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Werner's Typology of Banking Theories

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Abstract This paper examines and critiques a highly illuminating typology of three banking theories. The typology was proposed by Richard A. Werner, and it identifies the financial intermediation theory, the fractional reserve theory and the credit creation theory. Two experiments testing them are reviewed, as well as the explanation offered by Werner for retaining only the credit creation theory. Werner's research is unique in that it tracks actual bank records during a loan transaction. Yet, his conclusion—that banks *individually* can create credit—downplays the key role of the *collectivity* of banks in enabling borrowers to use their credit for making payments. Two neglected contexts for the three theories are proposed: one historical, involving monetary regimes, the other systemic, involving interbank clearing arrangements. It is found that the three theories are associated with different monetary regimes (relating to specie, reserves, and account money, respectively) and, despite Werner's rejection of two of them, they all remain appropriate in proportion to the prevalence of the respective monies in the case at hand.

Keywords: money creation, credit creation, fractional reserve, Richard A. Werner

JEL code: E42, E51

1. INTRODUCTION

Since the financial crisis of 2007–2008 there has been a resurgence of scholarly interest in the role of banks in the economy. In particular, the function that banks perform as the creators of the money supply has been stressed by writers on endogenous money (Lavoie, 2014; Rochon & Rossi, 2013) and advocates of

modern monetary theory (Wray, 2015). An additional, diverse group of researchers have focused on the power of banks to create money *ab novo* (Benes & Kumhof, 2012; Huber, 2017; Jackson & Dyson, 2012; Keen, 2017; McLeay, Radia, & Thomas, 2014; Pettifor, 2017; Ryan-Collins, Greenham, Werner, & Jackson, 2011; Turner, 2015; see Furey, 2013; Ravn, 2015 for introductions).

One important voice, over the past quarter century, has been that of Richard A. Werner, professor of international banking and sustainable development at Southampton University, UK. He argues that money creation by banks is a key causal factor driving economic performance, and one that has been seriously overlooked in finance and economics. Having spent more than a decade in Japan as a researcher, he has made Japan his paradigm case for the power of money creation and the role that banks, as guided, in Japan's case, by a central bank, may wield in an economy, occasioning us to search for a new basis for economics in money creation. Thus, Werner has recast the classical, now almost defunct, quantity theory of money into a quantity theory of *credit*, arguing that where *newly created* money (= credit) goes is the more important question (Werner, 2005, 2012, 2013). This, of course, refocuses our attention on the more basic question: Where does money come from?, as is the title of a book inspired by his research (Ryan-Collins et al., 2011).

What banks actually do with money is the subject of three seminal papers published by Werner (2014a, 2014b, 2016) in the International Review of Financial Analysis. Werner proposes and names three theories of banking:

[D]uring different time periods of the 20th century, one of three distinct and mutually exclusive theories of banking has been dominant: The oldest, the *credit creation theory of banking*, maintains that each bank can individually create money 'out of nothing' through accounting operations, and does so when extending a loan. The *fractional reserve theory* states that only the banking system as a whole can collectively create money, while each individual bank is a mere financial intermediary, gathering deposits and lending these out. The *financial intermediation theory* considers banks as financial intermediaries both individually and collectively, rendering them indistinguishable from other non-bank financial institutions in their behaviour, especially concerning the deposit and lending businesses, being unable to create money individually or collectively (Werner, 2016, pp. 261–262).

The present paper lays out and examines the three theories (Section 2). Werner derives testable hypotheses from each, and below, they are ordered for clarity and to show their interrelatedness. Werner tests them in an experiment, in which he takes out a personal loan in a representative bank and studies the records produced. The records show no sign of on-lending, a critical component of both the financial intermediation theory and the fractional reserve theory.

Thus, they are rejected and the credit creation theory retained (Section 3). An explanation is offered: No money is re-lent or funds required for lending, because the credit extended is recorded as Accounts Payable but never discharged, since in modern economies such liabilities of the banks, now relabeled Customer Deposits, are what constitutes the majority of the money supply (herein understood as M1, currency in circulation plus demand deposits) (Section 4).

In the discussion, it is argued that Werner glosses over the historical roots and relevance of the three theories. It is suggested that each theory has a basis in, and is suitable for the analysis of, monetary systems based on (a) specie, (b) reserves and paper issued against them, and (c) money on account, respectively. Being cognizant of the money incarnations of each banking theory facilitates their appropriate use in analysis of historical and future banking and monetary systems, such that the two first theories do not need to be condemned to the dust heap of history, as Werner implies (Section 5).

Also, it is argued that Werner pays insufficient attention to the system of clearing and payments that allows credit creation to proceed. His focus on proving that individual banks can and do indeed create money all on their own leads him to downplay the enabling role that clearing plays in facilitating money creation, absorbing the money created and concealing the origin of money in banks' credit creation (Section 6). It is concluded that Werner has made a major contribution to monetary theory in the three papers, but that a more complete picture would include historical contingencies and the systemic context of clearing arrangements between banks (Section 7).

2. THE THREE THEORIES

For reasons of clarity, the three theories will be presented in reverse order, from the familiar to the less familiar.

1. The financial intermediation theory is the popular understanding that banks play no fundamental role in the economy, as they simply act as middlemen between people with funds to spare and people who need credit. The theory posits that "... banks are merely financial intermediaries, not different from other non-bank financial institutions: they gather deposits and lend these out ... [B]anks borrow from depositors with short maturities and lend to borrowers at longer maturities" (Werner, 2016, p. 362). Without deposits, banks cannot lend. Support for this view is found in Keynes (1936), "... who in his *General Theory* clearly states that for investments to take place, savings first need to be gathered" (Werner, 2016, p. 362), and in the influential work by Gurley and Shaw (1960) and Tobin (1963). This is also the view of textbooks by influential

Table 1: Three Theories of Bank Lending and Their Accounting Implications (Which Are Testable Hypotheses).

1. Theory	2. Do banks intermediate money?	3. Do banks create new money?	4. Accounting implications (= hypotheses to be tested)
Financial intermediation	Yes	No	When a loan is paid out, funds are drawn from the bank's own reserves. The bank's <i>balance sheet does not lengthen</i> .
Fractional reserve	Yes	Yes, collectively	To grant a loan, a bank needs to first receive a deposit in the amount of the loan + the reserves to be retained. Its <i>balance sheet lengthens by this sum</i> .
Credit creation	No	Yes, individually	Prior to extending a loan, a bank needs neither to receive deposits nor draw any funds. The borrower's account is simply credited with the amount. The bank's <i>balance sheet lengthens by the amount lent</i> .

economists, such as Krugman (Krugman & Obstfeld, 2000; cf. Werner, 2014a, pp. 8–12). Since banks are assumed to play no essential role in the economy, "...this theory provides the justification for failing to incorporate banks and the way they operate in economic models" (Werner, 2016, p. 362).

2. According to Werner (2014a, pp. 4–6), many writers on banking have argued that this view is incorrect. Banks do not merely recirculate extant

money. Together, they are able to create new money by lending and relending savers' deposits while retaining only a fraction in reserves. By this process of "multiple deposit expansion" banks are able to increase a nation's money supply by the reciprocal of the reserve fraction, the so-called money or credit multiplier.

Werner (2016, p. 365) shows that in "[w]hat must be the most influential post-war textbook in economics", Samuelson (1948) "... supports the fractional reserve theory of banking ..." (Werner, 2016). Samuelson "... argues that, in aggregate, the banking system creates money" (Werner, 2016): "The banking system as a whole can do what each small bank cannot do" (Samuelson, 1948, p. 324, in Werner, 2016).

The earliest supporter of the fractional reserve theory of banking cited by Werner is Marshall (1888): "... if each bank could lend two thirds of its deposits, the total amount of loaning power got by the banks would amount to three times what it would otherwise be" (as quoted by Yohe (1995, p. 530), in Werner, 2014a, p. 6). A late version is found in the textbook "Economics" by Stiglitz (1997, p. 737): "... when there are many banks, no individual bank can create multiple deposits. Individual banks may not even be aware of the role they play in the process of multiple-deposit creation. All they see is that their deposits have increased and therefore they are able to make more loans" (quoted in Werner, 2016, p. 366).

While other recent expositions of the difference between the financial intermediation theory and the fractional reserve theory of banking (Jackson & Dyson, 2012; Keen, 2017; McLeay et al., 2014) emphasize the ability of banks to create money (and not merely intermediate pre-existing money), Werner calls particular attention to the points raised in the quotes by Samuelson and Stiglitz, amongst others, that it is only through the *collective* action of banks that the fractional reserve theory enables money to be created: the multiple expansion, the repeated lending of funds, less the reserve fraction retained. Further, for the fractional reserve theory to work, a deposit needs to be made in the first place, from which the designated fraction can be retained. In this sense, the fractional reserve theory also sees the banks as intermediators of money, but now the process of on-lending leads to money creation, which is not the case in the financial intermediation theory.

3. The third theory distinguished is the credit creation theory: Banks create credit (and money) by a process of bookkeeping during which the amount lent is entered into the borrower's account. Werner points out that a bank officer, having completed his credit assessment and using the bank's loan management software, causes the amount lent to be entered into the borrower's current account (ignoring fees etc.). At this moment, no funds are transferred from any other account in the bank or elsewhere in the economy. At the same time, the

value of the loan contract, documenting the borrower's promise to repay, is recorded as a bank asset, to match the credit entered in the borrower's current account, which is a bank liability. The "loan" amount thus entered is new money that did not exist before. This is what a modern bank does: it creates money on the basis of the borrower's promissory note, the loan contract.

Werner pulls no punches, saying that credit has been "created as 'fairy dust', produced by the banks individually, 'out of thin air'" (2014a, p. 1). This theory (minus the colorful metaphors) has received support in a publication from the Bank of England titled "Money creation in the modern economy" (McLeay et al., 2014). It entirely corroborates the description of money and banking that Werner calls the credit creation theory, without referring to it as a theory but simply stating it as fact. For example, "Money creation in practice differs from some popular misconceptions – banks do not act simply as intermediaries, lending out deposits that savers place with them" and "Whenever a bank makes a loan, it simultaneously creates a matching deposit in the borrower's bank account, thereby creating new money" (McLeay et al., 2014, p. 14).

3. TESTING THE THEORIES

To render the three theories amenable to experimental testing in a real bank, Werner (2016, p. 370) identifies a set of accounting implications of each theory, to serve as testable hypotheses. After a loan has been made in the bank where the experiment is to take place, the bank's books can be inspected for the changes predicted, confirming or disconfirming each theory.

Simplified, the accounting implications are as follows:

1. The financial intermediation theory holds that "[w]hen a loan is granted, the claim on the borrower arising from the loan contract is shown as an increase in assets. However, the payment of the loan involves the drawing down of funds, such as reserves held at central banks... [recorded as a corresponding *decrease* in assets. IR]. According to this theory, the *bank balance sheet does not lengthen* as a result of the bank loan" (Werner, 2016; emphasis added).
2. The fractional reserve theory requires a deposit to be made, from which a fraction can be held as a reserve. "With a reserve requirement of 1%, a bank would thus first need to receive a new deposit of €202,000 in order to extend a loan of €200,000. The bank's balance sheet should first show an increase in deposits large enough to accommodate the loan and the reserve requirement" (Werner, 2016). Thus, after the transaction, the *balance sheet would be lengthened* by €202,000 (not, however,

“... due to the extension of the loan, but due to the receipt of a new deposit” (Werner, 2016).

3. The credit creation theory says that “... banks are able to credit the borrower's account with the borrowed amount, although no new deposit has taken place ... [and] there has been no commensurate equal reduction in balance of any other account, as would be the case had the funds been transferred. Thus bank loans create new deposits, not the other way round” (Werner, 2016, p. 371). “The *balance sheet lengthens* due to the extension of the loan” (Werner, 2016, emphasis added).

These accounting implications, which amount to testable hypotheses, are summarized in Table 1, column 4. Columns 2 and 3 summarize the money-creating role assigned to banks by each theory; these are the key characteristics explored in the experiment.

To test the hypotheses, Werner arranges with a Bavarian bank to extend a personal loan to him of €200,000. A first test is live and is conducted on a normal business day (Werner, 2014a), a second and better test is performed under controlled conditions, without interference from other bank clients' transactions (Werner, 2016). This particular bank complies with all banking regulations and is thus representative of all banks in modern economies.

In both tests, after the loan has been made, the accounts show a lengthening of the balance sheet by the amount lent, €200,000. This is due to two transactions, recorded on opposite sides of the balance sheet: On the liability side, “Claims by customers” shows a new entry of €200,000, the newly credit money entered in Werner's current account. On the assets side, “Claims on customers” likewise shows a new entry of €200,000, which is the debt obligation accepted by Werner as per the loan contract. No other transfer or deposit relating to the loan appears. To make a loan, the bank did not need to draw down funds (as the financial intermediation theory predicted) or receive a deposit of the amount lent plus the fraction retained (as the fractional reserve theory predicted). Thus, both the financial intermediation and the fractional reserve theories are rejected; only the credit creation theory is consistent with the evidence.

Werner concludes that a loan extended by a bank consists in making an entry in a borrower's account, thus increasing the money supply, while recording the matching amount, representing the borrower's promise to return the money, as an asset of the bank (precisely as expressed in the BoE article by McLeay et al., 2014). This is a unique power of banks, not possessed by other non-bank financial firms. *They* need money before they can lend it; banks don't. The numerous rules restricting bank lending, such as Basel capital requirements, do not interest Werner here; only the larger principle: which of the three theories best describes the current reality of bank lending?

4. THE EXPLANATION: BANKS RELABEL ACCOUNTS PAYABLE AS CUSTOMER DEPOSITS

To determine exactly how it is that banks are able to create money in the process of lending, Werner (2014b) examines the steps involved in extending a loan by a bank and by a non-bank firm, whether a non-bank financial institution (like a stock broker extending a margin loan to a client) or a non-financial corporation (like a manufacturer extending a financial loan to a supplier).

A bank creates money during the process of lending due to these factors:

1. A bank takes deposits and thus maintains a system of customer accounts (which a manufacturer extending occasional credits to a supplier does not).
2. A bank has access to these customer accounts because it is exempt from “client money rules” (which require other financial institutions to segregate client monies from their own). This access means that a bank can credit customer accounts with “deposits” that are transferred from nowhere.
3. A bank may enter into a loan contract with a borrower, like any other firm, but the engagement unfolds differently, in two steps:
4. Step 1 is the same in banks and non-banks. The lender enters the loan contract as an increase in assets on its balance sheet. It enters its obligation to pay out a little later as an accounts-payable item on the liability side of its balance sheet. This initially lengthens the balance sheet equally in banks and non-banks.
5. Step 2 diverges, however. A lending *non*-bank actually discharges its liability to the borrower by drawing down its own funds and paying out the money to the borrower. It transfers money to the borrower from one of its other accounts. (That is, it does *not* create new money). This contracts the non-bank’s balance sheet again.
6. In contradistinction, a *bank* never discharges its obligation, that is, it never pays out the money to the borrower. Rather, it keeps the amount on its books as a liability, since these liabilities are what is known as Customer Deposits, that is, regular account money. Thus, the bank’s balance sheet remains in the lengthened condition, in which both the asset and liability sides of the balance sheet have expanded.

In Werner’s words:

We conclude that by disaggregating bank lending into two steps we have identified precisely how banks create credit, and we have solved a long-standing conundrum in

the literature, namely why banks combine what at first appear to be two very different businesses: lending on the one hand, and deposit-taking on the other. The answer is that banks are not financial intermediaries, but creators of the money supply, whereby the act of creating money is contingent on banks maintaining customer deposit accounts, because the money is invented in the form of fictitious customer deposits that are actually re-classified 'accounts payable' liabilities emanating from loan contracts. Banks could not do this if they did not combine lending and deposit taking activities. But, as we saw, combining these activities is a necessary yet insufficient condition for being able to create credit and money. The necessary and sufficient condition for being able to create credit and money is being exempt from the Client Money Rules (2014b, p. 75).

In a nutshell, other financial, non-bank firms can lend alright, but they pay out. Banks don't. Credit that is entered into a firm's Accounts Payable during lending is, in a bank, never discharged, but is renamed Customer Deposits and serve as the money supply, by virtue of this credit being transferable and accepted in payment by other banks and their customers. This is a bank's privilege, its special nature: its Accounts Payable, its debts, serve as the means of payment in a modern economy where they now amount to some 95% (King, 2016, p. 62) of the money supply.

5. DISCUSSION OF HISTORICAL CONTEXT: MONETARY REGIMES

As elegant and clarifying as it is, Werner's typology of banking theories is presented in a manner that calls for additional historical as well as bank-systemic context. In this section and the next one it will be argued, first, that the three theories derive from historically extant monetary regimes; they remain relevant in the proportion that historical or contemporary economies contain these elements; and hence, they should not be discarded as falsified, as Werner's otherwise decisive experiments could lead us to conclude. Second, Werner's emphasis on the ability of the *individual* bank to create deposits during lending leads us to pass over the importance of the collective actions of banks in the clearing of payments and its crucial role in modern credit creation. Let's consider these two points in turn.

The understanding of lending underlying the financial intermediation theory goes back to the earliest days of deposit banking, in classical Greece and Rome. A distinction was made between a *depositum regulare*, such as unique objets d'art that wealthy citizens entrusted to bankers with vaults and armed guards for safekeeping, and a *depositum irregulare*, which was fungible coin that the banker was allowed to lend to other customers, sharing the interest

charged with the depositor (De Soto, 2012, p. 6). The two kinds can be pictured as a tied-up sack of gold coins and an open one, respectively; one is for passive storage, the other for on-lending and moneymaking.

The archetypical fractional reserve banker is, of course, the London goldsmith of the late 17th century (Quinn, 1997; Davies, 2002, pp. 248–252; cf. Werner, 2005, pp. 167–171). He wrote fake deposit slips for prospective borrowers who accepted them in lieu of gold, since the deposits slips had started circulating as paper money and were, it was perceived, as good as gold. In the understanding of later critics and rationalizers, the goldsmith's prudence, such as it was, could be modeled in terms of fractions of gold to be retained, whether on each individual loan, as Werner assumes in his rendition of the fractional reserve theory or, equally likely, on the sum of his loans outstanding.

In like manner, the credit creation theory may be associated with a third prototype of banker: The merchant running accounts for his customers: nobles, craftsmen and farmers (Spufford, 2002). He may be of North Italian (1200–1500) or Dutch (1500–1700) extraction. He often operated in a cash-strapped environment and hence accepted the products of the local farmers and craftspeople by crediting their accounts. There is evidence from as early as the 1100's that merchants let their customers trade with each other by debiting and crediting their accounts in his books (Spufford, 2002, p. 38).

Early merchants/banks would lend by allowing a customer an overdraft on his account or, as per double entry bookkeeping, opening an extra account in the borrower's name for recording his debt (Sangster, 2016). This credit was not deducted from any other customer's account, as Werner shows is still not the case today in banks: "No transfer of funds from anywhere to the customer or indeed the customer's account takes place. *There is no equal reduction in the balance of another account to defray the borrower*" (Werner, 2014b, p. 74. Emphasis in original). Presumably, our renaissance merchant would see his lending as a matter of personal risk-taking, as he would bear the losses should borrowers default (Kohn, 1999, p. 14). The early merchant or banker would have been unaware that he engaged in credit or money creation (Lane, 1937, p. 2002) and he was most certainly ignorant of expanding any national money supply, as were many early economists.

Summing up, each of Werner's three theories of banking may be associated with a historical prototype: the Roman deposit banker's on-lending of fungible coin (the financial intermediation theory), the London goldsmith's deposit slip writing bounded by his estimate of reserves required for smooth operations (the fractional reserve theory), and the Italian merchant banker's extension of credit as digits entered into his customers' accounts on his own estimation and risk (the credit creation theory).

Now, evidently, these Weberian types of banking have overlapped empirically in different time periods and regions, as have the respective dominant forms of money (specie, paper money, and money on account). Thus, the applicability of the three theories of lending and banking will vary accordingly. The theories will be appropriate in proportion to the historical centrality of each kind of monetary system. To mention three examples, in the early history of money the financial intermediation theory would be acceptable (Usher, 1934). The fractional reserve theory would seem particularly relevant in 18th-century Britain and in the 19th-century United States—in both periods paper money was issued by private banks wary of exceeding their gold reserves. And the recent decades devoid of a gold standard but with banks and their creation of account money in full bloom would seem to be a credit creation regime *par excellence*.

As a differential explanatory device, the typology of the three theories and the monies on which they rest may be applied in the interpretation of the many voices of Keynes on money and the patently inconsistent treatment of monetary matters in his *Treatise on Money and The General Theory*, which Werner identifies (2014a, p. 9). Keynes' vacillation may be understood at least in part as an attempt to encompass in one theory the three different monetary regimes that interacted during his lifetime: Britain was going off the gold standard, rendering gold reserves (and the fractional reserve theory) less relevant; checks were in ever-increasing use, indicating reliance on account money (as highlighted by the credit creation theory); but much economic thinking was still in the thrall of commodity money (as per the financial intermediation theory).

6. DISCUSSION OF SYSTEMIC CONTEXT: CLEARING ARRANGEMENTS

A second point that bears elaboration is the key role of payments and their clearing in the interbank system. Once a bank has made a “deposit” through lending—which, as Werner points out, involves renaming Accounts Payable as Customer Deposits—the borrower will want to spend the money in her account, often by transferring it to another bank. This transfer, “when the money leaves the bank”, is often seen by mainstream economists as the defining moment when the bank has to “fund” its loan. Werner does make passing reference to the fact that through clearing, everything works out:

As long as banks create credit at the same rate as other banks, and as long as customers are similarly distributed, the mutual claims of banks on each other will be netted out and may well, on balance, cancel each other out. Then banks can increase credit creation without limit and without ‘losing any money’ (Werner, 2016, p. 373).

This point calls for clarification, since the process by which claims are netted and settled between banks not only facilitates money creation by banks, but also obscures it. Further, the fact that banks and their customers are not even distributed, since in most economies, a few banks are extraordinarily large and many are small, poses an additional problem for clearing systems. Let us briefly review the history of clearing arrangements.

Coin has always been a money historian's favorite (cf. Davies, 2002; Weatherford, 1997), presumably because the archaic, informal systems of credit and debt relations preceding coin have not worked their way into the archeological record (Graeber, 2011). One key means of payment, at least over the past 800 years, has been transfer by book, whether by medieval or early-renaissance merchants running accounts for the local farmers and craftsmen or, later, by banks facilitating overland trade. Over the centuries, the payment relationships between money changers, merchants and bankers developed from bilateral correspondent bank arrangements (Fратиanni & Spinelli, 2006) to the fairs in Champagne, Lyons, etc., where merchants/bankers met and cleared payments by tearing up mutual paper claims, to the more expansive financial networks between banks and their agents in England, the Low countries and Italy and Spain, to the "central banks" of the Amsterdamsche Wisselbank, Sveriges Riksbank and Bank of England, to the clearing systems of London (from c. 1770) and New York (from c. 1850).

These payment systems have received some research attention (e.g., Kohn, 2001; Norman, Shaw, & Speight, 2011; Timberlake, 1984), but not much. They are usually pictured as marvels of speed and efficiency, designed to expedite trade for payers and payees (Committee on Payment & Settlement Systems, 2003; Manning, Nier, & Schanz, 2009). While this benefit to the public is beyond doubt, a more immediate motivator for the financial institutions involved was the prospect of expanding their loan portfolios and earnings considerably by allowing their borrowers to take their freshly created credit *out of the bank* and spend it on goods and services produced by customers of *other banks*.

From the earliest days of bookkeeping, credit has been given as overdrafts, lines of credit or just by the addition of numbers to the borrower's account, so that, by book transfer, the borrower could make purchases from other customers of the same merchant (Kohn, 2001). As long as this was kept within limits and not recognized as money creation, the merchant merely expanded the local money supply, thus stimulating economic activity and development (Lane, 1937). The merchant's motive was profit, obviously: he could help his customers not only by letting them make payments using *existing* money in their accounts, but also by letting them make payments with *new* money lent to them (at interest) five minutes previously.

One early innovation was for merchant banks to run accounts with each other, through which their respective customers could trade. For example, in the early 1400's, the Banco di San Giorgio in Genoa ...

... extended loans to the Republic, tax farmers, and its own clients by allowing deposit accounts to run negative balances.... Account overdrafts were exchanged among clients as part of an extended credit network.... If Client A and Client B had accounts in the same bank, settlement would be intra-bank. If B had an account with a different bank, settlement would take place through one of the many correspondent banks of the Banco di San Giorgio (Fratianni & Spinelli, 2006, p. 23).

Positions outstanding were netted and settled (= cleared), requiring only fractions of the amounts involved to be actually handed over in specie (and, later, especially at the frequent French fairs, paper was written that carried outstanding amounts over from one fair to the next). By implication, and not often described in the literature, the few transfers that originated in newly granted credit were absorbed into the general clearing, reducing the need for coin (later: reserves) and thus enabling the banker to lend large amounts not actually in his possession, that is, to create credit or, functionally, money.

The bilateral clearing of correspondent banks in the city-states of northern Italy grew into multilateral network relations between banks, involving negotiable paper, such as trade credits and bills of exchange, as well as money on account in the still larger trading houses and banks (Spufford, 2002). The power of banks from 1400 to 1800 in financing courts and wars between kings and states rested on their ability to create money by using their networks of fellow banks, not to push in additional wheelbarrows of gold or silver, as is often imagined (cf. "By combining deposits, some very small indeed, in this way, quite enormous sums could be mobilised" (Spufford, 2014, s. 244)). When the borrowing kings spent their funds (account money), newly obtained from banks, on goods sold by customers of other banks, the consequent clearing between the many banks involved would ensure that the banks stayed liquid despite having created large amounts of (account) money for their borrowers.

As checks grew in prominence, especially in England during the 1700's, the clearing process was further institutionalized and secured. The major London banks employed walk clerks who returned checks to the issuing bank and collected the money in cash. Soon they found they could save on walking by meeting in the Five Bells pub in Lombard Street. At first, they netted their amounts bilaterally as occasion arose, settling the difference in Bank of England notes (Norman et al., 2011, p. 15). Then, a multilateral clearing was set up, in what became the Bankers' Clearing House: each bank clerk tallied the amounts *due*

from other banks as well as the amounts *owed to other banks*, and settled the difference in cash with the inspector (Matthews, 1921).

The clearing system was further improved in 1850, after Charles Babbage proposed that each bank open an account with the Bank of England (Campbell-Kelly, 2010, p. 19). The inspector would have access to these accounts and settle the amount owed or due to each bank simply by adjusting each bank's balance so that all transactions cancelled out. To get the system going, each bank deposited sufficient money in its account that there would always be a positive balance in the course of a normal business day. Needless to say, the increased efficiencies included those bestowed on the use of fresh credits, which were still more innocuously absorbed into the clearing machine, allowing the banks still greater freedom in extending credit as they saw fit and reap the benefits.

On a rare occasion, a bank would have outgoing payments exceeding its clearing account balance, whether these payments originated in existing money or newly created credit. This would happen, and still does, more often for a small bank than a large, since a bank with a larger market share is more likely to be on the receiving end of an outgoing payment and hence experience fewer liquidity problems (Graziani, 2003, p. 92). The bank could make up the difference by borrowing from another bank in the system. Alternatively, the bank could arrange for the Bank of England to enter fictitious deposits into the unfortunate bank's clearing account. This is, of course, the lender-of-last-resort function famously identified by Walter Bagehot (1873).

Our identification of the capacity of the clearing *system* and its modern custodian, the central bank, to rescue overextended banks from excessive lending completes Werner's precise account of the *individual* bank's ability to create money out of thin air, by the pretension of money being actually deposited into the borrower's account. When spent by the borrower, this baseless credit enters the clearing system and, leaving not a rack behind, transmutes into such stuff as the money supply is made on.

Without a clearing system, or at least a corresponding bank and a bilateral clearing agreement, credit extended and entered into a borrower's account could travel no further than to other customers of the same bank. In this sense, a collectivity of banks is needed for money creation by individual banks to be consummated in the economy as a whole—as tempered by the typically uneven distribution of large and small players in modern banking systems, where small banks are much more exposed in the event of loan defaults than large banks with many customers and large reserves. The factor that enables money creation is the clearing of payments, not the on-lending of deposits, the latter proposition being falsified by Werner in his experimental investigations.

7. CONCLUSIONS

Werner has done a great service to monetary economics by distinguishing and testing three extant theories of bank lending. Particularly useful is his disentanglement of the two non-intuitive alternatives to the financial intermediation theory: The fractional reserve theory, which assumes that banks create money by on-lending deposits and retaining a fraction for reserves, and the credit creation theory, which holds that a bank creates credit by entering matching amounts on the liability and assets sides of its balance sheet. The latter distinction is absent in most of the recent—critical, reform-minded or establishment—writings or research on money or banking (e.g., Benes & Kumhof, 2012; De Soto, 2012; Keen, 2017; McLeay et al., 2014; Pettifor, 2017; Turner, 2015; Wray, 2015).

Equally original is Werner's observation that the bank credit created is, in essence, Accounts Payable to its customer. Since the bank never actually discharges this obligation, as a non-bank lender would, the money stays on the bank's balance sheet in the deceptively renamed guise of Customer Deposits, these liabilities of banks being what constitutes most of the money supply in a modern economy.

By conceptualizing the three views of bank lending as scientific theories, Werner is able to derive testable hypotheses from each and put them to the test by taking out a loan in a standard modern bank. Inspection of the records shows that only the credit creation theory has merit; no on-lending takes place, as the financial intermediation and the fractional reserve theories stipulate.

In the discussion, two points were made in clarification of Werner's typology. One was its neglect of the historically contingent incarnations of the three theories: Financial intermediation is readily understood as the essence of banking operations when only specie is available (or banking in cash created by a central bank, that is, a money supply non-expandable by the lender). Fractional reserve banking is the proper interpretation when an economy operates on reserves and issues paper on top, as was the case in advanced economies roughly between 1600 and the mid-20th century. The credit creation theory is suitable to a banking system based on money on account issued as merchants credit their customers for goods delivered or for loans taken. This has proven to be the more resilient system of banking, having practically taken over the world today.

The differential appropriateness of the three theories is brought out by the fact that current monetary-reform proposals are based on one or the other of these theories. Full reserve or 100% banking reforms are obviously based on the fractional reserve theory (Benes & Kumhof, 2012; Fisher, 1935, cf. the critique by Fontana & Sawyer, 2016). Werner's own proposal for community

banking condones credit creation as a banker's privilege, but requires banks to be small and locally responsive, like the German Sparkassen (Werner, 2010). Lastly, the proposal of the UK reform organization Positive Money is best understood in terms of financial intermediation, in that it aims to "strip private banks of their power to create money", in Martin Wolf's (2014) arresting phrase, such that the central bank *creates* account money and the banks *allocate* it through lending (= financial intermediation). Thus, Werner's typology should not lead us to discard the two "obsolete" theories, but to use each in its domain of relevance, as suggested by the type of money and monetary system under consideration.

The second point added in discussion was the importance of the clearing system for money creation, for only through the elaborate clearing arrangements developed over many centuries of monetary evolution may credit created in the borrower's bank account leave the bank as money used in payment. Even though credit entered into a borrower's account as so many digits actually is recorded in national accounting as an addition to the money supply, critics will counter that "when the money leaves the bank funds have to be drawn. The charade of 'creating money out of thin air' is up!"

Not so, for although bank reserves need to be drawn when an *isolated* payment is made by the borrower, isolated payments are never made in the modern, intensely interconnected banking system. Millions of payments are made every day and the funds flowing in and out of a bank largely cancel each other out, obviating the need for individual (or, indeed, any) loans to be "funded" (under normal operations, that is; crises occur when normal conditions break down, and they arise in the clearing system precisely because the loans extended by banks exceed its capacity to absorb them). Werner's focus on the power of the *individual* bank to create credit in *individual* acts of lending somewhat obscures this collective or systemic aspect of money creation in the modern economy.

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