

How financial bubbles are fueled by money creation a.k.a. bank lending: An explanation for public education

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Introduction

It is widely acknowledged that the build-up of a financial bubble coincides with and may even be caused by excessive bank credit or lending (e.g., Reinhart and Rogoff, 2009; Kindleberger and Aliber, 2011; Jordà, Schularick and Taylor, 2015). Equally well understood, at least to the readers of this journal, is the fact that commercial bank lending involves money creation (Werner, 1997, 2014a, b; Ryan-Collins et al., 2011; McLeay et al., 2014; Jakab and Kumhoff, 2019).

Somewhat less frequently discussed is the possible causality implied by the conjunction of these two facts: If bank lending really is a process of money creation, and bank lending precedes the bursting of financial bubbles, then money creation by banks may be hypothesized to be a main driver underlying the rise and bursting of financial bubbles (e.g., Werner, 2005; Turner, 2015; Keen, 2017; Huber, 2017a).

In this paper I shall proceed from the assumption that future research will bear out this proposed connection between “bank lending (that is, money creation)” and “financial bubbles inflating and bursting”. Instead of showing this link to be the case I will set an historical and conceptual context for it that may help the expert readers of this journal explain it to their students and lay audiences. The inability of most neoclassical economics to embrace this link between money creation and financial bubbles suggests that an alternative, non-neoclassical interpretation of the monetary and banking context is required. Once supplied, such an explanatory context will render the link readily meaningful, even to beginners, and, thus, I hope, contribute to public education (cf. Ravn, 2015).

The context to be proposed is that of money being continually created, by such agents as pre-Renaissance merchants and then by banks and, especially, banks interconnected through clearing systems. This contrasts with the neoclassical narrative that starts with the myth of original creation, the barter story, and then largely forgets about money creation (the “fractional reserve banking” model is a fig leaf that flutters about around page 700 in most American textbooks on economics; it is accorded no theoretical centrality).

In what follows, the reader will be reminded of the more plausible genesis of money: Money arose out of informal debt obligations that were gradually formalized and recorded on paper (commercial paper and ledger books). Early keepers of people’s accounts discovered that they could extend credit by adding figures to these accounts, thus effectively expanding the money supply and reaping the associated benefits (seigniorage and interest). Next, banks invented means whereby the credit extended to their customers could be used out-of-bank: clearing arrangements at medieval fairs (for bills of exchange), clearing houses in the 19th century (for

checks) and, today, computerized payments systems in central banks (for bank money transfers).

In this context of permanent money creation, or money supply expansion, events like runs on individual banks or bursting financial bubbles in clearing systems are simply an expression of “credit booms gone bust” (Schularick and Taylor, 2012). This is equal to an overshooting in the supply of new money (Huber, 2017b, p. 78-79) occasioned by a system sorely lacking in negative feedback controls. In a financialized, capitalist economy bursting bubbles are the norm, as Minsky (1992) suggested. They are not inexplicable anomalies as implied by the British economists’ response to the Queen’s question: “Why did no one see it coming?” Well, because of “...a failure of the collective imagination of many bright people” (reported by Stewart, 2009).

A few remarks about the exposition to follow are in order. Needless to say, in a brief and popular account like this, I have taken a multitude of liberties. If some readers spot disturbing shortcuts in my narrative, especially the brief historical introduction, they will, of course, substitute their own preferred version of events when retelling the story to their students or lay audience. Also, notice that I entirely ignore the obsolete intermediation theory of modern banking, as well as the misleading fractional reserve theory, and settle for the credit creation theory of banking (Werner, 2014a, b, 2016. See Ravn, 2019, for a brief account of these three theories). On the whole, this is the approach taken by McLeay et al. (2014) as well, and described by Goodhart (2017, p. 33) as “now taking over as the consensus approach”. In popularizing I follow Furey (2013, p. 39): Why explain things from the wrong (conventional) point of view first and then make up for it by using the better theory afterwards?

By “bubble” I shall mean an episode “when asset prices deviate from their fundamental value in an asymmetric and explosive way” (Jordà, Schularick and Taylor, 2015, p. S5). As to other terminology, I will often use simple terms like “adding numbers to an account”, eschewing the proper technical terms of bookkeeping and accounting. This is to remind the reader to keep the story simple in the retelling, so as to forestall the intellectual alienation often experienced by laypeople exposed to economics, but also to demonstrate that seemingly complex monetary issues really can be explained so that practically everyone can understand them. A straightforward exposition should serve democracy and popular enlightenment, in sharp contrast to the “veil of deception” (Håring, 2013) that persistently hovers over money and banking, protecting vested interests from critique.

Money creation by banks

Money evolved as a means of payment, whether as coin to replace interpersonal relations of indebtedness (Graeber, 2011) or as money-of-account to record taxes, debts and arrears owed to the temple (Hudson, 2018). As a means of payment, money is a claim on resources traded in a market. The power to create money has always been a major privilege, in that the new money gave access to resources that were already claimed by *existing* money.

Typically, money creation by the minting of coin was a royal prerogative. Other types of money were handled and created by other agents, like palace administrators, temple bookkeepers, merchants, trading houses, goldsmiths and banks. As these agents offered accounts to their subjects or customers, they discovered they could extend credit by “creating a deposit for a borrower without any corresponding coin actually having been deposited. Since such a

'fictitious deposit' was indistinguishable from the real thing, the borrower could nonetheless use it to make payment" (Kohn, 2020, pp. 227-228). In other words, bookkeepers could add the requisite amounts to the borrower's account without mobilizing any real resources. Money was created.

For example, if a late-medieval winegrower asked his Florence merchant for a loan, the merchant would typically lend "on his own account". That is, he would write the requisite amount into the winegrower's account, without subtracting it from anyone else's. The winegrower could now purchase goods from the merchant's other customers "by book", that is, by asking the merchant to subtract the appropriate amount from the winegrower's account and adding it to the seller's account.

In like manner, if a gentleman in London in 1670 wanted to borrow gold specie, the goldsmith asked him to accept a (freshly written) deposit slip instead. Many borrowers accepted this alternative, since the slip, as a precursor of bank notes, would circulate as money as easily as would gold. If a citizen of Philadelphia desired a bank loan in 1810, the local bank simply printed the bills in its basement and issued the money. In all cases, the newly created purchasing power (credit, money) expanded the local money supply, which, if debts were repaid in kind, contracted again later.

In other words: As banks and other private agents keeping accounts on behalf of their customers wrote fictitious amounts on commercial paper and in ledger books, only constrained by their estimation of the creditworthiness of their borrowers, what emerged was that peculiar money-creation-through-lending that defines modern banking (Withers, 1914). Evidently, in this institutionalized construction of purchasing power *ab nihilo* – and its obverse, the creation of debt – lies the root cause of financial bubbles: the departure of money from fundamentals.

The creation of paper money and money-of-account was lucrative. Amounts or, essentially, digits supplied to the borrower were often paid off with real resources: 10 actual barrels of olive oil for the handful of digits and letters contained in the two words "10 florins". Such easy access to scarce resources accrued to early banks as they increased the money supply by writing numbers on paper – in so far as debts were not repaid by corresponding "transfers" of numbers from other accounts.

Presumably, early credit creators did this under cover of ignorance, in an age that, so far, seems to have left no written record of the concept of money supply nor seemed capable of entertaining the idea that these ephemeral credit digits were actually money.

A run on the bank

A bank could issue as much money as it deemed prudent. The bank could keep doing this until some account holders suspected foul play and triggered a run on the bank. Worried customers would attempt to withdraw the real money (specie, coin) that banks claimed the figures in their accounts represented. In the period when banks expanded the money supply rapidly, financing colonialism and industrialization, this was plainly the cause of the bank run: The bank created too many digits-on-paper ("representative money") on the back of too few real resources ("commodity money").

In the context of the goldsmith bankers the notion arose that they kept too little gold in reserve relative to the paper money they created. This was formalized in the fractional reserve theory, common today, but obsolete, as gold reserves gave way to central bank money used for clearing during the 20th century. The early 20th century desire to maintain prudence in banking led Fisher (1935) and Soddy (1933) to propose full reserve banking (a concept that barely makes sense anymore, now that reserves are infinitely expandable, e.g., through Quantitative Easing).

To repeat: The fact that banks are allowed to and do create money through lending, out of sync with the availability of real resources, is the structural or deeper cause of bank runs. The run itself (Gorton, 2012), the attendant euphoria, irrational exuberance, etc., are either triggering factors, symptoms or effects of money-creation-induced financial bubbles.

Many observers point out that periods of massive credit (bank lending) co-occur with bubbles or precede their bursting (in the vein of Kindleberger & Aliber, 2011; Reinhart and Rogoff, 2009; Schularick & Taylor, 2012). However, only when credit involves money creation does a bubble appear. Were loans really merely other people's funds, as the intermediation hypothesis has it, the scarcity of these funds would constrain any bubble expansion. But as bank credit/bank money is created through bookkeeping, its magnitude is mostly constrained by the banks' own evaluation of their loan applicants. When the economy is humming along, banks are optimistic and they expand credit dramatically, pushing up the money supply correspondingly, for example, by an annual 40%, as happened in Iceland during the period 2003 to 2008 (Sigurjónsson, 2015, p. 45). Recipe for disaster.

While *runs* happen to *individual* banks, *financial bubbles* involve the larger economy. Bubbles arise where banks are connected through clearing systems or, minimally, a network of bilateral correspondent accounts. Why do banks clear with each other? So that the credit they extend to their *own* customers can be used in payment for goods and services produced by customers in *other* banks. Let's take a closer look.

Credit travels by commercial paper and is cleared at fairs

A merchant or an early bank (in, e.g., Italian city states in the 1200's or Holland and England in the 1600's) could extend credit to his own customers by writing numbers into the customer's account, for the latter's use for payment in-house to sellers of goods. The merchant did this on his own risk, meaning that if the borrower could not repay his debts and the seller wanted the amounts "transferred" to his account redeemed in cash, the merchant would have to supply the cash out of his own pocket. So, even though extending credit earned the merchant (or bank) the interest charged, his profits suffered from the losses he regularly incurred from defaulting borrowers.

Merchants wanted to expand this lucrative business by enabling their customers to trade with customers of *other* merchants/bankers. How could the merchant get his freshly invented monetary amounts and inscribed account digits to travel out of his ledger book? By writing the digits on paper not bound in a book: deposit slips, bills of exchange, letters of credit, checks, that is, commercial paper. Loose pieces of paper with numbers written on them helped digits otherwise confined to the bank's books travel more widely.

An example: A weaver in late-medieval Venice obtains credit from his merchant, who enters the digits into the weaver's account. The weaver wants to buy wool in London and so purchases a bill of exchange from his merchant. He sends the bill by courier to London, where a wool trader receives it in payment (and ships off his wool to Italy). The wool trader deposits the bill with his merchant, who enters the amount into the wool trader's account. The London merchant now has a claim (in the amount stated on the bill) on the Venetian merchant. Similar traffic takes place in the opposite and many other directions, and scores of merchants in many cities soon have thousands of claims on each other (Kohn, 2020).

Every three months or so, merchants from Western European cities met at the fairs in Lyons, Champagne and Bruges. In an elaborate clearing process they matched their claims on each other and tore them up: "I owe you a hundred, you owe William a hundred, William owes me a hundred [rip!]." Unmatched amounts were summarized on new bills and carried over till the next fair, where they were cleared.

What this means is that the merchants extended credit to their customers at no cost to themselves, in so far as merchants managed to clear (tear up) all their claims on each other. The clearing at the fairs between merchants was what allowed their customers to spend the credit obtained from their *own* merchant on purchases from customers with *other* merchants. This expanded trade beyond the town, stimulating production and consumption at home and abroad.

Even though the bills were torn to bits and the claims they represented were cleared and extinguished, the digits or credits or money in the wool trader's and other sellers' accounts stayed. Less the debts repaid, these slowly expanding account balances held with merchants (later: banks) increased the supply of money-of-account available for production, trade and consumption. This increasing money supply obviously fueled the Renaissance, European imperialism and Western capitalism.

The enormous success of credit and money creation in mobilizing manpower and resources in the recent history of Western civilization serves to underscore the welfare function of money and its creation: To improve access to resources required to satisfy people's needs. This was the universe of Adam Smith's baker and butcher, before overconsumption and financialization set in. When credit and money creation occurs at a safe pace, that is, in concord with the expansion of the economy, things are fine. When money creation occurs too fast, beyond the typically slow growth of fundamentals, we see bank runs and financial bubbles. And, of course, when money creation expands beyond the carrying capacity of the planet, never envisioned by the classical economists, or even those of yesteryear, we have the current climate catastrophe.

Clearing systems connect banks

During the 1700's, London banks allowed their customers to use preprinted checks for payment. "Walk clerks" brought deposited checks back to the issuing bank for payment. By 1770 the clerks were meeting in a room adjacent to The Five Bells pub in Lombard Street for clearing purposes. In this clearinghouse, all outgoing and ingoing claims for each bank were netted (added and subtracted) and one amount in cash per bank was paid to or received from the clearinghouse inspector (Matthews, 1921).

At the suggestion of Charles Babbage, in 1850 each bank opened a dedicated “settlement account” with the Bank of England and deposited a suitable amount there (Campbell-Kelly, 2010). Instead of transacting the netted amount in cash, the inspector adjusted each bank’s settlement account accordingly. Clearing was now performed wholly by book, a huge gain in efficiency.

Clearinghouses were opened in many countries, independent houses in large US cities or systems operated by central banks in other countries. As the clearing system now emerged as the guarantor of safe payments (Timberlake, 1984), banks gradually sold their gold reserves to central banks and were compensated by credits added to their settlement accounts. Deposits in these settlement accounts now took on the additional function of reserves, acquiring a double identity that persists today (e.g., Bank of England, 2019, p. 6). Today, reserves are but account digits, also known as liquidity, maintained by the central bank, which may add to them in times of crisis as it sees fit: the lender-of-last-resort function.

Very little liquidity (money-of-account) is required in the settlement accounts to clear the millions of transactions on an ordinary business day; in the order of one percent of the amount transacted (Huber, 2017b, p. 72). All that the clearing system requires for its smooth functioning is that every participating bank’s settlement account balance exceeds its (netted) outgoing payments of the day.

The historical semi-truth, that a bank’s reserves of gold backed the paper money it issued, has now been replaced by the very efficient mechanics of clearing operations, largely unbeknownst to the public. In a sense, clearing systems have made reserves redundant (Norman, Shaw and Speight, 2011). As long as banks maintain a pittance in their settlement accounts, “... there is no limit to the amount of bank money which the banks can safely create *provided that they move forward in step*” (Keynes, 1930, p. 23, italics in original).

The money creation of banks is now carried, camouflaged and made inconspicuous by the clearing system (today called a payments and settlement system, cf. Manning, Nier and Schanz, 2009). The desire of medieval merchants to have the credit they extended to their customers be usable out of town has been fulfilled beyond anyone’s wildest dreams, transforming bankers, 800 years later, into the “Masters of the Universe”, as per their own pre-2007-08 crash folklore.

Financial bubbles appear in the clearing system

If, on an otherwise ordinary business day, a bank’s outgoing minus incoming payments exceed its reserve balance (liquidity), it can borrow from other banks. (This is often referred to as seeking “funding”, reinforcing the fallacious belief that banks must “fund” their loans 1:1.) If one bank is short on liquidity, another bank holds a corresponding excess amount. Banks happily provide each other this service, charging a small fee. Such overnight loans, or repurchase agreements, repos, are part of the so-called interbank market. “Intraday liquidity” may also be provided by the central bank hosting the clearing system.

With a clearing system as sweet as this, how can financial bubbles arise? As in the case of a run on a *single* bank, in this system of *many* interconnected banks the causality is in the process of money creation inherent in bank lending. How? Like all other capitalist firms, banks compete for market shares. In large part, they do this by increasing lending to willing borrowers. Once

they have exhausted their stock of solid and creditworthy customers, they move on to the less creditworthy ones, loan applicants with fanciful projects and poor collateral. Banks increase their risk or exposure, as the banker's euphemism goes (= they make stupid loans).

When banks lend and create more money than is needed for realistic production and trade, a bubble is being inflated. (What is "realistic" is often self-evident in hindsight, but rarely in foresight.) This excessive lending often occurs in markets like shares and real estate, especially housing, because fixed assets are their own collateral and hence highly desirable from the banker's point of view. The imaginative business ideas of the average entrepreneur are much harder for the bank to seize and auction off. When there is a decreasing ratio of bank lending for productive, GDP-contributing purposes to bank lending for speculative, non-GDP purposes (fixed assets), a bubble is being inflated (Werner, 2012).

At some point, a bank may discover that some of its riskier loans are not being repaid. If the borrowers are large (like real estate developers) or plentiful (like homeowners), large amounts will remain unpaid to the bank's settlement account in the clearing system (or in the accounts that the bank holds with other banks bilaterally). The bank will experience liquidity problems, being unable to complete its payments during a particular business day. The bank will borrow on the interbank market or obtain liquidity from the central bank. However, the other banks may judge the bank to be so exposed as to be hours away from failing, in which case other banks would lose money if they lend and so don't.

Also, the central bank may refuse to act as a lender of last resort, letting the bank go bust, perhaps to set an example. One bank's liquidity problems may spread to other banks to whom it owes money, leading to a general distrust and unwillingness to lend at all, as no one bank knows which one is the next in line to fail. This causes the interbank market to freeze.

When liquidity problems cause payments not to be completed on a given business day, the next risk anticipated is a shortage of cash for cash machines. As consumers cannot make payments, so the scenario goes, whether by cash or credit or debit cards, this raises the specter of food riots. In this age of just-in-time production and delivery, a few days without a functioning payments system would mean a complete stop of food deliveries to supermarkets in large cities (Ricks, 2016). No responsible central bank would want this, and the banks know it. Effectively, this enables the banks to hold the payments system hostage and they can exact emergency aid from the central bank or the government.

Of course, financial bubbles may occur in other systems of interlocking accounts, payment systems or markets, where banks or near-banks lend, create money and clear amongst themselves, especially in shadow markets.

If extraordinary liquidity problems and the interbank market freeze are handled successfully by central bank intervention or government bail-outs to banks, the bubble may be deflated gracefully and stability, implying interbank market trust, be restored. Alternatively, the bubble bursts, in varying degrees of severity. Banks that cannot meet their obligations may close shop and file for bankruptcy. The bank creditors and depositors bear their share, according to national rules. Debts are called, credit lines are not renewed, new loans are not extended, businesses close and employees are laid off, and a recession or a depression ensues.

Money creation by banks drives financial bubbles

I have emphasized the role of money creation in its guise of bank lending as a major structural factor driving financial bubbles. So, to reiterate: Apart from specie and coin, most other forms of money have always been issued (created) by banks. By lending or extending credit, that is, entering digits on designated paper (whether circulating or book), banks have sent money into circulation, in amounts ever increasing over the centuries. When money creation expands rapidly, faster than the fundamentals, whether they are gold dug out of the ground or the production of goods and services, a financial bubble is inflated.

An *individual* bank so engaged may suffer a run. Banks *connected* in a clearing system have foregone reliance on their own reserves and embraced the powers of netting and clearing, placing their eggs in that collective and much more efficient basket. But risks persist. While a clearing bank is less exposed to runs mounted by its customers, it still requires the faith of the other participants in the clearing system, the central bank and the government. Absent such trust, a bank will suffer for its excessive money creation (lending) and go down as the bubble bursts.

Despite its risks, we must bear in mind that money creation in moderate amounts is a blessing, driving innovation and economic development, taking whole populations out of poverty. In excess, however, it becomes the curse known as financial bubbles. As Minsky pointed out, in capitalism, a system with banks in competition for market share and profits, the system is inherently unstable and will cycle between boom and bust, regularly and predictably inflating and puncturing financial bubbles. To Minsky's theory we have added the fact that this rollercoaster is driven by banks' money creation *as absorbed and camouflaged by clearing systems* that are wonderfully efficient – until, one day, they're not.

Rethinking classically identified contributing factors

Observers have identified a number of factors that seem to contribute to financial bubbles. They include the lending of loanable funds, private debt, greed, irrational exuberance and shocks. Let us take a brief look at each in turn. I will conclude that these factors may act as triggers, which, at one particular point in time, release the tensions built up by gradual and excessive money creation. Causes they are not.

Lending, a commonly identified precursor of bubbles (Schularick and Taylor, 2012; Reinhart and Rogoff, 2009; Kindleberger and Aliber, 2011; Vague, 2019), is highly relevant, but only because of the money creation that bank lending entails. Were lending actually the on-lending or intermediation of other people's (scarce) money, it would act as a negative feedback, a brake on the inflating bubble. As Nobel Prize winner Eugene Fama, apparently ignorant of banks' money creation, argued, off-handedly, in an interview published in *The New Yorker*: "People who get credit have to get it from somewhere. Does a credit bubble mean that people save too much during that period? I don't know what a credit bubble means" (quoted in Cassidy, 2010).

Debt is another often-mentioned factor. However, the well-known emphasis on (private or public) debt and its proportion of BNP (e.g., Reinhart and Rogoff, 2011) seems to miss the mark. Debt that derives from bank loans is merely the passive result of money creation, just as footprints in the snow are traces of the primary action: people walking. No one ever takes out a loan to acquire debt. Although terms like "purchasing debt" are fashionable among

economists, no one ever goes to the bank and says, “I want to buy a house. Can I purchase some debt?” Money creation is what blows up bubbles; debt, certainly, is what bursts them when banks have lent foolishly to debtors who cannot repay. To see and predict a bubble one must be mindful of bank lending/money creation and notice where it goes: for productive or speculative purposes (Werner, 1997). The amount of debt outstanding is primarily interesting in so far as it was spent for non-productive purposes.

Greed. Certainly, avarice is a motivator when easy money is beckoning. But this is true everywhere. The scientific question is: what general opportunities for greed does a particular economic system encourage that trigger specific instances of greed? We have focused on the fact that the monetary system impels banks to expand money creation or face extinction. “Financial innovation” is the euphemism of choice for new and more complex ways to create money, beyond conventional analysis and comprehension. Agents better able to navigate these waters we call greedy.

Irrational exuberance (Greenspan, 1996; Shiller, 2000) is a variation of the greed explanation. Who is irrationally exuberant? Fans at the Super Bowl or music aficionados at a classical concert? No, of course not: investors or speculators, people in pursuit of outsized profits. When it becomes evident that there is easy money to be made in a particular market, exuberant fools rush in while experienced market operators exit quietly, just before the crash. Soon after they return to buy back the assets for cents on the dollar.

Shock is a catch-all term for events that destabilize an economy, possibly leading to boom and bust, like power-downs, technological dislocations, climate change, natural or man-made disasters, coups d'état, wars, etc. Obviously, such events may impact any system in a multitude of unforeseeable ways. However, they should not distract from a causal analysis of the system at hand. Where do babies come from? Well, individual parenthood as well as national birth rates are influenced by many factors, including the shocks of unemployment, marriage break-up and military conscription, but these factors only moderate the central casual mechanism of sexual reproduction. This is what makes babies. Likewise, the explanation forwarded here is that financial bubbles trace their roots to the created nature of money and to the institutions currently responsible for money creation.

In summary: Money created by bank lending fuels financial bubbles

Money is a claim on resources. To create money is to expand one's claim on the resources in a community. Only rulers with overt power over their subjects can create money (cash) and demand its acceptance (through taxation). Historically, merchants, goldsmiths and banks found ways to create money covertly, not for themselves, but disguised as lending, that is, the process of making money available to others (for a modest fee). This increased their covert power over the economy immensely.

Such credit, issued in proper measure for investment in productive capacities, became a great engine of economic development. When, however, banks expand the money supply far in excess of extant resources, things have to go sour. Holders of existing money will experience their claims on resources infringed upon and lose faith in the issuers of money, whether *individual* customers in the case of a run on *one* bank, or all the *other banks* in the case of a bank loaded with bad debts in a *clearing system*.

In an economy with competition between banks, their quest for profits and market share will lead them to lend still more, at first to creditworthy borrowers, and then to still more dubious clients with risky projects. Sooner or later, some of these clients will fail to repay their debts and the bank will experience liquidity problems. In a modern economy, other banks, the central bank or the government will step in and provide liquidity or guarantees, perhaps postponing or preventing a crisis.

If the bubble does burst and a crisis sets in, financial regulators will be blamed for having slept on their watch and more stringent regulation will be proposed: “If only limits to lending were tighter, bubbles would never inflate nor crises occur. There is nothing wrong with the system, but it has to be regulated more.”

The causal factor made explicit in this paper, however, has been the structural and systemic nature of bank lending *qua* money creation, and its facilitation by clearing systems. This causal structure may be beyond the type of regulation known today, in which superficial parameters are tweaked while the underlying engine is left intact. This structure or mechanism was not designed or planned in its totality, but rather emerged as a result of banker’s and other agents’ pursuit of their own interests. The periodic production of bubbles from banks’ money creation may be seen as an unintended side effect, a serious design error or, rather, an error arising from non-design.

A rational redesign of the monetary system would render the process of money creation transparent and comprehensible. Money creation would be appropriately constrained, rendering the formation of financial bubbles much less likely, thus stabilizing the economy. In a reformed money and banking system, money creation would serve the interests of society, rather than banks. This prospect, however, is beyond the scope of the present paper (but see proposals by Huber and Robertson, 2000; Jackson and Dyson, 2012; Huber, 2017a).

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