms do not perform asset transformation activities themselves, so they seem not to pose direct financial stability concerns. Yet, there may be more subtle, indirect effects.

First, the fact that systemic risk will not materialise at the platform level does not imply that P2P lending does not contribute to build up systemic risk. In fact, there is evidence that many lenders investing in these loans are highly leveraged themselves.[40] Moreover, the fee-based compensation scheme of the platforms generates incentives to over-lend, originating riskier and riskier loans.[41] Therefore, if the P2P lending market scales up, massive defaults due to an abrupt shock can trigger contagion potentially outside of any supervisory scrutiny.

Second, the increased competitive pressure on banks may induce those to engage more and more in transactional activities to save costs, abandoning more and more relationship banking. In this regard, one can note a certain parallelism with the reaction of banks to securitization two decades ago.

Finally, if banks will acquire FinTechs, partner with them or set up their own platforms, the two threats to financial stability highlighted above may be magnified.[42]

2.3 Disintermediating Money and Payment

We now turn to discussing how FinTech can disintermediate the services provided by bank to depositors, namely safety, liquidity and payments. Cryptocurrencies are the most paradigmatic example.[43] Cryptocurrencies aim to disrupt the centralised system of money and payments. Ideally, the blockchain technology should provide a completely decentralized and trustless system replacing the current system characterised by licensed intermediaries and trusted central gatekeepers, such as central banks that have a legal monopoly to issue fiat money.

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[37] This confirms in a sense the trend of financial intermediaries of shifting from interest rate-based earnings to fee-based earnings, from relational banking to transactional financial intermediation. See Allen and Santomero (n 6) 291.

[38] Thakor (n 7) 4.

[39] The operating cost of Lending Club, a leading P2P platform in the US, have been estimated in 2,70%. In contrast, banks' operating costs are, on average, 7%. See Welltrado, 'Global Blockchain-Backed Loans Marketplace ICO' (2018) 7 <https://icorating.com/upload/whitepaper/DEBIoWzy08SpyvZJLrhqFIy8dFSjT6jSNtFz8I3U.pdf>. Accessed on 06.06.2020.

[40] Thakor (n 7) 4.

[41] Viral Acharya and Hassan Naqvi, 'The Seeds of a Crisis: A Theory of Bank Liquidity and Risk Taking over the Business Cycle' (2012) 106 Journal of Financial Economics 349.

[42] Arnoud WA Boot, Jeroen E Ligterink and Jens K Martin, 'Understanding Fintech and Private Equity', Topics in Corporate Finance Nr. 26, Amsterdam: Amsterdam Center for Corporate Finance, 12.

[43] Even though not the only one, especially in the area of payments. Think for instance of all digital wallet services, like PayPal, that do not necessarily work with the blockchain.

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In its simplest description, the blockchain is a chronological database of transactions recorded in a network of computers. Some participants to the network (miners) verify the validity of the transaction, and whether ownership of cryptocurrency is actually transferred, through solving complex mathematical problems that ensure there is no double spending.[44] This decentralized method of verification allegedly makes intermediaries, such as banks, unnecessary to carry out transactions.

We contend that, at this technological stage, a completely decentralized and trustless system is far from being achieved, if it is ever possible. We offer three main reasons to support our claim. Firstly, cryptocurrencies are exchanged on the blockchain, but are stored in digital wallets. Moreover, digital platforms, such as Coinbase, usually support such transactions. Hacking the blockchain is extremely difficult and costly to an extent that it was deemed impossible.[45] Even assuming that the blockchain cannot be corrupted, hacking digital wallets and platforms is much easier.[46] Therefore, who uses cryptocurrencies might blindly rely on the blockchain to trade them, but still needs to trust the ecosystem's intermediaries to store them.

Secondly, parties may want to condition the transaction in the blockchain to future, uncertain contingencies. In this case, parties can code the obligation they intend to undertake in "if-then" type digital statements, creating a self-executing contract, a so-called smart contract.[47] In this case, parties need to trust the coder.[48] The coder can be a third party, acting as an agent of the contracting parties, or one of the contracting parties. Either way, coding contractual obligations is an opaque mechanism that a party may be unable to understand. Opacity can only be accepted if the counterparty or the agent is trusted.

Thirdly, cryptocurrencies cannot fully replace fiat money. First of all, there are transactions that cannot be settled via cryptocurrency, for instance all the transactions between private parties and the governments, which require legal tender. Relatedly, the majority of the sellers still do not accept cryptocurrencies as means of payment. The fact that states have a monopoly on fiat money affects the ability of disintermediate banks via the blockchain.

Cryptocurrencies could be converted into fiat money, but that requires intermediaries. Moreover, because cryptocurrencies work on a decentralized basis and no central authority backs them, their conversion rate is highly volatile. The first reported purchase made using Bitcoin is a good example. In 2010, a man in Florida bought two pizzas worth 25 dollars for 10.000 bitcoins. In December 2017, the same amount was exchanged for almost 200 million dollars; at the end of May 2020 those were still worth more than 95 million dollars.[49]

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[44] Aaron Wright and Primavera De Filippi, 'Decentralized Blockchain Technology and the Rise of Lex Cryptographia' [2015] Available at SSRN 2580664.

[45] Such alleged impossibility is challenged by the so-called "51% attack", where a member of the network that owns more the half of the blockchain can double spend. See https://www.technologyreview.com/2019/02/19/239592/once-hailed-as-unhackable-blockchains-are-now-getting-hacked/, accessed 31.05.20

[46] Famously, in 2014 hackers attached Mt. Gox, a bitcoin exchange, and stole 850000 bitcoins worth 14 billion $. See 5 things to know about Mt. Gox crisis, the Wall Street Journal, 25 February 2014, https://blogs.wsj.com/briefly/2014/02/25/5-things-about-mt-goxs-crisis/?mg=prod/accounts-wsj. Accessed 06.06.2020.

[47] Smart Contract Alliance, 'Smart Contract: Is the Law Ready?' (2018) 10.

[48] Roberet C Merton, 'Solving Global Challenges Using Finance Science: Past and Future' (*China International Conference in Finance. Tianjin, China, July* 2018) 12. Available at http://www.cicfconf.org/past/cicf2018/. Accessed 06.06.2020.

[49] See Bitcoin Pizza Day: Celebrating the $80 Million Pizza Order, https://www.investopedia.com/news/bitcoin-pizza-day-celebrating-20-million-pizza-order/, Accessed on 31.05.20

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Traditionally, money is been defined according to three functions it performs in the economy: medium of exchange, store of value, and unit of account.[50] Arguably, given the current state of technology, cryptocurrencies perform none of these functions.[51] In this respect, Facebook's proposed Libra project is a little different. The cryptocurrencies issued in the Libra ecosystem would be pegged to a basket of main currencies to avoid volatility and increase public confidence in the coins.[52] Here comes the importance of state monopoly on fiat money. The monetary authorities in the US and the EU have credibly threatened to subject the Libra project to financial regulation as dealing in currency-denominated assets requires a banking or an investment services licence, which is easy to enforce. On these grounds, the project has been put on hold: Facebook is currently considering downsizing Libra to a digital wallet.[53]

Finally, several central banks are experimenting with digital currencies.[54] This is a way to exploit the promise of the blockchain in terms of management of money supply and efficiency of settlements, while maintaining the role of central banks as gatekeeper of money and monetary policy. Libra and government-controlled digital currencies could scale up in the coming years. Nevertheless, these projects hardly imply disintermediation of money and payments, as governments are either directly involved or require intermediaries to have a license in order to convert digital into traditional currencies. Rather, these projects change the way money and payments are intermediated, exploiting the blockchain.

3. Disintermediation of Investment Services

3.1 Investment Firms: Problem Solvers and Problem Makers

Banks are not the only financial intermediaries pursuing the efficient allocation of financial resources. Several investment firms intermediate investment in financial markets too. For instance, underwriters intermediate public offerings between the issuers and the investors; mutual funds invest in the financial market the investing public's savings according to predetermined strategies; brokers-dealers intermediate between investors and a stock exchange. This section scrutinizes how FinTech firms can disintermediate the services offered by financial firms other than banks and what the promises and the perils of such disintermediation are.

To understand disintermediation of financial services, it is important to understand first why investment firms exist in the first place, which problems they solve, and what market failures are associated with them.

In the standard economic model of resource allocation, non-bank financial intermediaries play no role.[55] However, the vast majority of investors are not involved in financial transactions

[50] William Stanley Jevons, *Money and the Mechanism of Exchange*, vol 17 (D Appleton 1876).
[51] Thakor (n 7) 10.
[52] The Libra Association is backed by Facebook. At this point, it is not clear which kind of cryptocurrencies will be issued. The initial project aimed at backing Libra with a basket of multiple currencies but latterly it seems that Libra wants to offer stable coins, each of those backed by a single State currency. See https://www.cnbc.com/2020/04/16/facebooks-libra-plans-new-crypto-offering-backed-by-just-one-currency.html, accessed 31.05.20
[53] See Katarina Pistor, The Case for Free Money (*Just Money, 20 March 2020)* https://justmoney.org/k-pistor-the-case-for-free-money-a-real-libra/, accessed on 29.06.2020.
[54] Stijn Claessens and others, 'Fintech Credit Markets around the World: Size, Drivers and Policy Issues' [2018] BIS Quarterly Review September.)
[55] John Geanakoplos, 'Arrow–Debreu Model of General Equilibrium', in Hohn Eatwell et al (eds.), *The New Palgrave: A Dictionary of Economics.* (1987) 116.

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and do not understand increasingly complex financial markets.[56] Therefore, intermediaries acting in the financial markets reduce the "participation costs" of financial transactions for non-professional investors.[57] These services come at a cost, usually a fee that intermediaries charge to their clients. Interestingly, empirical evidence shows that the unit cost of financial intermediation has been rather stable in the last 130 years, despite technological innovations improving efficiency. This suggests that rent extraction by financial intermediaries increased overtime.[58] This observation leads us to the market failures in investment services provision. First, there is significant asymmetric information between investment firms and investors. This depends on the participation services investment firms provide. As a consequence of information asymmetry, the quality of the services offered by intermediaries remains unknown to customers, creating an adverse selection problem.[59]

In theory, the market could self-correct the asymmetric information problem if the uninvolved investors could follow the signals that informed, marginal investors produce.[60] In this setting, providers of investment services would compete for the marginal investors and this would in turn protect the uninformed. Yet, the marginal consumer argument seems not to hold true for financial services. Most financial services are experience goods that both marginal and uninvolved investors purchase infrequently. This fact prevents marginal investors from quickly learning all the quality aspects of the services purchased and engaging in comparison shopping.[61]

Cognitive biases worsen the market failures that asymmetric information generates. Behavioural finance reveals that investors, especially the unsophisticated ones, suffer from a variety of cognitive biases in their decision-making.[62] Financial firms exploit cognitive biases in financial decisions through the adoption of marketing and contractual strategies that appeal to those biases.[63] This provides a further reason why marginal, informed investors cannot protect the inframarginal, uninformed ones. Marginal investors can identify aggressive marketing, opt out of harsh terms, and contract for better terms. Firms have incentives to cross-subsidize the better terms offered to marginal investors by introducing non-salient, harsh terms in the packages offered to unsophisticated investors.[64]

Financial advice could seemingly ameliorate market failure, but that's illusory. One would expect financial advisors to remedy the information asymmetry, providing even unsophisticated investors with guidance on which financial service or product to choose in a rational way. However, investors face the same asymmetry of information when they choose a financial advisor. Moreover, investors have no way of determining whether the performance of their investment depends on the quality of the financial advice or on the investment risks. This is to say, financial advice is a credence good and the quality of credence goods cannot be

[56] Alessio M Pacces, 'Financial Intermediation in the Securities Markets Law and Economics of Conduct of Business Regulation' (2000) 20 International Review of Law and Economics 479, 481.
[57] Franklin Allen and Anthony M Santomero, 'The Theory of Financial Intermediation' (1997) 21 Journal of Banking & Finance 1461, 1462.
[58] Philippon (n 4).
[59] David T Llewellyn, 'Regulation of Retail Investment Services' (1995) 15 Economic Affairs 12.
[60] Louis L Wilde and Alan Schwartz, 'Equilibrium Comparison Shopping' (1979) 46 The Review of Economic Studies 543.
[61] Pacces (n 56) 483.
[62] See, for instance, Shlomo Benartzi and Richard Thaler, 'Heuristics and Biases in Retirement Savings Behavior' (2007) 21 Journal of Economic perspectives 81.
[63] Xavier Gabaix and David Laibson, 'Shrouded Attributes, Consumer Myopia, and Information Suppression in Competitive Markets' (2006) 121 The Quarterly Journal of Economics 505.
[64] Armour and others (n 11) 215.

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ascertained, not even after a process of repeated purchase.[65] This leaves considerable room for financial advisors to extract rents from unsophisticated investors, colluding with other financial firms with which they share financial ties, customers, and network.[66]

The aforementioned arguments support regulatory intervention in financial markets.[67] These also represent a suitable benchmark to assess the promises and perils of technology-enabled disintermediation: Can FinTech cope with the market failures discussed above? Or is FinTech making the matter worse?

3.2 Disintermediating Financial Services

Technologically-enabled financial services can potentially improve the allocation of financial resources.[68] At the same time, they also pose considerable challenges. This section discusses both issues.

As mentioned, there is a severe asymmetric information between investors and providers of financial services. This allows financial intermediaries to exploit investors by way of conflicts of interest. FinTechs can ameliorate this situation setting up arm's length transactions between investors and issuers, which allegedly avoid conflicts of interests. Crowdfunding platforms are a case in point.[69] Such platforms offer entrepreneurs, primarily start-ups, an alternative access to finance allowing the "crowd" to directly provide capital in typically small amounts. The challenge is that crowdfunding doesn't address the issue of investor protection. Small, unsophisticated investors have a limited capacity to assess the potential of a business, especially if it is a start-up. Moreover, their decision to join the crowd might be based on behavioural biases and herding behaviour.[70]

Another paradigmatic example of technology-enabled financial service is Robo advice. It consists of algorithmic-based financial advice with minimal or no human interaction. Early empirical evidence shows that Robo advice increases return on investment and reduces volatility.[71] Yet, unsophisticated investors have limited capacity to determine whether the advice fits their preferences. [72] Likewise, consumers usually are not in the position to appreciate the soundness of the algorithm on which the advice is based, no matter how transparent such algorithm is.

Based on these examples, it is possible to identify a few pros and cons of FinTech in financial services. FinTech opens up great opportunities for entrepreneurs to access cheap finance and for investors to participate in a wide variety of financial transactions at reasonably low costs. Moreover, algorithmic-based financial services and the use of big data can decrease the asymmetric information that is inherent in financial services. However, considerable challenges for investor protection remain. Algorithms do not solve the old investor protection issues, but rather bring new issues of investor protection. They may obscure the same

[65] Pacces (n 56) 483.
[66] Armour and others (n 11) 217.
[67] ibid 218.
[68] The efficient allocation of resources represents, in its essence, the ultimate goal of financial markets.
[69] Guido Ferrarini and Eugenia Machiavello, 'FinTech and Alternative Finance in the CMU' in Danny Busch, Emilios Avgouleas and Guido Ferrarini (eds), *Capital Markets Union in Europe* (Oxford University Press, UK 2018).
[70] John Armour and Luca Enriques, 'The Promise and Perils of Crowdfunding: Between Corporate Finance and Consumer Contracts' (2018) 81 The Modern Law Review 51, 53.
[71] Francesco D'Acunto, Nagpurnanand Prabhala and Alberto G Rossi, 'The Promises and Pitfalls of Robo-Advising' (2019) 32 The Review of Financial Studies 1983.
[72] Wolf-Georg Ringe and Christopher Ruof, 'A Regulatory Sandbox for Robo Advice' (University of Hamburg, Institute of Law and Economics 2018).

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exploitative tendencies financial intermediaries have and are more difficult to monitor for deficits in investor protection. As discussed before, platforms and algorithms cannot be merely considered automatic machines that generate matches between lenders and borrowers. Platforms are profit-maximising corporations. Their conflicts of interests may be hidden in the way algorithms are programmed. As in the case of P2P lending, FinTechs provide investment services based on fees. Therefore, they have an interest to induce investors to trade and invest, exploiting their behavioural biases. Moreover, traditional financial institutions are increasingly acquiring FinTechs, which results in more conflicts of interest depending on the provision of multiple activities.[73]

As a final note, the "wisdom of the crowd" is attracting considerable attention among the proponents of financial disintermediation. According to the narrative, experts acting as intermediaries pursue their own interests at the expense of the crowd, whereas information technology allows the crowd to choose wisely without the need of self-interested intermediaries.[74] Information technology is thought to improve the quality of the noisy public signals about investment opportunities, which used to call for intermediaries to improve financial information.[75] However, anecdotal evidence suggests that crowds are not always wise.[76] On the contrary, herding behaviour is a serious threat for investors who may fund suboptimal projects or become victims of fraudulent arrangements.[77] Interestingly, FinTechs are sorting out ways to elicit the crowd's wisdom; for instance, they are making more salient to uninformed investors the behaviours of better informed ones.[78]

4. A Law & Economics Approach to FinTech

4.1 FinTech and Market Failure

FinTech has a large potential to improve the efficiency of financial markets by disintermediating banking and non-banking services. However, this potential comes with the risk of exacerbating market failures because the regulations applicable to traditional financial intermediaries are not always neatly applicable to FinTech. In this section, we look at market failures more closely, discussing how regulation can cope with them.

The law & economics problem is twofold. First, banking and non-banking services result in different market failures. As mentioned, the main goal of banking regulation is to cope with the externalities stemming from financial instability, whereas the regulation of investment services is mainly concerned with protecting investors from the consequences of asymmetric information. Second, there is the issue of enforcement. Some FinTechs operate on the blockchain. Because the blockchain supports smart contracts, which are self-executing, blockchain-based FinTechs are harder to subject to regulation, which in turn affects the ability of governments to correct market failure.

QAT is a defining feature of banking.[79] This transformation makes banking fragile because they are exposed to runs. For this reason, virtually anywhere in the world, banking requires a license. Licensing triggers prudential regulation of banks and gives them access to the safety

[73] Luigi Zingales, 'The Future of Securities Regulation' (2009) 47 Journal of Accounting Research 391.
[74] James Surowiecki, 'The Wisdom of Crowds: Why the Many Are Smarter than the Few and How Collective Wisdom Shapes Business' (2004) 296 Economies, Societies and Nations.
[75] Raghuram Rajan and Andrew Winton, 'Covenants and Collateral as Incentives to Monitor' (1995) 50 The Journal of Finance 1113.
[76] The best example of this might be the dotcom bubble of the early 2000s.
[77] Abhijit V Banerjee, 'A Simple Model of Herd Behavior' (1992) 107 The quarterly journal of economics 797.
[78] For more detailed consideration on this point see Armour and Enriques (n 70) 79.
[79] See Section 2.

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net, both of which aim to promote financial stability.[80] Licensing, however, also shields banks from competition. FinTechs challenge banks' monopoly to the extent that they provide banking services without a license. As the previous discussion reveals, it is difficult for FinTechs to provide core banking services such as, on the one hand, relationship lending and, on the other, repayable funds functioning as safe assets.

For instance, P2P lending does not involve core banking. Although some jurisdictions regard it as banking,[81] P2P platforms do not take any position or risk in the loan concluded between the investors and the borrowers, and most importantly, do not promise liquidity on demand. Thus, P2P lending competes with banks on the extension of credit, but not on the provision of safe assets. Like other forms of crowdfunding, P2P lending raises concerns for investor protection, but not for financial stability, as platforms do not issue liabilities, loans are illiquid, and the scale of P2P lending is still small.[82] However, the threat to financial stability might be *indirect*. P2P platforms potentially undermine the value of a banking licence and prompt banks to take more risk to remain competitive with P2P platforms in attracting better loans. Whether this is going to be the case is theoretically unclear, as P2P platforms may be no match for bank's trust in long-term credit relationships. Another reason is that banks increasingly acquire P2P platforms for arm's length credit. Only time will tell whether P2P lending can grow as big as to make traditional banking riskier.

Cryptocurrencies are potentially more troublesome. In principle, they provide means of payment and of investment. As far as the payment function is concerned, cryptocurrencies exploit the efficiency of digital wallets and other technological innovations. Going a step further, they offer an alternative to fiat money. It is questionable whether cryptocurrencies can replace money. Private money creation is not the problem, as banks routinely engage in this, subject to regulation, and shadow banking does that too, trying to end-run regulation.[83] Private money undermines financial stability to the extent that its safe assets status comes into question during a financial crisis.

However, private money needs the option to convert into fiat money to be credible.[84] Convertibility makes banking and shadow banking dangerous. Because cryptocurrencies lack convertibility into fiat money, their ability to disintermediate banking is limited. Cryptocurrencies are extremely volatile as they are not backed by a financial institution or a pool of assets that could confer upon them liquidity and safety. Libra – the only attempt to overcome this limitation so far – has been effectively opposed by the monetary authorities. The lesson from this is twofold. First, money creation is too important for financial stability to be left out of the regulatory perimeter. Keeping this in mind, central banks are increasingly considering issuing fiat money in digital form.[85] Second, the effective way to stop FinTechs from creating a parallel monetary system is to deny them access to (i.e. conversion into) fiat money in the absence of a banking or non-banking services license. This point has more far-reaching consequences than financial stability.

Regarded as investment, cryptocurrencies are paradigmatic of the investment services dimension of FinTech. As discussed, this includes crowdfunding (both equity and P2P lending) and Robo advice, among others. All of these services share an important characteristic, which

[80] Alessio M Pacces and Dirk Heremans, 'Regulation of Banking and Financial Markets', in Gerrit De Geest (eds.), *Encyclopedia of Law and Economics - Volume 9* (Edward Elgar 2012).
[81] These include e.g. Italy, France, and Germany. See Ferrarini and Machiavello (n 69) 217.
[82] Thakor (n 7) 3.
[83] Nabilou and Pacces (n 31), 28.
[84] Perry Mehrling, *The New Lombard Street: How the Fed Became the Dealer of Last Resort* (Princeton University Press 2010).
[85] Thakor (n 7) 10.

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make them prone to market failure: they allow particularly (but not exclusively) retail investors to invest their savings at a negligible entry cost. It is very easy to invest in cryptocurrencies, and in general low-key access to investment services is one of the competitive advantages of FinTech. This potentially exacerbates the market failures stemming from asymmetric information, such as unsuitable investment choice, vulnerability to aggressive marketing, and exposure to conflicts of interest.[86] Because financial services are experience goods infrequently purchased, or even credence goods, it may take some time (or some high-profile scandals) before FinTech undermines investor confidence in financial markets. Regulation should try to correct market failures before then.

4.2 How to Regulate FinTech?

FinTech regulation faces two hurdles. First, technology-enabled financial services exploit some regulatory vacuum in order to offer alternative services competitively. Their competitive advantage could vanish if they were to be subject to the same regulations as traditional financial services. This leads to the second challenge. In order to escape the threat of regulation, some FinTechs offer services through smart contracts.[87] Because smart contacts are self-executing on the blockchain, financial regulators may be unaware of the services offered in this fashion. To stay under the regulatory radar, transactions must be settled in cryptocurrencies.

The first problem is a classic policy problem in the face of (financial) innovation. There is always a tension between the efficiency advantages of more competition in financial services and other market failures. Optimal regulation depends on context. Such a nuanced discussion of FinTech is beyond the scope of this chapter. It is worth noting, however, that regulation should functionally address market failures. For instance, the strategy for FinTechs to avoid regulation in the EU has been to avoid dealing with 'financial instruments' or otherwise falling into the scope of application of the MiFID.[88] This is a sensible strategy because the MiFID, as securities regulation in general, triggers massive compliance obligations which are overly burdensome for lightly organized FinTechs. Nevertheless, bespoke regimes of disclosure, conduct of business rules, and conflict of interest should be able to commit FinTechs to investor protection without undermining their competitive advantage.[89] Regulatory sandboxes and mentoring arrangements with licensed intermediaries are two promising strategies to design such regimes.[90]

The second challenge is admittedly harder. It seems difficult to regulate what you cannot see, such as "smart" investment contracts that are fully designed and executed on the blockchain. These smart contracts "can be described as computer programs that trigger certain prespecified actions (such as sending a certain amount of tokens to a specific address in the network) if the conditions set out in the code are met."[91] As the execution of smart contracts doesn't require cooperation from the legal system, regulation cannot prevent it from happening unless smart contracts are illegal and the legal system can enforce their prohibition. And yet, the blockchain

[86] See Section 3.1.
[87] See e.g. DeFi Lending, https://defiprime.com, accessed on 29.06.2020.
[88] Directive 2014/65/EU of the European Parliament and of the Council of 15 May 2014 on markets in financial instruments and amending Directive 2002/92/EC and Directive 2011/61/EU [2015] *OJ L 173/ 349.* For more details on this argument, see Ferrarini and Machiavello (n 69) 218-219.
[89] Guido Ferrarini and Eugenia Machiavello, 'Investment-Based Crowdfunding: Is MiFID II Enough', in Danny Busch and Guido Ferrarini, Regulation of the EU Financial Markets: MiFID II and MiFIR (OUP, 2017).
[90] Ringe and Rouf (n 72). See also Luca Enriques and W Georg Ringe, 'Bank-Fintech Partnerships, Outsourcing Arrangements and the Case for a Mentorship Regime' (2020) European Corporate Governance Institute - Law Working Paper No. 527/2020.
[91] Jens Frankenreiter, 'The Limits of Smart Contracts' (2019) 1 Journal of Institutional and Theoretical Economics (JITE), published Online First February 4.

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is not only a source of strength for such contracts, but also a limitation. Smart contracts cannot enforce actions outside the blockchain.[92] A crucial action in the provision of financial services is the exchange of financial resources on specified dates or contingencies. On the blockchain, only the transfer of cryptocurrencies is self-enforcing.

FinTechs operating on the blockchain might be less difficult to regulate than it looks. The reason is similar to the argument, made above, that FinTechs are not a big threat for financial stability so long as they cannot operate as shadow banks, i.e. so long as they cannot credibly promise the conversion of cryptocurrencies into fiat money. In order for such promises to be credible, FinTechs should own a sufficiently large amount of safe assets to support convertibility. However, governments control these assets either because they produce them, as public debt or fiat money, or because they can (not necessarily do) regulate the financial institutions and the contracts creating new safe assets.[93]

On the one hand, a promise to convert cryptocurrencies into euro, dollars or assets denominated in one of these currencies requires the cooperation of the legal system to be enforceable, if only because FinTechs must own such assets via licensed intermediaries. On the other hand, investors need fiat money to pay for goods and services that cannot be purchased in cryptocurrencies and to settle transactions with the government. Therefore, to make blockchain-operated financial services emerge from darkness, financial regulation could restrict the conversion of cryptocurrencies into fiat money. This approach could address the quick emerge of stablecoins, of which Libra is just one example, tackling directly the attempt to decrease a cryptocurrency's volatility by pegging it to assets denominated in fiat money.

We leave the discussion on how exactly to design a regulatory strategy focusing on the convertibility of cryptocurrencies for another day. However, it is important to note that it requires licensed intermediaries to operate as gatekeepers, denying convertibility to the FinTechs that do not comply with financial regulation. This isn't trivial. It is not sufficient to focus on banks, because cryptocurrencies could also be converted via the shadow banking system. Shadow banking still needs liquidity and liquidity ultimately means trading securities, which also requires a license. Nevertheless, it may be impossible for regulation to control access to every safe asset that could work as means of payment. The same problem applies to illegal markets. Still, reserving the conversion of cryptocurrencies to licensed intermediaries could be a first step towards attracting blockchain-based FinTechs to the regulatory perimeter.

5. Conclusion

In this chapter, we have analyzed the economics of FinTech and the case for its regulation depending on market failure. Based on the theory of financial regulation and its relationship with FinTech, we distinguish between technology-enabled services that work outside and inside the blockchain. For the former, the crucial regulatory trade-off is between efficiency gains from innovation and regulatory arbitrage. For the latter, our analysis suggests that regulating the convertibility of cryptocurrencies into fiat money is a promising strategy not only to safeguard financial stability, but also to attract financial services to the regulatory perimeter, whenever it is efficient to do so.

[92] Ibid.
[93] Nabilou and Pacces (n 31), 40.

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Author Bios

Fatjon Kaja is a Lecturer in Law and Economics at the University of Amsterdam and a Research Associate at the Amsterdam Center for Law and Economics (ACLE). He teaches in the area of law and economics and international business.

Edoardo D. Martino is a Postdoctoral Researcher at the University of Amsterdam and a Research Associate at the Amsterdam Center for Law and Economics (ACLE). He holds a PhD from Erasmus University Rotterdam. His research focuses on corporate law and financial regulation. He published in journals such as the European Business Organization Law Review (EBOR) and the European Journal of Risk Regulation (EJRR).

Alessio M. Pacces is Professor of Law and Finance at the University of Amsterdam and the director of the Amsterdam Center for Law & Economics (ACLE). A Research Member of the European Corporate Governance Institute (ECGI), his research focuses on the economic analysis of corporate law and financial regulation. He published in journals such as Harvard Business Law Review, Annals of Corporate Governance, and International Review of Law & Economics and in books with publishers such as Oxford and Cambridge University Press, Routledge, and Edward Elgar.

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