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On the Controversy Over the Origins of the Chicago Plan for 100 Percent Reserves: Sorry, Frederick Soddy, it was Knight and (Most Probably) Simons![*]

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The idea of 100 percent reserve requirements against demand deposits received a renewed impetus following the 2007-08 financial crisis. In 1933, a group of University of Chicago economists, led by Frank Knight and Henry Simons, circulated two memoranda that called for 100 percent reserve requirements. The idea became known as the Chicago Plan of Banking Reform. That same idea had been proposed in 1926 by Frederick Soddy, a Nobel Laureate in chemistry, in his book, *Wealth, Virtual Wealth and Debt.* Soddy claimed precedence, a claim that caught on. I provide evidence showing that Knight, and probably Simons, conceived the idea of 100 percent reserves prior to the publication of Soddy's 1926 book. By 1934, however, Simons raised concerns that 100 percent reserves would not be sufficient in a world where financial markets could innovate around legal restrictions on banks.

Keywords: 100 percent reserves, Chicago Plan, Frank Knight, Henry Simons, Frederick Soddy.
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1. *Introduction*

In March 1933, at the height of a banking crisis that gripped the United States during the Great Depression, a group of University of Chicago economists, under the leadership of Frank Knight, circulated to politicians and other academics an untitled memorandum calling for, among other things, a fundamental reform of the banking system. At the core of the proposed reform was the idea of 100 percent reserve requirements on demand deposits. The principle underlying the proposal originated in the practices of seventeenth-century goldsmiths, and was reflected in the nineteenth-century debate between the banking school and the currency school and in the English Bank Charter Act of 1844, although the earlier emphasis was on reserves for currency instead of reserves for demand deposits (Allen, 1993, p. 705; Dimand, 1993, p. 61). The March memorandum was short on details about the benefits of the proposal, but in November 1933, Henry Simons, one of the signatories of the memorandum, circulated a follow-up memorandum, titled "Banking and Currency Reform," that provided additional details about the advantages of the 100 percent reserves scheme.

The idea took off. During the next few years numerous articles about the proposal, authored by leading economists of the day, appeared in the literature. The idea was debated in Congress, and several pieces of Congressional legislation that included the 100 percent reserve requirement were introduced.[1] Irving Fisher embraced the idea in 1934 and became its leading advocate, making the adoption of what had become known as the Chicago Plan of Banking Reform his chief policy objective during the remainder of his lifetime.[2]

[1] Graham (1936, p. 428), an advocate of the proposal, pointed-out that "few suggestions for monetary reform have commanded such immediate and widespread interest as that which has attended the proposal to require 100 percent cash reserves against bank demand deposit liabilities."

[2] Fisher passed away in 1947. Dimand (1993) and Phillips (1995) reviewed the 1930s academic literature on the 100 percent reserves scheme. Phillips (1995) also reviewed the Congressional debate on the issue.

On the other side of the Atlantic, however, the attribution of the idea was greeted by one individual with great consternation. Frederick Soddy, who had been awarded the Nobel Prize in Chemistry in 1921, had published a book on economics, *Wealth, Virtual Wealth and Debt*, in 1926 in which he proposed 100 percent reserve requirements on demand deposits. The following year, Knight (1927b) reviewed the book, praising the idea. However, the two 1933 Chicago memoranda and much of the subsequent academic literature, including articles by Simons (1934a, 1936), on the subject, failed to mention Soddy's origination of the idea. Soddy was furious. He "repeatedly upbraided" Fisher in a mistaken belief that Fisher had failed to give him credit (Dimand, 1993, p. 70).[3] Likewise, Soddy reprimanded Knight and Simons for not having cited Soddy in the two 1933 Chicago memoranda. As I discuss below, Alvin Hansen also chimed in. In his book, *Full Recovery Or Stagnation?* (1938), Hansen chided Simons and other proponents of the 100 percent scheme for failing to give credit to Soddy as the originator of the proposal.[4] In a review of Hansen's book, Simons (1939) relented, citing Soddy, but the citation was embellished with sarcasm (see below). Simons wrote numerous subsequent articles containing the 100 percent reserves idea, but he never again cited Soddy. After his 1927 review of Soddy's book, Knight also never again referred to that author.

Soddy's claim of origination produced an effect. There is presently a widely-held view -- though not unanimous agreement -- that Soddy was the progenitor of the

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[3] Fisher's books *Stable Money* and *100% Money,* published in 1934 and 1935, respectively, cited Soddy's 1926 book. Fisher also cited other forerunners, including Joplin (1823) and von Mises (1912), of the 100 percent reserves scheme. Thus, while Fisher gave credit to Soddy, Fisher did not consider Soddy the originator of the idea. I am grateful to Robert Dimand for bringing this point to my attention.

[4] In fact, the idea of 100 percent reserves against checking deposits -- as opposed to reserves against currency -- can be found in the mid-nineteenth-century work of Charles H. Carroll (see Carroll, 1860), although neither Soddy nor the early-1930s Chicagoans seemed to have been aware of Carroll's work. Consequently, the debate between Soddy and Knight and Simons about origination was actually about the rediscovery of the 100 percent reserves idea in the context of the 1920s depression in the United Kingdom and the 1930s depression in the United States.

Chicago 100 percent reserves scheme and that the Chicago economists -- especially Knight -- took the idea over from Soddy. Phillips (1995, pp. 46-47) wrote: "The ideas of the Chicago economists on banking reform were influenced by Soddy …. Frank Knight … one of the greatest economic minds of the twentieth century, embraced the heretical proposal of a noneconomist to transform the banking system radically." Barber (1996, p. 90) stated: "Soddy … had sparked the contemporary [*i.e.,* 1930s] discussion with a pamphlet calling for 100 percent reserves in 1926." Laidler (1999, p. 240) expressed the view that the 100 percent scheme was "labelled 'the Chicago Plan,' and with considerable justice, if we set aside the claims of Frederick Soddy (1926), whose work was known to Frank Knight."[5] Similarly, Benes and Kumhof (2012, p. 17) wrote: [The Chicago Plan] was first formulated in the United Kingdom by … Frederick Soddy …. Frank Knight … picked up the idea almost immediately." Daly, who published an article on Soddy's economics (see Daly, 1980), recently expressed the view that "Soddy's advocacy of full reserve banking was later picked up by … Frank Knight and others of the Chicago School" (Daly, 2016, p. 2).[6]

Did Soddy's 1926 proposal for 100 percent reserves influence Chicago thinking on that issue? If so, why did the Chicagoans, especially Knight and Simons, the main propagators of the 100 percent reserves scheme at Chicago, fail to acknowledge the influence of Soddy? In what follows, I address that issue.

The remainder of this paper is structured as follows. Section 2 summarizes the main elements of 1933 Chicago proposal and discusses the business-cycle theory that motivated the proposal. I show that the core element underlying that theory was the notion that a fractional-reserve banking system has the potential to exacerbate the

[5] Laidler (1999, p. 240) also noted that Lauchlin Currie had come up with the scheme in 1934.

[6] Not all modern writers take the view that the Chicago economists got the idea of 100 percent reserves from Soddy. Dimand (1993) noted that Soddy formulated the idea in 1926, but he left open the possibility that the Chicagoans came up with the idea independently of Soddy.

business cycle greatly because it makes possible the multiple expansion or contraction of deposits. Section 3 presents Soddy's theory of the business cycle, including the role of banks in exacerbating the cycle, and differentiates that theory from the Chicagoan analysis. Section 4 discusses the views of Soddy's work expressed by Knight and Simons. Section 5 presents evidence, much of it for the first time in the literature, showing that Knight, and probably Simons, conceived the idea of 100 percent reserves prior to the publication of Soddy's book in 1926. Section 6 describes Simons's concerns about the effectiveness of 100 percent reserves in a world characterized by financial-market innovation; the section relates those concerns to the 2007-08 financial crisis. Section 7 concludes.

2. *The Chicago Proposal*

With real GDP having collapsed by about 25 percent since the onset of the Great Depression in 1929, and with more than one-fifth of commercial banks having suspended operations (Friedman and Schwartz, 1963, p. 299), the five-page March 1933 memorandum proposed both long-term banking reform to stabilize the banking system and short-term measures to reverse the economic contraction.[7] The memorandum was signed by eight Chicago economists;[8] it was circulated to about forty individuals and was accompanied by an introductory letter from Knight. Henry Wallace, who was U.S. Secretary of Agriculture, was one of the individuals to whom the letter was sent. On March 23, 1933, Wallace forwarded the memorandum to President Roosevelt with a positive appraisal of its contents as follows: "The memorandum from the Chicago economists, which I gave you at [the] Cabinet

[7] Franklin D. Roosevelt assumed the U.S. presidency on March 4, 1933. On the following day, he issued a proclamation to close the banks. The banks reopened on March 13.

[8] In addition to Knight and Simons, the signatories were Garfield Cox, Aaron Director, Paul Douglas, A.G. Hart, Lloyd Mints, and Henry Schultz. There were at least three versions of the memorandum: a March 15 version, a March 16 version and an April version, which did not have a specific date. See Tavlas (2019). Phillips (1995) reproduced the March 16 version.

meeting Tuesday, is really awfully good and I hope that you or [Treasury] Secretary [William] Woodin will have the time and energy to study it. Of course, the plan outlined is quite a complete break with our present banking history. It would be an even more decisive break than the founding of the Federal Reserve System" (quoted from Phillips, 1995, p. 49).

The primary objectives of the March banking-reform proposals were to prevent a further decline of the money supply that had occurred (through the conversion of deposits into cash) since the beginning of the Depression and to eliminate the possibility of losses by depositors, thereby putting an end to bank runs. The Chicagoans proposed an immediate guarantee of deposits by the Federal Reserve Banks and the "gradual liquidation" of all then-existing banks, the deposits of which "would be paid off in [Federal Reserve] Notes or in drafts upon the Reserve Banks" (Knight *et al.*, 1933, p. 3). They also proposed the establishment of two new kinds of institutions: (1) an institution "which shall be required to maintain reserves of 100 % in lawful money and/or deposits with the Reserve Banks" (Knight *et al.*, 1933, p. 2) -- basically, a "warehouse" for funds that acted "exclusively as a depository and agency for the transfer of funds … it would derive earnings solely from service charges"; and (2) "a distinct class of institutions, in the general form of investment trusts" which would "engage in the business of short-term lending, discounting, and acceptance; [the investment trusts] would be prohibited from accepting demand deposits" (Knight *et al*., 1933, p. 3). Those latter institutions would get their funds by issuing securities.[9]

Apart from allowing for better control of the money supply -- thereby, preventing a further fall of the quantity of money -- and eliminating the possibility of additional losses by depositors due to the closure of banks, the March memorandum provided

[9] Although Fisher (1935) embraced the 100 percent reserves scheme, he did not endorse the idea of replacing lending banks by investment trusts.

few details about the advantages of the 100 percent reserves proposal. The November memorandum, the main text of which was approximately fourteen pages in length, supplied those details. The memorandum was authored by Simons, with strong input by Director, and reflected regular discussions among the Chicago group.[10] It included a six-page appendix, "Banking and Business Cycles" and a seven-page supplementary memorandum, "Long-time Objectives of Monetary Management." [11] Like its March predecessor, it advocated that existing commercial banks be separated into two sets of institutions -- one would essentially be a warehouse for money underpinned by 100 percent reserves, and the other would be an investment trust. Under both the March and November memoranda, the Fed would issue the necessary reserve balances (to underpin demand deposits) and disseminate the balances to the banks by purchasing the assets, including government securities, of the banks: "At the end of the transition period," during which the Fed would be purchasing assets off the balance sheets of the banks, "the Reserve Banks should find themselves in possession of additional investment assets (perhaps exclusively bonds) about equal in value to the amount of the present federal debt" (Simons *et al.*, p. 4); the "earnings of the Reserve Banks would belong to the government." Thus, another benefit of the proposal, according to the November memorandum, could be the elimination "of the entire burden of the present federal debt" (Simons *et al.,* 1933, p. 4).[12]

[10] Both the March and the November memoranda were outgrowths of regular departmental meetings and social gatherings, the latter at Knight's home on Sunday afternoons, in which the Chicagoans discussed the causes of, and policy responses to, the Great Depression. See Tavlas (2019). Whalen (1994) reproduced the November memorandum.

[11] The November memorandum and its supplementary memorandum also provided detailed assessments of alternative monetary rules, with the preferred rule being one that fixed the quantity of money. See Tavlas (2019; 2020). Along with the 100 percent reserves proposal, a monetary rule was a key element of the "Chicago Plan" of monetary reform.

[12] An additional motivation for the 100 percent reserves proposal -- not stated in either of the 1933 memoranda but subsequently expressed by Simons (1934a) -- was to prevent the complete socialization of the banking system.

A major purpose of the November memorandum and its appendix was to show that a fractional-reserve banking system exacerbates the business cycle; therefore, adoption of 100 percent reserves would help stabilize the cycle. The memorandum made this clear at the outset. It began:

> Our government has, in a significant sense, allowed the commercial banks to usurp its primary function of controlling the currency. Bank credit has become the predominant element in our circulating medium …. Money is created when it should be destroyed, and destroyed when it should be created (Simons *et al.,* 1933, p. 1).

Consequently, "it is precisely to the role of [fractional-reserve] banking in the cyclical fluctuations that we wish especially to direct attention" (Simons *et al.,* 1933, App., p. 3).

The business-cycle theory contained in the memorandum consisted of the following elements. (1) A basic feature of economic life is the danger of sharp and unpredictable changes in the velocity of circulation of money, which, in turn, are attributable to expectations of changes in price levels. (2) The prices that determine the operating cost of production -- mainly wages -- are inflexible in the short run (Simons *et al*., 1933, App., p. 1). Consequently, when the prices of goods change, profits and output change in the same direction, giving rise to expectations of further changes in prices, profits, and production: "larger profits breed optimism; they stimulate investment and induce dishoarding (reduction of idle cash reserves)" (Simons *et al*., 1933, App., p. 2). (3) The foregoing process is highly exacerbated by the "perverse" behavior of the main part of the money supply under a fractional-reserve banking system in which lending, and thus demand deposits (that is, the money supply), expand in booms and contract in depressions.

During the expansionary phase of the cycle, the Chicagoans argued, banks increase their lending "and new money (deposits) are created; these changes bring still larger earnings, which in turn induce further expansion of loans. During such expansion, *no single bank loses reserve, unless it expands more rapidly than the rest*" (italics supplied, Simons *et al.,* 1933, App., p. 3). The process operates in reverse fashion during the contractionary phase of the cycle:

> Every reduction in bank loans means reduction in the community's effective money; and this in turn means lower prices, smaller volumes of business, and still lower earnings. Moreover, in a country where wages and freight rates (to name only the most important items) are as inflexible as they are in the United States, there is no limit, in the absence of drastic federal interference, to the deflation which may ensue (Simons *et al*., 1933, App., p. 5).

The Chicagoans' judgment of the role played by a fractional-reserve banking system in the business cycle was the following: "if some malevolent genius had sought to aggravate the affliction of business and employment cycles, he could hardly have done better than to establish a system of private deposit banks in the present form" (Simons *et al.,* 1933, App., p. 3).[13]

One point about the Chicagoan analysis of a fractional-reserve banking system is important to highlight. As explicitly expressed in the Chicagoans' discussion of the role played by banks during the expansionary phase of the business cycle, a single bank loses reserves if it expands more rapidly than the rest. The underlying principle here is the following. In a fractional-reserve banking system, a single bank that expands its loans loses reserves (except for the part of the loan that may be redeposited in the bank). Therefore, an individual bank that receives new funds can increase its lending by no more than the amount of new funds (apart from an amount retained as reserves). The situation for the banking system as a whole is different because -- provided the private sector's currency holdings are unchanged -- the

[13] I attribute the wording in the above quotation to Knight. In an April 1933 review of Hansen's book, *Economic Stabilization in an Unbalanced World* (1932), Knight (1933, p. 244) expressed the following view about the business cycle: "the devil in person could not have invented a device more obviously 'intended' than is commercial banking to increase the amplitude of any incipient swing by an indefinite amplitude."

system as a whole does not lose reserves from increasing its lending when the volume of reserves is increased; the *system* can lend by an amount equivalent to a *multiple* of the increase in reserves, thereby creating money.[14] It is this latter feature of a fractional-reserve banking system, the Chicagoans believed, that greatly amplifies the business cycle.

3. *Soddy on Money, the Trade Cycle, and 100 Percent Reserves*

In his book, *Wealth, Virtual Wealth, and Debt* (1926), Soddy distinguished between what he called "real wealth," which comprised physical objects such as buildings and machines, and what he called "virtual wealth," which consisted of money, and represented claims on real wealth.[15] Real wealth, Soddy argued, is subject to inescapable entropy laws of thermodynamics (*i.e.,* depreciation), while virtual wealth is subject to laws of mathematics, compounding at the rate of interest instead of depreciating. He believed that a major problem with the economic system is that the banks, through their lending activities, had taken over the power to create money from the government. He also believed that when a single bank makes a loan, the bank can multiply deposits up to the limit set by reserve requirements. Under a gold standard:

> the banker can safely lend part of his depositors' money; but what is not so clear is that he can lend many times as much as the [gold reserves] as the whole nation possesses -- in fact, create it to lend it at will …. Now the whole secret of the system is contained in the fact that when a bank creates a loan and lends £ 100 to a borrower, to do so it need only have £ 15 of its depositors' money, or whatever the 'safe' ratio may be (Soddy, 1926, p. 185).

Soddy went on to argue that, with an initial deposit of £ 100, and with a reserve ratio of fifteen percent, an *individual bank* can create an additional £ 566 of money. He also argued that, in practice, the amount of additional money that a bank can create is

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[14] Alternatively, a bank can increase its holdings of securities.

[15] See Daly (1980) for a discussion of Soddy's views on economics. Daly did not discuss Soddy's view of the trade cycle.

even larger because the reserve ratio is closer to seven percent than fifteen percent: "At least since, if not before, the War the figures suggest rather a 7 per cent 'safe' limit than 15 per cent. On this basis a client depositing £ 100 of cash in current account enables the bank to loan £ 1,330" (Soddy, 1926, p. 186).

Soddy believed that three main consequences follow from the power of banks to create money. First, the banks gain seigniorage; the interest paid by the borrower is a "cost to the community" which the banks are paid because they possess the power to create money (1926, p. 186). Second, "the community is robbed"; since demand deposits can be created much more rapidly than new physical wealth can be created, the creation of deposits leads to an excess of money relative to physical wealth, resulting in inflation. Third, the trade cycle is greatly amplified (1926, p. 188).

Soddy's trade-cycle theory was based on a transmission process emanating from changes in the supply of gold. Essentially, the author argued that injections and withdrawals of gold into and from the economy underpinned the cycle, and that fractional-reserve banking system amplified the cycle. In a country *without* a highly-developed banking system, the process operated as follows:

> Not only during the War, but also after the gold discoveries of last century, trade greatly flourished, and general prosperity resulted. Now this prosperity directly stimulates the luxury demand for gold for jewelry and ornament, and in countries— still the majority—without a highly developed banking system, for saving. Thus the money tends to disappear again, the stimulus due to abundance of money receives a check, and a period of depression ensues. Then these hoards and stores, before taken out of the circulation, tend to reappear and again help to inaugurate a boom. The trade cycle, in some part at least, must be due to the use of a metal as the basis of currency, which is gradually withdrawn as industry expands and comes back as it contracts, exactly the opposite to what is required of a currency. Even the ease with which the precious metals can be melted up without loss, and converted from coin to merchandise and back again an innumerable number of times at trifling cost, which has been held to make them especially suitable for coinage, is a fatal defect. Just as the industrial system has been laboriously tuned up to a higher level of production, the medium of exchange turns into an article of luxury, and with it goes the wave of prosperity (Soddy, 1926, p. 211).

In a country *with* a well-developed banking system, the ability of banks to create and destroy money greatly exacerbates the trade cycle:

> by the use of credit money, based upon a small proportion of gold, the quantity of money becomes subject to much greater and more violent variation than before, and the exchange value of gold in terms of goods oscillates. The causes which are inherent in the use of gold as a luxury article, as well as a medium of exchange, are greatly exaggerated, producing the trade cycle (Soddy, 1926, p. 212).

Soddy derived the following policy proposals from his economic analysis: (i) a constant price index to help prevent fluctuations in the purchasing power of money; (ii) flexible exchange rates to facilitate equilibrium in the balance of payments; and, (iii) 100 percent reserve requirements on demand deposits to moderate fluctuations in both the quantity of money and the price level, and to eliminate the seigniorage prerogative of the banks. With regard to the 100 percent reserves proposal, he stated:

> Banks create and destroy money arbitrarily and with no understanding of the laws that correlate its quantity with the national income. They have been allowed to regard themselves as the owners of the virtual wealth which the community does not possess, and to lend it and charge interest upon the loan as though it really existed and they possessed it. .... The banks should by law be required to keep national money, £ for £ of their liabilities for customers' "deposits" in current account [i.e., demand deposits] and only be permitted to lend money genuinely deposited into their keeping by its owners, who give up the use of it for the stipulated period of the loan and receive receipts in legal form (Soddy, 1926, p. 331).

Two points about Soddy's treatment of the business cycle warrant mention. First, Soddy did not spell-out a specific transmission mechanism through which fluctuations in gold flows are related to the business cycle. He simply argued that "the trade cycle ... *must* be due to the use of a metal as the basis of currency" (italics supplied) and that a fractional reserve banking system amplified the cycle. Soddy may have had a Hume-type price-specie-flow mechanism in mind, but, if he did, he did not spell it out. In contrast, the Chicagoan theory of the business cycle, which emphasized the role played by autonomous changes in the velocity of circulation of money, flexible product prices combined with sticky costs, and self-justifying expectations, exacerbated through the behavior of a fractional-reserve banking system, was a coherent and relevant explanation of the occurrence and depth of the Great Depression. Second, Soddy believed that an *individual bank* was the entity likely to create money equivalent to a multiple of an initial deposit. As shown above, the Chicagoans recognized that the banking system taken as a whole – but not an individual bank – possessed the capacity to multiply deposits on a given reserve base. I return to this issue below.

4. Knight and Simons on Soddy

Knight. In his review of Soddy's book, published in the *Saturday Review of Literature,* Knight (1927b) criticized Soddy's effort to contribute to the theory of wealth,[16] but praised that author's criticism of fractional-reserve banking. Knight began his review as follows: "Somewhat to the reviewer's surprise, this book has proven well worth the time and effort of a careful reading" (Knight 1927b, p. 732). With regard to Soddy's criticism of fractional-reserve banking, Knight stated:

> The practical thesis of the book is distinctly unorthodox, but is in our opinion both highly significant and theoretically correct. In the abstract, it is absurd and monstrous for society to pay the commercial banking system "interest" for multiplying several fold the quantity of medium of exchange when (a) a public agency could do it at negligible cost, (b) there is no sense in having it done at all, since the effect is simply to raise the price level, and (c) important evils result, notably the frightful instability of the whole economic system and its periodical collapse in crises, which are in large measure bound up with the variability and uncertainty of the credit structure if not directly the effect of it (Knight, 1927b, p. 732).

Knight pointed out, however, that Soddy seemed to be unaware of the fact that the idea underlying the 100 percent reserves proposal originated in the nineteenth-century debates between the banking school and the currency school; the English Bank Charter Act of 1844 had been a victory for the currency school, the members of

[16] Knight (1927b, p. 732) stated that "[Soddy's] effort to establish a conception of physical wealth ... must be briefly dismissed." Daly (1980), in contrast, had a positive appraisal of Soddy's work on wealth.

which argued that the issuance of new (unbacked) banknotes had been a major cause of English inflation in the early part of the nineteenth century. Thus, Knight (1927b, p. 732) stated that Soddy "has apparently never heard of the controversy over the banking versus the currency [school] principles." Knight concluded his review with the following statement: "in general it is a brilliantly written and brilliantly suggestive and stimulating book" (Knight, 1927b, p. 732), but Knight never again cited Soddy in his (Knight's) writings.[17]

Simons. Simons referred to Soddy on two occasions. The first was in an overlooked 1935 article published in the periodical, *The Christian Century*. The article was titled "Depression Economics"; it was a review of three books, one of which was Soddy's *The Role of Money*, published in 1934.[18] Much in line with Knight's (1927b) review of Soddy's 1926 book, Simons praised Soddy's advocacy of 100 percent reserves but was highly critical of Soddy's views on other economic issues. Regarding the former, Simons (1935, p. 1421) stated that "Soddy's conclusions and proposals ... merit intelligent consideration; and the supporting argument, when relevant, is often stimulating. So long as he sticks to the subject of banking, Soddy writes with considerable penetration." Regarding Soddy's views on economic issues more broadly, Simons (1935, p. 1421) stated: "Soddy's other [views] will be insufferable to critical readers. His critical comments on traditional economics indicate that he has read little and understood even less."

[17] Knight's review was published in April 1927. In a paper published in the March 1927 issue of the *American Economic Review, Papers and Proceedings*, he stated: " as the loans made by commercial banks in connection with created deposits form an important fraction of the total supply of capital in the world of trade and industry, the payment received by the banks for this alleged service of economizing gold and increasing the supply of exchange-medium (and I say advisedly 'alleged' service, as a further suggestion, without stopping to develop that idea either) the payment for this alleged service to the community takes the form of interest; ... It seems to me that the whole problem of the relation of commercial banking to the capital market is crying loudly for thorough examination" (Knight, 1927a, p. 121).

[18] The other two books were *The Money Revolution* (1934), authored by Charles Morgan-Webb, and *Moneyless Government* (1934), authored by Henry McCowen.

The second occasion on which Simons referred to Soddy was in a generally critical review of Hansen's 1938 book, *Full Recovery or Stagnation?*.[19] As previously mentioned, in that book Hansen prodded the Chicago group, along with other proponents of the 100 percent reserves proposal, for not giving credit to Soddy.[20] Hansen (1938, p. 111) stated: "Credit for originating this plan is usually given to a group of Chicago economists who circulated a mimeographed memorandum in 1933. It is strange that most of the leading writers on this proposal should quite overlook the fact that the 100 percent reserves plan had been publicized several years earlier by Sir Frederick Soddy." Hansen (1938, p. 112) then quoted Soddy's formulation of the 100 percent reserves proposal as stated in Soddy's *Money, Virtual Wealth, and Wealth*. An accompanying footnote listed four writers who had discussed the proposal who did not give credit to Soddy; among the names were those of Hart (a signatory of the March 1933 memorandum) and Simons.[21]

In his review of Hansen's book, Simons addressed Hansen's prodding of Simons and other proponents of the Chicago proposal for not acknowledging Soddy as follows: "since Hansen has chided us [i.e. the Chicago group] for not mentioning Soddy as an earlier proponent of 100 percent reserves, I must say that, while it is sometimes permissible to expound ideas without tracing out their historical antecedents, it is hardly appropriate, after one has brought up the matter in this instance, to stop with mention of Soddy!" (1939, p. 293). The sarcastic demeanor of Simons's "acknowledgment," with the clear suggestion that there had been antecedents other than Soddy, indicates that Simons did not regard Soddy as someone

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[19] Simons (1939, p. 275) expressed the view that: "[Hansen's] monetary theory, like that of Mr. Keynes, may not unjustly be characterized as a theory which attains to magnificent generality by being about nothing at all."

[20] Credit for directing me to the following exchange between Hansen and Simons belongs to Rockoff (2015).

[21] The other two writers cited by Hansen were James W. Angell and Fritz Lehmann. The latter writer was not an advocate of the 100 percent reserves idea.

who influenced the Chicago proposal for 100 percent reserves. If that was indeed the case, then why not?

5. *Why Knight, and Most Probably Simons, Originated the 100 Percent Reserve Scheme: The Evidence*

The preceding discussion has laid out the following facts: (1) Soddy proposed the 100 percent reserves scheme in his 1926 book, *Wealth, Virtual Wealth and Debt*; (2) Knight reviewed that book and praised the notion of 100 percent reserves; (3) Simons reviewed Soddy's 1934 book, *The Role of Money*, and, like Knight, praised the idea of 100 percent reserves; (4) the 1933 Chicago memoranda, which did not give credit to Soddy, advocated the 100 percent reserves scheme, and the scheme became identified with the Chicago group; and, (5) despite the vocal consternation of Soddy, supported by Hansen, the Chicagoans failed to give Soddy credit after 1933 for the origination of the 100 percent reserves scheme. Why not? In what follows, I provide evidence leading to the conclusion that Knight -- and most probably Simons -- originated the 100 percent reserves scheme prior to 1926.

1. Simons's letter to Fisher, January 19, 1934. In a letter to Fisher explaining the origins of the Chicago proposal, Simons wrote:

> I got started toward this scheme of ours about ten years ago, by trying to figure out the possibilities of applying the principle of the English [Bank Charter] Act of 1844 to the deposits as well as to the notes of private banks. The Act would have been an almost perfect solution of the banking problem, if bank issue could have been confined to notes (Simons, 1934b; quoted from Phillips, 1995, p. 67).

Two points about this letter merit comment. First, Simons stated that his thinking about the 100 percent reserves idea originated "about ten years" ago, which would have placed the origination date to the early part of 1924 (or late 1923, since the letter was written in January 1934), that is, prior to the publication year of Soddy's book. Simons's qualification with the adjunct "about," however, leaves the precise origination year subject to uncertainty. Second, Simons credited the inspiration for the idea to "the English Act of 1844," and not to Soddy. As mentioned, in his 1927 review of Soddy's *Wealth, Virtual Wealth, and Debt,* Knight had noted that Soddy seemed to have been unaware of the banking school-currency school debate that led to the Act. An implication of both Simons's letter to Fisher and Knight's 1927 review of Soddy's book is that the catalyst underlying the Chicago 100 percent reserves proposal was the English Bank Charter Act of 1844.

2. Knight on Soddy's Claim of Precedence. In a 1937 letter to Fisher, Soddy complained that the "Chicago group" had failed to give him (Soddy) credit for originating the 100 percent reserves proposal. Fisher communicated Soddy's complaint to Knight as follows.[22]

> Professor Soddy seems to be hinting that the Chicago group derived the 100% money idea from him, inasmuch as you had reviewed his "Wealth, Virtual Wealth and Debt" in 1927, and there are a few sentences in this book on a "L [pound sterling] for L" reserve. As I have been explaining to him that my idea of 100% money was largely due to the Chicago group's, I would be glad if you would tell me whether there is anything in his notion that it all traces back to him (Fisher letter to Knight, August 27, 1937).

Knight replied as follows.

> I completely disclaim getting the one hundred per cent money idea from Soddy or anybody else, as far as I am personally concerned. I was always skeptical about the theory of pyramiding, and think I have taught practically the one hundred per cent doctrine from the beginning of work as teacher, in 1917. Of course I always explain to classes that it was distinctly heterodoxy doctrine. I don't presume to speak for Simons, or any one else. (Simons was one of my "gang" in the elements course at Iowa City from about 1920 on, but may perfectly well have been infected with that idea before that, for all I know.) It is true that I reviewed Soddy's first edition, and expressed agreement with this phase of his doctrine; and, of course, I had not, and have not, published anything on the subject (Knight letter to Fisher, September 2, 1937).

3. The Iowa Connection. Knight taught at Cornell during the 1916-17 academic year and at Chicago during the 1917-19 academic years, before joining the faculty at

[22] The following exchange between Fisher and Knight was reproduced in Barber (1997, p. 4, footnote b).

the University of Iowa. He taught at Iowa from 1919 to 1927, before departing again for Chicago. At Iowa, Knight was initially an Associate Professor; he was promoted to Professor in 1923. Simons joined the University of Iowa faculty in 1920 as an Instructor, while also taking courses in economics; he was promoted to Associate Professor in 1924. While at Iowa, he became a disciple of Knight, becoming a member of Knight's "gang,"[23] and he followed Knight to Chicago in 1927. Another member of the Iowa faculty during the stints of Knight and Simons at that institution was Chester Arthur Phillips, who joined the faculty as a Professor in 1920; Phillips taught at Iowa until 1952. Knight taught a principles course for undergraduates, a history-of-thought course for both undergraduates and graduates, and a theory (methodology) course for graduates. Simons taught public finance for both graduates and undergraduates. Phillips taught mainly money-and-banking courses for both undergraduates and graduates.[24]

In 1920, Phillips published the book, *Bank Credit*, in which he made a major contribution to the banking literature. Phillips's (1920, p. 32) objective was to "draw a sharp line of distinction between credit extension by an individual bank, and that of banks taken in the aggregate." He succeeded in attaining that objective.[25] Specifically, Phillips "brought home to the economics profession the crucial distinction between the reserve loss of a [single] competitive bank that expands its loans versus multiple expansions by the banking system as a whole" (Humphrey, 1987, p. 8). Prior to the publication of Phillips's book, the "commonly held [view] by prominent banking economists ... [was] that the typical *bank* can use a given input of

[23] In a 1942 letter to Frank Fetter, Simons wrote of his relationship with Knight while at Iowa: "Knight was nearly perfect as an influence at the next stage [of my career]" (Simons, 1942).
[24] The exact teaching assignments varied from year to year. The information in the above paragraph is from the *Bulletin of the State University of Iowa* (various years).
[25] Schumpeter (1954, p. 1116) called Phillips's *Bank Credit* "a great stride" in the banking literature. Humphrey (1987) and Timberlake (1988) discussed Phillips's contributions.

reserves to multiply deposits .... Phillips's contribution was to show that those successive actions and reactions [of an initial increase in lending by a single bank] result in a system-wide expansion of deposits, even though any individual bank could expand its deposits only slightly" (italics supplied, Timberlake, 1988, p. 300).

Phillips's contribution would have certainly been known to, and discussed by, his Iowa colleagues, Knight and Simons; according to Rockoff (2015, p. 47), Phillips's book was on Simons's reading list at Chicago. As mentioned, the distinction between the reserve loss of a single bank that expands its loans versus the multiple system-wide expansion of deposits marked the analysis contained in the Chicago memorandum of November 1933 and helped differentiate that analysis from that of Soddy. The likely exposure of Knight and Simons to Phillips's work on that distinction, and its incorporation in the November 1933 memorandum, suggest that the thinking underlying the analysis about the role played by the banking system in exacerbating the business cycle in that memorandum originated prior to the publication of Soddy's 1926 book.

4. Business Cycles. There is, to my knowledge, a single, surviving document from Knight's teaching material while he was at Iowa. That document is an undated exam (or quiz), titled "Business Cycles," and it likely derives from Knight's principles course. Several of the questions refer to "the recent [economic] crisis." The United States economy experienced a sharp contraction in 1920-21. The contraction began in January 1920 and ended in July 1921; real output fell by 33 percent. Friedman and Schwartz (1963, p. 232) referred to that contraction as follows: "this contraction [although] relatively brief ... ranks as one of the severest on record." Since the document on "Business Cycles" refers to "the recent crisis," I conjecture that it was completed shortly after that episode -- that is, during the 1921-22 or the 1922-23 academic years.

The document consisted of thirty-six questions, most of which had multiple choice answers. A focus of the exam questions was on the role played by credit expansion and contraction in the business cycle. Seven of the questions pertained to that issue; another three questions concerned the behavior of the "bank rate of interest" during the business cycle. The seven questions pertaining to credit behavior are reproduced in the attached Table (with the numbering of the questions corresponding to that in the original document). The questions on the reserve ratio -- that is, reserves-to-deposits -- during the cycle (questions 15 and 23) indicate that Knight placed an emphasis on the creation and the destruction of credit during the business cycle since a mechanism through which credit contracts, for example, during the contractionary phase of the cycle is through deleveraging, or liquidation (question 8), as banks convert their loans into cash. In this connection, Friedman and Schwartz (1963, p. 244) referred to "businessmen's ... experience of loan liquidation in 1920-21."[26] Question 10 suggests that Knight thought that credit contraction played a critical role in the 1921-22 episode since students were expected to know the precise amount of credit contraction. One of the questions (number 7) hints that Knight may have discussed the possibility of regulating bank credit to control the business cycle. Clearly, the exam questions suggest that, in the first half of the 1920s, Knight had been thinking about the role played by the banking system in the business cycle.

5.1 Discussion

The foregoing discussion pertaining to the origin of the Chicago 100 percent reserves proposal has laid out the following, additional evidence.

[26] Friedman and Schwartz (1963, p. 235) also stated that: "The [1920-21] contraction was accompanied by a sharp curtailment in customer loans by member banks ... [and] a sharp increase in bank failures."

- First, in his 1927 review of Soddy's book, Knight noted that Soddy had not recognized that the idea underlying 100 percent reserve requirements featured in the nineteenth century debate between the banking school and the currency school. As mentioned, the currency school's victory in that debate culminated in the English Bank Charter Act of 1844, although the emphasis of that Act was on reserves for currency instead of reserves for demand deposits.
- Second, Simons used the occasion of a 1934 letter to Fisher to attribute the inspiration for the Chicago 100 percent reserves proposal to the English Bank Charter Act of 1844. Simons did not mention Soddy in that letter. Simons's comment about when he began thinking about the proposal indicated that his thinking predated the year of publication of Soddy's book.
- Third, in his 1937 letter to Fisher, Knight categorically "disclaimed" the suggestion that he got the 100 percent reserves proposal from Soddy. By explicitly stating in his letter that Simons was "one of my gang" in the "elements" [*i.e.*, principles] course, Knight placed Simons in a position to verify the veracity of Knight's statement that he (Knight) "taught practically the one hundred percent doctrine" at Iowa.
- Fourth, even discounting the claims of origination in the above-cited letters of Simons and Knight, the indirect evidence from the early-1920s pertaining to what would emerge as the Chicago framework about the role of the banking system in exacerbating the business cycle and the distinction in that framework between the effects of the banking system versus those of individual banks on the cycle, suggest that Knight, and most probably Simons, had thought about the destabilizing effects of fractional-reserve banking prior to the publication of Soddy's book. As mentioned, a feature that distinguishes the business-cycle theory underlying Soddy's proposal from that underlying the Chicago proposal is the difference between the effect of credit expansion by a *single bank* and the effect of credit expansion by the *banking system*. The Chicagoans differentiated -- but Soddy did not -- between (i) the capacity of the banking system as a whole to multiply deposits on a given change in the reserve base and (ii) the behavior of an individual bank, which tended to be constrained in its lending by the amount of new funds received (apart from an amount retained as reserves.) The origin of that crucial distinction is Phillips's

1920 book. That distinction would have been known to that author's Iowa colleagues, Knight and Simons.

- Fifth, Knight emphasized, probably in 1921-22 (if not earlier), the role of credit expansion and contraction, working through changes in the reserve ratio, in exacerbating the business cycle in his principles course at Iowa. In the early-1920s, Knight also appears to have considered regulating bank credit to control the business cycle.

5.2 Why Wasn't Soddy's Work Cited?[27]

Even though Soddy's work did not influence the development of the Chicago Plan, why was it not cited in the 1930s Chicago literature as a matter of standard professional courtesy? After all, Soddy's 1926 book had been reviewed -- receiving mixed assessments -- in several professional journals shortly after its publication. In a generally-critical review in the *Economic Journal*, Roy Harrod (1927, p. 272) wrote: "In his destructive passages Mr. Soddy does not appear to have a sufficiently firm grasp of the economic doctrines commonly held by present or earlier writers to make his criticisms pointed or telling." A similar view was expressed by A. G. Silverman (1927, p. 277) in a review in the *American Economic Review*: "[Soddy's] proposed solutions [*i.e.*, 100 percent reserves and elimination of private issuance of money] … seem to involve evils greater than those connected with our present system." James Angell, who in the mid-1930s would become an advocate of 100 percent reserves, reviewed the book -- generally favourably -- in the *Political Science Quarterly*. Paradoxically, given his subsequent views, Angell was critical of Soddy's specific proposal of 100 percent reserves because, according to Angell "it rests on a familiar misunderstanding of the nature of banking and of the actual limits on the volume of lending" (1927, p. 623). The *Times Literary Supplement,* (*London Times*, 1926, p. 565) also reviewed Soddy's book. Daly (1980, p. 471) reported that the

[27] The following discussion has benefitted from the thoughtful comments of a referee.

content of that review included the following: "[It is] sad to see a respected chemist ruin his reputation by writing on a subject about which he was quite ignorant."

There are several possible reasons for the absence of references to Soddy's work in the 1930s Chicago literature on 100 percent reserve requirements. First, the Chicago documents that launched the 100 percent reserves scheme in 1933 were memoranda -- not articles published in scholarly journals in which citations to the previous literature would have been expected. Second, an absence of citations to previous works by Simons was just his way of doing things; most of his well-known papers are more like policy memos than conventional journal articles, and contain few references. Thus, Bordo and Rockoff (2013, p. 17) pointed out that "Simons generally did not waste a lot of ink citing his predecessors." In contrast, in his scholarly 1945 book, *A History of Banking Theory*, Simons's Chicago colleague Lloyd Mints, did cite Soddy as a proponent of the 100 percent reserves scheme (Mints, 1945, p. 290).[28] Third, Soddy was viewed as an outsider by the economics profession and, with justification, a crank. He considered economics to be "a pseudoscience in need of a totally new beginning" (Daly, 1980, p. 471). He argued that an international conspiracy of bankers sought to establish global dominance (Soddy, 1926, Chapter 14).

6. Simons's Misgivings and the 2007-08 Financial Crisis

By early 1934, Simons began to express misgivings about the practicality of the 100 percent reserves scheme in the presence of financial-market innovation. In a January 1934 letter to Douglas, he wrote that he had been:

> a little upset lately about the banking scheme – trying to figure out how to keep deposit banking from growing up extensively outside the special banks with the

[28] Among the other proponents cited by Mints, were Fisher and Simons. The scholarly character of Mints's book is reflected in the fact that the bibliography contains over four-hundred references to authors and to over six-hundred works. On Mints's contributions to monetary economics see Dellas and Tavlas (2019).

> 100% reserves. Just what should be done, for example, to prevent savings banks (a) from acquiring funds which the depositors would regard as liquid cash reserves or (b) from providing through drafts a fair substitute for checking facilities? (Simons letter to Douglas, January 24, 1934c).

In a July 1934 letter to Fisher, Simons expressed his concern that the imposition of 100 percent reserve requirements would cause risks to migrate to other parts of the financial system:

> In fact, I am more and more convinced of the importance of the point on which we seemed somewhat do disagree. Much is gained by our coming to regard demand deposits as virtual equivalents of cash; but the main point is likely to be lost if we fail to recognize that savings-deposits, treasury certificates, and even commercial paper are almost as close to demand deposits as are demand deposits to legal-tender currency. The whole problem which we now associate with commercial banking might easily reappear in other forms of financial arrangements. There can be no adequate stability under any system which permits lenders to force financial institutions into effort at wholesale liquidation, and thus to compel industry to disinvest rapidly -- for orderly disinvestment on a large scale is simply impossible under modern conditions (Simons letter to Fisher, July 4, 1934d).

Simons's concerns about the potentially-destabilizing role of nonbanks presaged a major characteristic of the 2007-08 financial crisis. Financial innovation has led to the development of financial institutions that can offer commercial-banking-type services without being subjected to the regulations applying to commercial banks. The runs on financial institutions during that crisis were not on commercial banks, but on such institutions as mutual funds and investment banks. This episode suggests, as Simons fully recognized, that 100 percent reserve requirements on commercial banks' deposits may not be sufficient to prevent financial crises. Simons's solution to the problem of runs on nonbanks was to ban short-term-debt issuance by nonbanks.[29]

A recent proposal to create a "narrow bank" would be a market-driven implementation of the Chicago Plan. With the Fed now paying interest on banks' deposits, under the proposal the narrow bank would not make any loans; instead it

[29] I am grateful to a referee for this insight.

would put all its customers' deposits into an interest-bearing account at the Fed (Cochrane, 2018). To cover costs and profits, the narrow bank would pay a slightly lower rate of interest to its depositors than what the Fed pays on reserves.[30]

7. *Concluding Remarks*

Simons's solution to the problem posed by the existence of financial assets that, like demand deposits, were seen as stable and safe was to propose a reform of the financial system in a way that would reduce the quantity of near-monies and the instability of the debt structure.[31] He continued to advocate the 100 percent reserves scheme throughout the remainder of his lifetime, but only within the context of a long-term, fundamental reform of the financial system.

With Simons expressing misgivings, Fisher picked up the mantle of the policy agenda.[32] His efforts continued almost until his death on April 29, 1947; while in a terminal stay in a hospital, on March 27, 1947, he wrote a letter to President Harry S. Truman, urging "a law which will sever the tie that now binds bank loans to the volume of checkbook money" (quoted from Allen, 1993, p. 715). Knight never again referred to the scheme in print after his 1927 review of Soddy's book. Other Chicagoans continued to support the 100 percent reserves scheme; it was supported in the 1930s by Douglas (1935; see also Douglas *et al.*, 1939) and Hart (1935), in the 1940s by Mints (1945; 1946), and from the late-1940s onward by Friedman (1948).[33]

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[30] The application to create a narrow bank was brought to the Federal Reserve Bank of New York in 2018. In March 2019, New York Fed issued a statement that "it has serious concerns" about the narrow bank's business model (see Derby, 2019).

[31] For example, Simons (1936) recommended that the government should issue only two kinds of debt -- currency and consols.

[32] In contrast to Simons, Fisher believed that the velocity of circulation of money would be stable, even in the presence of near-money substitutes like savings deposits should the money supply be brought under control. On the differing views of Fisher and Simons on the 100 percent reserves scheme, see Dimand (1993), Phillips (1995) and Demeulemeester (2018).

[33] Hart's (1935) support of the scheme was lukewarm. Friedman's views on the 100 percent scheme were discussed by Nelson (2013; 2018) and Lothian and Tavlas (2018). Tobin (1985) also supported the 100 percent reserves scheme.

The idea of 100 percent reserve requirements has gained adherents on the occasions of major financial crises. It received a renewed impetus following the 2007-08 financial crisis; recent advocates of the idea include Benes and Kumhof (2012), Wolf (2014) and Cochrane (2016). For example, Cochrane would apply the scheme to bank-like entities, such as money-market mutual funds; such entities would be allowed to invest only in short-term debt issued by the Treasury or the Fed. In June 2018, the idea of 100 percent reserves on demand deposits was the subject of a national referendum in Switzerland.[34] As mentioned at the outset, however, there is presently a widely-held view that Chicago economists took over the idea from Soddy in 1933. On the basis of the evidence presented in this paper, I conclude that, for Knight, and very probably for Simons, the principle underlying the English Bank Charter Act of 1844 was the wellspring of their advocacy of one-hundred-percent reserves against demand deposits -- an idea that aptly came to be known as the Chicago Plan of Banking Reform. Further, I contend that their advocacy of this policy prescription, based on the potentially-destabilizing effects of the multiple-deposit expansion and contraction that can occur under a fractional-reserve banking system, predated the publication of Soddy's *Wealth, Virtual Wealth, and Money* in 1926.

[34] The 100 percent reserves proposal was defeated in the referendum.

Table: Frank Knight's Exam on the Business Cycle: Questions Related to Credit

Number (as listed in the original)	Question
4	Rank the following in the order of their sensitiveness or amount of change they undergo (A) Retail Prices (B) Wholesale Prices (C) Interest Rates (D) Bank Loans and Deposits (E) Physical Production
6	The main direct cause of the business cycle is (1) Over-expansion and collapse of bank credit (2) Over-production of certain basic commodities (3) Waves of business optimism and pessimism (4) Variation in farm crops (5) Speculation
8	By "liquidation" is meant (1) Making of loans by business men to tide over a crisis (2) Payment of debts out of income (3) Payment of debts by sale of property (4) Reduction of debts by mutual cancellation (5) Reduction of debts to banks by long-term financing
10	Reduction in total volume of bank loans [in the recent crisis] was...
15	*During the period of liquidation,* the reserve ratio in banks is (1) Increasing (2) Decreasing (3) Constant (original italics)
23	During the *Boom* period of the cycle, the reserve ratio in banks is (1) Increasing (2) Decreasing (3) Constant (original italics)
36	The most hopeful method of controlling the business cycle is (1) To undertake public works during depression (2) To regulate the issue of bank credit (3) To provide unemployment insurance for wage-earners (4) To disseminate information regarding business conditions

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