



On the social usefulness of fractional reserve banking



V.V. Chari, Christopher Phelan*

University of Minnesota and Federal Reserve Bank of Minneapolis, United States

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ABSTRACT

In this paper we argue that if monetary policy has insufficient deflation, private agents have incentives to set up alternative payment systems like fractionally backed bank deposits, which pay interest on the means of payment. In a competitive environment with free entry, these alternative systems are inherently fragile in the sense that they are subject to socially costly bank runs. These social costs are not internalized by private individuals and banks and may exceed their social benefits. We argue that as communication technologies improve, the social benefits of fractional reserve banking decrease, but the private benefits may still exceed the private costs so that such systems continue to be used. In such situations, 100% reserve requirements are optimal.

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1. Introduction

Fractional reserve banking is, to put it mildly, problematic. Banks with fractional reserves are subject to runs and panics with arguably enormous external effects. Further, banks are costly. Even abstracting from runs and panics, the banking sector uses up real resources — labor and capital — which could be put to alternative uses. But fractional reserve banking is also ubiquitous. It appears to occur throughout history, with or without bailouts, making it difficult to argue that this ubiquity is due simply to bailouts or government subsidies. Usually, the ubiquity of an economic arrangement itself implies that this arrangement serves a valuable social purpose. Historically, one such purpose is that banks have allowed individuals and firms to pay for goods and services through their provision of bank checks and other widely accepted claims. Therefore, those individuals and firms have not had to resort to costly barter or non-interest-bearing specie trade.

The observation that individuals and firms voluntarily choose to use bank deposits backed by fractional reserves as means of payment clearly implies that these deposits serve a *privately* useful function. Here we argue that the use of such bank deposits may have *social* costs and that these social costs may exceed the private benefits from creating private payment systems. We go on to argue that if technological changes allow households to access all their wealth more easily (or less expensively) when needed, the social benefits net of social costs associated with fractional reserve banking decreases. Nevertheless, fractional reserve banking may survive even when it is inefficient. Technological changes now allow households to more easily access their wealth to make transactions. Thus, now or in the near future, the benefits of fractional reserve banking may no longer justify its associated cost to society.

The core of our argument rests on two simple ideas. If monetary policy has insufficient deflation, private agents have incentives to set up alternative payment systems like fractionally backed bank deposits, which pay interest on the means of payment. In a competitive environment with free entry, these alternative systems are inherently fragile in the sense that

* Corresponding author.

they are subject to bank runs, which impose social costs. These social costs are not internalized by private individuals and banks. Whether a fractionally backed bank deposit like system is socially desirable then comes down to a comparison of the benefits stemming from the higher interest rates on bank deposits to the social costs from bank runs and other costs associated with banking.

We develop these arguments using a means-of-payment-in-advance model similar to that of [Lucas and Stokey \(1987\)](#). A key difference is that we allow for privately produced means of payment. We assume that these private means of payment must be risk-free debt-like claims. This assumption is intended to capture the idea that sellers may be unwilling to accept risky means of payment. This assumption also captures the idea that historically, widely accepted means of payment consisted of debt-like claims. We refer to issuers of these claims as banks and allow banks to hold capital or currency to back up their debt claims. We show that a competitive banking system is inherently fragile in the sense that if an individual depositor believes all other depositors will run on a bank, it is optimal for that depositor to do so as well. Thus, bank runs occur in equilibrium. We capture the costs of bank runs by assuming that if a bank suffers a run, the capital it holds does not yield any return. These assumptions imply that a means of payment system in which banks hold capital has social costs.

In our model, banks face a reserve requirement that dictates the minimum fraction of their assets that must be held in the form of currency. We show that, depending on parameters, our model has either a currency equilibrium in which fiat currency is used for all transactions and banks play no role, or a banking equilibrium in which deposits are used for all transactions and banks hold all the currency. If the inflation rate is sufficiently high and the banking technology is not too costly, our model has a banking equilibrium in which banks hold both currency and capital. Banks purchase this capital from households by issuing deposits. To see why individual households find it optimal to sell capital to banks when all other households are doing so, note that in a fractional reserve equilibrium, deposits are a multiple of the outstanding currency stock, raising the price level compared with a currency equilibrium. This higher price level implies that each individual household must also sell capital to a bank to afford its level of consumption. That is, when a household switches from using currency to using fractionally backed deposits, it does not take into account that its shift from currency to deposits causes an increase in the price level, thereby inducing other households to switch as well.

At a subtle theoretical level, competitive equilibria are inefficient because the price of consumption goods enters the consumption sets of households through the means-of-payment-in-advance constraints. Since prices enter consumption sets, the usual welfare theorems do not hold and competitive equilibria are not necessarily efficient. If the monetary authority follows the Friedman rule, the means of payment constraint is slack and the welfare theorems hold. If the monetary authority deviates from the Friedman rule, equilibria are inefficient.

This inefficiency implies that private agents have incentives to set up interest-bearing private means of payments such as deposits. The debt-like feature of deposits leads to another source of inefficiency. This source arises when our model has a banking equilibrium in which banks hold capital. Banks use the income generated by productive capital to pay interest on deposits. We assume that bank runs disrupt the ability of bank managers to generate income from the productive capital they hold. This disruption implies that banks are necessarily fragile in the sense that if all depositors demand their funds, they will not be able to meet the interest obligations on their deposits. Thus, if all other agents demand their deposits, it is rational for any given individual to do so as well, so that bank runs are an ever-present possibility. The loss of income from capital deployed in banks is a cost imposed on society and is the additional source of inefficiency.

We also assume that households in our model can access their wealth and circumvent the means-of-payment-in-advance constraints with some probability. We model technological improvements in communication technologies by assuming that the probability of being able to access their wealth increases and becomes less costly. If the probability of accessing wealth is sufficiently high and the cost of doing so is sufficiently low, our model can still have a fractional reserve banking equilibrium. In such cases, a policy of raising the required reserve ratio to 100% raises welfare.

The key policy implication of our analysis is that if the social benefits of fractional reserve banking are less than the social costs, it is desirable to induce banks to hold less capital. Such inducements and the associated increase in efficiency can arise by regulation (such as increasing reserve requirements) or by paying interest on currency reserves held by banks. See [Goodfriend \(2002\)](#) for related arguments on the desirability of paying interest on reserves.

Our paper is related to a large literature on money and banking. Our paper has in common with [Aiyagari et al. \(1998\)](#) that private money creation uses real resources so that inflation stimulates the demand for private money and has real costs. They focus on the welfare costs of inflation, whereas our focus is on examining the benefits and costs of changes in reserve requirements. Our paper is also related to [Monnet and Sanches \(2011\)](#), who show, among other results, that 100% reserve requirements may be undesirable. Their result derives from the lack of commitment of bankers to repay depositors. We also show that 100% reserve requirements may be undesirable, but our results derive from comparing the costs of private money creating with the insurance benefits associated with private money. [He et al. \(2005\)](#) develop a search model of fractional reserve banking, where, like our model, fractional reserve banking occurs in equilibrium, but they do not focus on welfare implications.

Other papers (see, for example, [Gu et al., 2013](#)) have developed theories of banking using mechanism design approaches. Almost by construction, such theories imply that allocations are efficient. Although we believe that such an approach is highly useful, in our paper we focus on inefficiencies that could arise when private and social interests do not coincide.

Finally, our paper is related to an extensive literature on the so-called pecuniary externalities that arise when prices enter consumption or production sets. See, for instance, [Kehoe and Levine \(1993\)](#), [Kiyotaki and Moore \(1997\)](#), [Lorenzoni \(2008\)](#), and [Hart and Zingales \(2011\)](#). Perhaps the most closely related of these papers is [Hart and Zingales \(2011\)](#), who develop a

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