THE CAUSES OF PRICE INFLATION & DEFLATION: FUNDAMENTAL ECONOMIC PRINCIPLES THE DEFLATIONISTS HAVE IGNORED

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1. Introduction

IN OCTOBER 2008, IN RESPONSE TO THE FINANCIAL CRISIS, the Federal Reserve began a massive expansion of the monetary base. In a period of only two months commercial bank reserves leaped from $45B to over $600B, an astounding increase of over 1200%. Despite the fact the money supply has steadily grown since then, a number of commentators, purportedly sympathetic to the Austrian school, have doggedly clung to a prediction that prices-in-general will continue to fall. According to these authors, price deflation in the wake of the financial crisis was caused by an immense credit contraction, and prices cannot rise again unless credit expands, a prospect they see as unlikely.

In the deflationists' view, "credit" is the all important factor that affects prices-in-general. Even though commercial bank reserves have expanded exponentially, the deflationists see little possibility of either monetary or price inflation, because credit has remained scarce, and is likely to remain so. Boyapati (2010) even calls into question the notion that an expanding monetary base encourages banks to issue additional quantities of fiduciary media. According to that author, for many years banks have had the ability to issue credit virtually at will, using a variety of methods to lower the reserve requirement close to zero, and thus an increase in bank reserves does not pose any particular threat of credit expansion—and hence monetary

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inflation—that did not already exist. Indeed, says Boyapati, an empirical analysis of commercial bank lending suggests the causality between a change in the amount of reserves and that of credit is in fact *reversed*, and therefore it is very unlikely prices will rise.

There are numerous faults with these arguments. First, is the notion that a change in the quantity of credit is the most important factor affecting prices when in fact there are other elements at play, such as the reservation demand for money, which have all but been ignored. Credit is but one factor affecting the money supply, which is itself one factor affecting prices. Thus it is *not* conclusive that a credit contraction was the principal cause of the price deflation following the events of 2007 and 2008, and it is not inevitable that prices can only rise again when credit expands.

Second, is the failure to distinguish between the effects of different types of credit on the money supply. Credit arising out of the fractional reserve process—which Mises termed circulation credit—produces fiduciary media and *does* affect the money supply whereas credit that arises out of genuine time deposits *does not*.[1] Yet the deflationists have an unfortunate tendency to lump all credit together in this regard and blithely assume the effects are the same.

Third, is the notion that because banks in the recent past have been able to lower their reserve requirements close to zero, expansions of the monetary base are immaterial. For while it is true that banks have been able to use a variety of methods to circumvent the legally mandated reserve ratio on demand deposits, it is not true to say they have been able to reduce their needed reserves to *exactly* zero. Therefore, the required reserve ratio is still a limiting factor on the amount of fiduciary media that can be issued, and an expansion of reserves—of several orders of magnitude—grants banks an unprecedented ability to expand the money supply, an ability they would otherwise not have.

Fourth, is the use of empirical analysis to suggest the causality between changes in the quantity of reserves and that of credit is reversed. This is doubly dubious because (a) an analysis of historical data is a poor method of determining any kind of economic principles, and (b) the empirical analysis itself is flawed because no attempt is made to distinguish between the different forms of credit in analyzing the data. Even if it is possible to demonstrate that expansions and contractions in the level of credit historically have taken place prior to changes in the level of reserves, this

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[1]For an analysis of the distinction between circulation credit and commodity credit (credit arising out of genuine time deposits), see Mises (1953) pp. 263–65.

observation neither vitiates the money multiplier theory, nor renders the fractional reserve process obsolete, if some of the observed changes occur in a type of credit that does not produce fiduciary media.

This is not to say the deflationists predictions will necessarily turn out to be in incorrect. After all, unforeseen external influences can always intervene to make just about any outcome possible. However, by applying faulty economic theory to the data, the *rationale* for their arguments is deficient. Economic theorizing and explicating economic events, are separate disciplines, but the latter must rest on a sound theoretical foundation. Unfortunately, to the extent the deflationists use any economic theory at all, it is often incorrect and not clearly differentiated from either their historical account or their prognostications.

It should be mentioned that economic theory involves deducing non-quantitative laws *a priori* of the type, *ceteris paribus* if A then B, without reliance on the use of empirical data. Provided the reasoning is correct, such propositions are always apodictically certain because the theorist—that is, the economist *qua* economist—assumes all other exogenous variables are held constant. Explaining economic events, on the other hand, is the work of the economist qua historian or forecaster. It involves selecting the appropriate data, and then using chains of reasoning that employ the relevant economic laws, to arrive at a plausible argument.

The conclusions drawn by the economic historian or forecaster can never be absolutely certain. Even though the laws they apply must be absolutely true, the inclusion of specific causal factors, and the assessment of their relative importance, rests on personal judgment and understanding.[2] Moreover, while the historian has a set of existing data available to him, the forecaster has no certain knowledge of the future external influences that will be brought to bear. Anticipating these influences lies well outside the realm of economics, relying on an understanding of such things as the political, psychological and technological conditions of the market.

While neither the historian nor forecaster can ever say with certainty that the set of conditions, A, definitely caused B, or will cause B, the theory that is used to support the analysis must be sound if the overall argument is to be persuasive. The economic laws employed, and the chains of reasoning applied, must be logically correct.

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[2]As such, an analysis of history can never be used to prove or test any economic theory; it can only be used to illustrate it. On this point, see Rothbard (1997A) pp. 58-77 and Mises (2007).

For this reason, a major part of the present article is devoted to a discussion of the causes of price inflation and deflation from a *theoretical* perspective, particular attention being paid to money and banking. Sections 2 through 4 examine the factors that cause prices-in-general to change, while section 5 looks at the factors that cause prices to change in certain sectors of the economy, particularly during booms and recessions. The purpose is not to provide an all-encompassing account of the Austrian theory of prices or of Austrian business cycle theory; rather it is to present a simple theoretical framework that can be used to interpret the data. In section 6, the theory is applied to recent economic data, to provide an historical analysis of the major price movements since the onset of the credit crisis. In section 7, some possible future scenarios are discussed. Section 8 concludes.

2. Factors Affecting Prices-in-General

What is meant by the terms inflation and deflation? Much confusion arises from the fact that many mainstream economists use these terms to describe a rise and fall in prices, whereas those in the Austrian School adhere to the original definition, namely, a rise and fall in the quantity of money. Unfortunately, the mainstream definition, by focusing on prices, obscures the fact that it is changes in the money supply that often *cause* changes to prices.[3] In the present article, the terms "monetary" inflation/deflation or "price" inflation/deflation shall be clearly stated to avoid any possible confusion.

At the outset it is important to point out there is no single number that can be assigned to a so-called price level, or to its inverse the purchasing power of money.[4] The price of each good is expressed in terms of the quantity of the monetary unit *per* unit of that good; for example, $2 *per* pound of apples or $500 *per* television set or $500,000 *per* house and so on. The problem with a price level is there is no meaningful way to express an average price of two or more different goods, because while the numerator is always expressed in terms of the monetary unit alone, the denominator is expressed in terms of a unit that is different in every case. We cannot average $500 per television with $10,000 per car, or with $2 per pound of apples, because televisions, apples and cars have different units.

Therefore the terms "price inflation" and "price deflation" when applied to the economy as a whole refer not to a single price level, but rather to an *array* of prices for all the goods and services on the market, and to the

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[3]For a discussion on how these terms came to be used by mainstream economists in this way, see Salerno (1999).

[4]See Rothbard (1997B).

concept that, *in general,* they move in a certain direction, though individually not necessarily in the same direction.

Indexes, such as the CPI and the PPI, which represent baskets of goods can be indicative, but they are never definitive, of prices in general because the goods selected and their relative importance within the index are arbitrary. At times, it might even be difficult to ascertain the trend when analyzing the data. Certain price movements might be obvious within particular sectors of the economy, but not so others. So, for example, there might be price deflation within the electronics industry, and price inflation in real estate, while the prices of most other goods and services might appear more or less neutral.

From a theoretical perspective, however, it is possible to deduce the direction of the general level of prices following a change in a specified exogenous factor, ceteris paribus. At the most fundamental level, the prices of all goods are determined by their individual demand and supply schedules. Exchange demand is a factor of increase on prices, and supply a factor of decrease on prices. It is not logically possible to aggregate supply or demand schedules, for the economy as a whole, and thus determine a unique price level for goods-in-general. Nevertheless, provided it is always borne in mind that we are referring to an array of prices, it is possible to say that, in general, the *exchange demand* for goods consists of the stock of money minus the reservation demand for money; therefore, the stock of money is a factor of increase on prices, ceteris paribus, and the reservation demand for money, a factor of decrease, ceteris paribus. And the *supply* of each good consists of its stock minus its reservation demand, if any; therefore, the stock of goods is a factor of decrease on prices, and the reservation demand for goods is a factor of increase.[5] As stated by Rothbard (2004) p. 817:

> Whether we treat one good or all goods, the price or prices will increase, ceteris paribus, if the stock of money increases; decrease when the stock of the good or goods increases; decrease when the reservation demand for money increases; and increase when the reservation demand for the good or goods increases.

The diagrammatic exposition in Figure 1 illustrates the foregoing principles.[6]

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[5]The terminology "factor of increase" and "factor of decrease" are the same that Rothbard (2004) uses. The terms "positive correlation" and "negative correlation" have been avoided since they do not make clear which is the antecedent and which is the consequent.

[6]See also Salerno (2006) for a discussion of a model demonstrating this same principle.
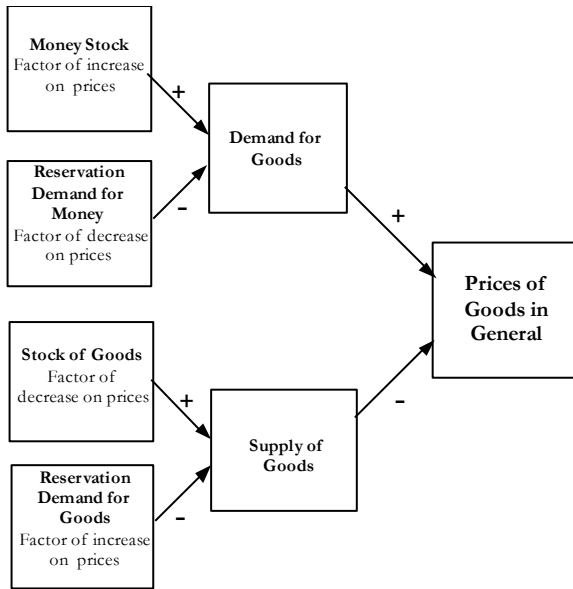
Figure 1

Arrows indicate cause and effect between the antecedent factor and its consequent.

 "+" indicates the consequent follows in the same direction as the antecedent and "-" indicates the consequent and antecedent move in opposite directions. Note that they follow the rule of negation. For example, the reservation demand for goods is a factor of decrease on the supply of goods, which in turn is a factor of decrease on prices Therefore, the reservation demand for goods is a factor of *increase* on prices. (two negatives make a positive.) On the other hand, the reservation demand for money negatively affects the demand for goods, which in turn positively affects prices. Therefore the reservation demand for money negatively affects prices. (a negative and a positive make a negative) etc.

Referring to the diagram above, there are four principal factors that affect the prices of goods-in-general. They are: *the total stock of money, the reservation demand for money, the total stock of goods, and the reservation demand for goods.* The next two sections are devoted to discussing the variables that affect the money stock and the reservation demand for money. Particular attention

is paid to the banking system, the different forms of credit, and their effect on the money stock.

3. Factors Affecting Prices-in-General: The Money Stock

The money stock, or money supply, is the total amount of money in the economy. Money is the medium of exchange for which all other goods are traded, and in a fiat system is the total amount of currency in circulation—i.e. coins and federal reserve notes—plus money substitutes. Money substitutes are forms of money that are redeemable on demand for currency at par value. They include any financial instrument or any account in which the depositor can demand payment instantaneously "on-demand" for cash.[7] Demand accounts include checking accounts held at commercial banks, credit unions, thrifts and other financial institutions. But do they also include savings and share accounts?

In years gone by, savings deposits were not instantaneously redeemable; a depositor had to wait a certain number of days before withdrawal could be made. Today, however, virtually all savings accounts are on-demand, and thus legitimately can be considered money.[8] On the other hand, deposits held in accounts which are not instantaneously redeemable cannot be considered money. Thus, genuine time deposits, or any account or financial instrument in which the depositor relinquishes ownership for a specified period of time, and is unable to redeem the funds at par until the term expires, is not money.

Rothbard (1978) and Salerno (1987) have each attempted a precise definition of the money supply from an Austrian perspective, listing the elements that constitute money or money equivalents.[9] Their definitions are broadly similar and are tabulated below:

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[7]See generally Mises (1953), Rothbard (1978), Salerno (1987).

[8]For a contrary opinion on savings deposits, see Shostak (2000).

[9]Shostak (2000) and Evans & Baxendale (2010) have provided Austrian definitions of the money supply which omit savings accounts. They do so on the grounds that claims on dollars held in these accounts, even if they are redeemable on demand, do not act as a final payment on goods and services, and as such do not circulate in exchange. However, the present author sides with Salerno and Rothbard in this regard, in that this argument is beside the point. When assessing the money supply from an *economic* perspective, rather than a purely definitional one, savings deposits should be included as money precisely because of their on-demand redeemabilty. If depositors can transfer funds to checking accounts, or withdraw them in the form of cash, and do so instantaneously without any required period of waiting, the deposit acts like money, and as such must be included in the money supply.

Currency in circulation	Salerno / Rothbard
Checking accounts at commercial banks Rothbard[10]	Salerno/
Checking accounts at savings banks/credit unions & thrifts	Salerno / Rothbard
Savings accounts at commercial banks	Salerno / Rothbard
Savings accounts at savings banks/credit unions & thrifts	Salerno / Rothbard
U.S. Savings bonds	Salerno / Rothbard
Govt demand accounts at commercial banks and the Fed	Salerno / Rothbard
Foreign institutional accounts at comm banks and the Fed	Salerno
Foreign bank demand accounts at comm banks and the Fed	Salerno
Money market deposit accounts	Salerno
Overnight repurchase agreements	Salerno
Overnight eurodollar accounts	Salerno
Instantaneously redeemable small denomination time deposits/CDs	Rothbard[11]
Cash surrender value of life insurance policies (not term)	Rothbard

Excluded from both definitions:

> Large denomination time deposits
>
> Small denomination time deposits not instantaneously redeemable
>
> All corporate and government bonds except U.S. Savings bonds
>
> Term repurchase agreements
>
> Term eurodollar accounts
>
> Traveler's Checks
>
> Treasury securities
>
> Money market mutual funds[12]

Some obvious omissions from Rothbard's definition are demand deposits held by foreign official institutions and foreign commercial banks, and money market deposit accounts (MMDAs), although to be fair, MMDAs were not widely prevalent at the time he penned his article. Rothbard includes small denomination certificates of deposits, and the cash surrender value of

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[10]Interestingly, Rothbard argues that accounts (held at commercial banks) owned by savings and loan banks and other non-bank money creators act as the reserves for their customers' demand accounts, and thus to include them would be double counting, although this is a minority view.

[11]Cash surrender value.

[12]Most Austrian economists do not include MMMFs as money. However, for a contrary opinion see Haymond (2000).

life insurance policies, on the grounds they can be instantaneously redeemable.[13] However, among Austrian economists he stands virtually alone in including them as money. Most authors exclude them, because to the extent they are redeemable prior to the expiration of the term, it is always at a discount to par value.

An essential point to realize is that deposits act like cash as long as market participants *believe* they are redeemable on demand at par value. It is not required that they all *actually* have to be redeemable. As Rothbard (1978) points out:

> It might well be objected that since, in the era of fractional reserve banking, demand deposits are not really redeemable at par on demand, that then only standard cash (whether gold or fiat paper, depending upon the standard) can be considered part of the money supply. This contrasts with 100 percent reserve banking, when demand deposits are genuinely redeemable in cash, and function as genuine, rather than pseudo, warehouse receipts to money. Such an objection would be plausible, but would overlook the Austrian emphasis on the central importance in the market of subjective estimates of importance and value. Deposits are not in fact all redeemable in cash in a system of fractional reserve banking; but so long as individuals on the market think that they are so redeemable, they continue to function as part of the money supply.

Since all checking and savings accounts today are insured, and since the Federal Reserve always stands ready to act as lender of last resort, it is doubtful that they could ever be viewed as anything other than instantaneously redeemable and absolutely secure.

The data used to compute the money supply in section 7 of this article shall include the following components from the FRB H6 statistical release:

From M1 components: Currency, demand deposits, and other checkable deposits at commercial banks and thrifts.

From non-M1 M2 components: Savings deposits (including MMDAs) at commercial banks and thrifts.

From Other Memorandum Items: Demand deposits at banks due to foreign commercial banks and foreign official institutions, U.S. Government demand deposits at commercial banks, U.S. Government deposits at the Federal Reserve (general account only), and U.S. Government note balances at depositories.

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[13]These he calculates by the formula: total policy reserves of life insurance companies minus policy loans outstanding.

The critical question to ask is how does this money come into being? From where does it originate in the first instance? Only when this question has been answered is it possible to understand fully the factors that affect monetary inflation and deflation. There are essentially only two sources of money creation: The Federal Reserve and fractional reserve lending institutions. The latter includes all regular commercial banks, savings banks, credit unions, thrifts and all other institutions which create fiduciary media.

The Federal Reserve and open market operations

The Federal Reserve can create fiat money at any time of its choosing through open market operations. It is essentially a counterfeiting operation since under a purely fiat system hard money in the form of precious metals can never be redeemed. If the Fed wants to increase the amount of money, it buys assets such as treasuries, or other securities, and pays the sellers of those assets with newly created money. The money is electronically created, *ex nihilo*, and credited to the sellers' demand accounts held at commercial banks. It thus becomes part of those banks' reserves. If the Federal Reserve wants to reduce the amount of money, it sells assets, and destroys the money it collects. This reduces the reserves of the banks. Through this same mechanism, the Fed can adjust the so-called Fed funds rate, the rate at which commercial banks lend reserves to each other. The Fed also issues currency as and when the banks have to convert some of their reserves into notes or coins at the request of their account holders.

The total monetary output of the Federal Reserve—i.e. the "monetary base" or "base money" or "high-powered money"—consists of total commercial bank reserves plus currency in circulation (notes and coins). The large majority of bank reserves are held on deposit with the Federal Reserve. As such the Fed acts as the banks' bank. A small portion, however, is held as vault cash, which is cash that is not currently in circulation, and which is used by banks as a float for their customers' day to day requirements.

The term "high powered money" comes from the fact that banks are legally permitted to use their reserves to create additional quantities of money through the fractional reserve process. As will be shown in a later section, money creation artificially lowers the interest rate, results in misallocations of capital, and causes the boom and bust cycle, but at this point we are interested only in the effect on the total quantity of money.

The fractional reserve process

The fractional reserve process is a secondary money-creating enterprise that allows banks—that is, all financial institutions that engage in fractional

reserve lending—to multiply the money the central bank creates many times over, through the issuance of fiduciary media.

It is worth reviewing the process by which this occurs. Suppose the securities seller, mentioned above, receives $100 of newly created money from the Federal Reserve, which the Fed has duly deposited into his bank account. His bank now has an extra $100 in reserves, while he, as an account holder, has a demand claim, instantaneously redeemable at par for $100. Thus the monetary base and the money supply have increased by $100. Despite the fact the account holder retains ownership of the money therein, the bank is legally permitted to lend up to 90% (assuming a 10% minimum required reserve ratio) to someone else. Let us suppose the bank lends out $90, keeping only $10 in reserve. It has now created $90 of fiduciary media *ex nihilo*, money that has been created out of thin air, since the bank still has a $100 demand obligation to the original depositor. Once the newly created $90 has been lent by the bank and spent by the borrower, it resides in the accounts of other individuals or businesses, and becomes part of the reserves of *their* banks. These banks in turn can lend $81 out of the $90, keeping $9 in reserve, and so on.

Even though this process can be repeated many times over, the total amount of reserves, split among the many different banks, will still be $100 regardless of what the banks do in terms of lending.[14] The total amount of fiduciary media, however, will increase every time the money is lent, and will tend towards $900 (i.e. 100 + 90 + 81 +....etc). Mathematically, this is the maximum that can be created from $100, assuming a 10% minimum required reserve ratio. Once this point has been reached, the total amount of money added to the system will have increased from $100 to $1000.

The $100 demand claim held by the original depositor has thus been transformed into $1000 of demand claims, now held by a multitude of depositors. The source of this money is the initial $100 created by the Federal Reserve plus the additional $900 of fiduciary media created by the banks.

The combined change to the balance sheets of the Federal Reserve and the banks are shown below:

Federal Reserve Balance Sheet:

Change to Assets	*Change to Liabilities*
Securities: $100	Bank Reserves $100

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[14]The aggregate quantity of reserves in the economy can only be changed through central bank open market operations, or by account holders withdrawing or depositing currency.

Banks' Consolidated Balance Sheet:

Change to Assets	*Change to Liabilities*
Bank Reserves: $100 (ex nihilo by Fed)	Demand Deposits: $1000
Fiduciary Media: $900 (ex nihilo by banks)	

Once money has been created in this way it acts as the general medium of exchange for which all other goods are traded. It exists in the accounts of any deposits which are instantaneously redeemable. It is important to realize that in a fiat system the source of *all* funds in these accounts originates from the money creating activities of either the Federal Reserve through its open market operations or the banks through fractional reserve lending, the latter process accounting for the majority of newly created money since it is a multiple of the reserves. There are no other sources. Thus, the total quantity of money in all demand accounts owned by the public is equal to the total amount of bank reserves plus the total amount of fiduciary media.

The crucial difference between the two basic forms of bank credit

Fiduciary media result in more than one person having a demand claim, or title, to the same money. If all the owners of all the demand accounts were to attempt to redeem their deposits for cash, the banks would not have enough in their reserves to cover the claims, and the money supply would shrink to an amount equal to that held in reserves plus currency. It is only the fact that depositors are led to believe they *could* redeem their accounts for cash, a belief that is undoubtedly strengthened by the availability of federal deposit insurance and the Federal Reserve's willingness to act as a lender of last resort, that makes their deposits equivalent to cash, and thus a form of money.

Credit originating from genuine time deposits, however, does not create fiduciary media and does not expand the money supply because the depositor relinquishes ownership of the funds for a set period of time. Because the depositor has no expectation that his deposit is available on demand, no additional quantity of money is created. Suppose an individual, call him A, lends $100 to another individual, B, for a year. Title to the $100 is transferred to B, whereupon B can now spend the money. A does not presume he can spend it at the same time. He knows he must wait until B returns it to him with interest, one year hence. Even though $100 of credit has been created, it is obvious this process has not expanded the money supply. Suppose there is an intermediary involved, such as a bank. If A lends money to the bank for one year, and the bank lends the same money to B, here again no new money

has been created. $100 of credit has been granted to B, but since A has no expectation he can use the $100 on demand, the process does not create fiduciary media.

It is clear, therefore, that any amount of money deposited into a time account creates an equivalent amount of credit that is benign in its effects on the money supply. Similarly, any amount of credit that is retired or sold that is accompanied by a corresponding reduction in time deposits has no effect on the money supply.[15]

Currency

Currency is money in the form of notes and coins, issued by the central bank, that is converted from bank reserves as and when depositors redeem money in their accounts for cash. It is therefore part of the monetary base. Even though the source of currency is the central bank, the amount of currency in circulation is dependent on the public's demand. Thus while the central bank has absolute control over the total dollar amount of the monetary base through its open market operations, it does not have total control over how much of the reserves it creates are converted into currency.

If the public demand for currency increases, banks have to redeem some of their reserves held on deposit at the Federal Reserve when they do not have enough in their vaults. As the reserves are drawn down, banks may have to simultaneously reduce the amount of circulation credit—credit issued in excess of reserves—if the minimum required reserve ratio is in danger of being transgressed. A large public withdrawal of currency can therefore throw the fractional reserve process into reverse, and lead to a severe contraction in fiduciary media, and a concomitant reduction in the money supply. Banks can quickly become insolvent when the public loses confidence in their soundness and there are "runs". Bank runs demonstrate the inherently bankrupt nature of banks, and the fact that they lend money they do not own. They are the inevitable consequence of the practice of fractional reserve banking.

Prior to the advent of deposit insurance, bank runs were a fairly common phenomenon, and provided a sobering lesson to depositors about the dangers posed by fractional reserve banks. Since 1933, however, Federal Deposit Insurance has insured depositor's accounts (currently up $250,000) to prevent runs from happening. It has been extremely effective in alleviating

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[15]However, Barnett and Block (2009A) argue that intertemporal mismatching of time deposits and loans contribute to business cycles, even though they have no effect on the money supply.

public anxiety about the safety of their accounts, reducing the possibility of *en masse* withdrawals almost to zero, but it has increased the moral hazard. Federal deposit insurance lulls the public into believing banks are inherently sound, when they are not, and allows banks blithely to counterfeit money without being called to account. Due to deposit insurance, bank runs have not been a common feature in recent times and are unlikely to be so. The concern that the FDIC could run out of money during a financial panic is unwarranted, since the Federal Reserve in conjunction with the government always stands ready to print enough currency to meet the need.

A run is defined as a withdrawal of *currency,* which results in bank credit deflation, and not a "flight" into treasuries or other assets, which does not. For while a particular bank's reserves might fall if depositors withdraw funds to purchase treasuries or other securities, the reserves of other banks, where the sellers of these assets maintain accounts, must increase. In this case, the banking system as a whole is not forced to scale back fractional reserve loans, and the money supply does not contract. The only exception to this is if the Federal Reserve sells the treasuries and destroys the money it collects. This does cause bank credit deflation, but the deflation in this circumstance is caused by central bank policy rather than the direct result of a loss of confidence in the soundness of the commercial banks.

Government spending

All funds that the government spends are derived from tax revenues or borrowing. Tax revenues do not increase or decrease the money supply; the monies are simply transferred from accounts owned by the public to those owned by the government, and back again after the tax revenue has been spent. Government borrowing, on the other hand, always has the potential to increase the money supply. In theory, the government could sell treasury securities directly to the Federal Reserve, in which case newly created money would be immediately deposited into the Treasury's account, inflating the money supply. In practice, however, the government sells treasuries to other entities first, in which case money is transferred from the public's bank accounts to the Treasury and there is no immediate inflationary effect. However, any debt sold in this way must ultimately be settled through future tax revenues, or by the issuance of new debt, or by the central bank purchasing the debt from the public through open market operations. This last case also inflates the money supply, and from an economic point of view, is no different than if the government sells its debt to the Federal Reserve directly. Whatever the method, any time the Fed purchases treasuries, it

monetizes government debt, and adds newly created money to the economy.[16]

At any given time, less than 1% of the total money supply can be found in government demand accounts.[17] This simply reflects the fact that, while the government is a prime benefactor of money creation, the monies it receives are quickly spent, and thereafter reside in the accounts of the public.

Assets and liabilities

Figure 2 depicts stylized consolidated balance sheets for the commercial banks and the Federal Reserve, and their relation to each other and the money stock.[18]

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[16]With the exception of money deposited into the Treasury's Supplementary Financing Account. See section 8 for more details.

[17]This ratio has been derived from the FRB H6 statistical release "Other Memorandum Items." for U.S. Government demand deposits at commercial banks, U.S. Government deposits at the Federal Reserve, and U.S. Government note balances at depositories.

[18]Some liabilities of the Fed, such as government accounts, have been omitted for clarity. Government accounts are in addition to the monetary base. They form only 0.7% of the total money stock. Vault cash is also not shown. Vault cash is part of bank reserves and is equal to total currency issued by the Fed minus currency in circulation. Vault cash is approximately 10% of total currency issued.

Figure 2

From the chart, note the following equivalences:

Monetary Base (base money) = reserves + currency
Fiduciary Media = loans from demand deposits (circulation credit)
Money stock = demand deposits + currency
Money stock = monetary base + fiduciary media
Money stock = fiduciary media + reserves + currency
Reserve Ratio = demand deposits : reserves

Loans originating from time deposits (commodity credit) do not affect the money stock.

Figure 3 augments the diagram of Figure 1 by including the factors affecting the money stock discussed above:
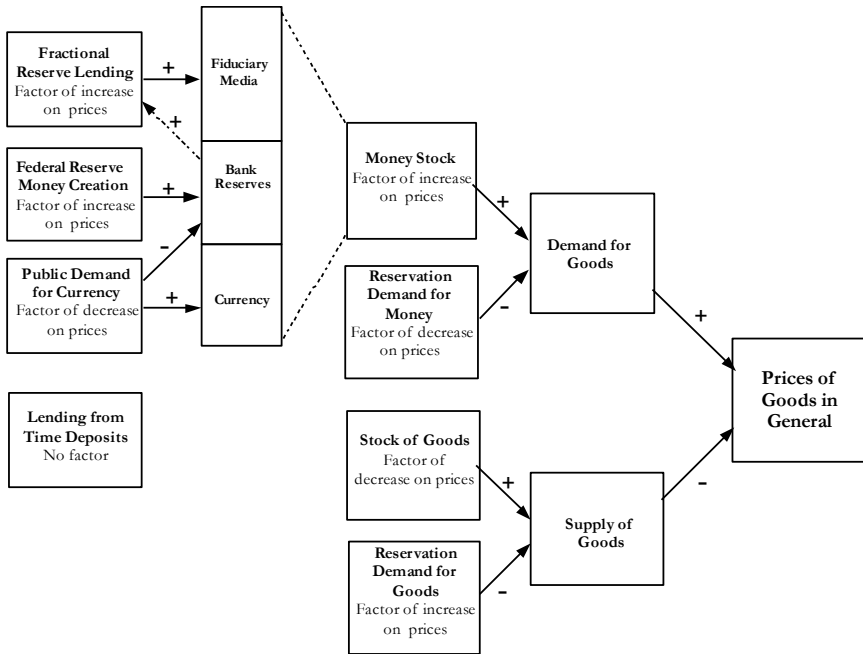
Figure 3

Arrows indicate cause and effect between the antecedent factor and its consequent. "+" indicates the consequent follows in the same direction as the antecedent; "-" indicates the consequent and antecedent move in opposite directions.

Additional notes: Greater public demand for currency increases currency in circulation, but decreases reserves. This by itself causes no change to the money stock, but currency will be a factor of decrease on prices, ceteris paribus, if the change to reserves causes banks to reduce fiduciary media to comply with minimum reserve requirements. Federal Reserve money creation is a factor of increase on prices in two ways: (a) because additions to reserves directly increase the money supply, and (b) because increases in reserves cause banks to expand fiduciary media, which also increases the money supply.[19] Fractional reserve lending is

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[19]The exception to this is if open market operations involve increasing reserves through purchases of fiduciary media, in which case (a) is not applicable, but (b) is still

always a factor of increase on prices. Loans from time deposits have no effect.

Other factors that affect the quantity of money

The minimum required reserve ratio is the minimum legal reserve requirement that banks must maintain on checking accounts. In the U.S. it is presently 10% for all depository institutions having greater than $55.2 million in net transaction amounts. However, since the required ratio on savings deposits is 0%, the effective required reserve ratio for all demand accounts (checking accounts + savings accounts) is usually considerably less than 10%.

Banks can reduce their effective reserve requirement even further by counting on the fact that at any given time depositors rarely draw down their demand accounts completely. Without the explicit consent of their customers, banks frequently engage in the practice of temporarily "sweeping" unused balances into Money Market Deposit Accounts (MMDAs).[20] Because MMDAs fall under the same rules as savings accounts and have a 0% reserve ratio, the sweeps program allows the aggregate value of accounts subject to a 10% reserve ratio to be minimized. The lower the effective reserve ratio, the greater is the quantity of fiduciary media that can be produced.

One constraint imposed on banks in their money creation endeavors is their capital adequacy ratio, the ratio between equity capital and the value of risk-weighted assets such as loans and bonds.[21] Since the advent of sweeps, this is frequently more limiting than the reserve ratio. A bank's total assets are its loan portfolio, bonds and other securities, reserves deposited at the Federal Reserve, cash, treasuries, and property such as buildings. A bank's liabilities are the money in its depositor's accounts (demand + time) and net borrowings. The difference is shareholder equity. If borrowers default, the book value of the asset side of the bank's ledger falls, and the value of its equity capital must fall by the same amount. This is because the dollar amount of its liabilities has not changed. Since its equity position is usually much smaller than the value of its loans, the *ratio* of equity to risk-weighted assets can fall dramatically if a large number of borrowers default simultaneously. If it falls below a proscribed limit, a bank is forced to shrink its balance sheet to bring the ratio back above that limit. It can do this in two

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applicable. The Federal Reserve's actions in this case are still a factor of increase on prices, but not doubly so.

[20]For a good discussion of sweeps see Charles Hatch (2005).

[21]Certain assets such as cash and treasuries are assumed to have zero risk, and are therefore excluded in the calculation of the ratio. For a more detailed explanation, see Thorsten Polleit (2008).

ways: either retire old loans without renewing them, or attempt to sell some of its existing loans. If banks attempt to sell their loans en masse, as can occur during a financial crisis when the capital ratios of a large number of financial institutions drop concurrently, the value of *all* loans will tend to fall, even those which are not in danger of default. This can compel banks to shrink their balance sheets further than they would otherwise be required to do.

When banks, as a whole, reduce their loan portfolios to comply with capital requirements, the liabilities side of the consolidated balance sheet for the banking sector must contract by the same amount as the assets side. The effect on the money supply is dependent on the kind of liabilities that are reduced. If time deposits are reduced as loans are divested, the money supply is unaffected. However, any amount of loans that are divested *without* a reduction in time deposits, or in excess of such a reduction, results in the elimination of fiduciary media, and demand deposits decrease accordingly. In this case, the money supply contracts.

The Federal Reserve has the ability through its open market operations to shore up any bank's balance sheet by taking its riskiest loans off its books and, at full value, exchanging them for cash, thereby increasing the bank's reserves. Alternatively it can exchange them for treasury securities. Since neither treasuries nor reserves are counted as part of a bank's loan portfolio, this has the effect of instantaneously restoring the equity-loan ratio above the minimum, and obviates the need for the bank to shrink its balance sheet further. During a financial crisis, this is one way in which the Fed can head off an incipient credit contraction and prevent monetary deflation.

When the Fed initiates programs designed to bolster failing financial institutions by monetizing their riskiest assets, it is fulfilling its role as "lender of last resort," but it increases the moral hazard by rewarding poor lending practices. Furthermore, when the Fed purchases a sizable portion of a failing bank's loan portfolio and expands the bank's reserves, it can dramatically increase the bank's reserve ratio, over and above the minimum required, and enhance the opportunity for it to engage in further money creation through the fractional reserve process at some point in the future.

Derivatives

Derivatives such as options, futures and swaps are financial instruments that do not *directly* affect the total quantity of money in existence.[22] They are bets between two parties that are essentially zero-sum games. One party

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[22]Nor do they affect the equilibrium price of the underlying asset.

loses, while the counter-party gains. For example, an options contract grants one party, upon payment of a premium, the right to buy or sell an underlying asset within a specified period of time at a specified strike price. If the option is not exercised, the option buyer loses the premium paid to the issuer. If it is exercised, the buyer gains from the seller the difference in the exercise and strike price minus the premium. Money changes hands, but no new money is created by this process. A credit default swap (CDS) is in effect an insurance policy on an underlying loan. If the borrower defaults, the loss is simply passed from the original bond holder to the CDS issuer. In theory, if fractional reserve banks hold a large number of derivatives and are net "losers," in the aggregate, to non-bank entities, the consolidated balance sheet for the banks falls, and this could reduce the money supply. However, the effect in this case is indirect.

4. Factors Affecting Prices-in-General: The Reservation Demand for Money

The reservation demand for money is the demand for money to hold by those who already have it; sometimes referred to as the "demand for cash balances," cash in this instance referring to all forms of money, not just currency. It is the post-income demand. This is *not* to be confused with saving, in which a person relinquishes ownership of his money for a certain period of time while it is invested in goods or services. Rather, the reservation demand is manifested in the fact that people hold onto money, retaining title, *without* spending it. In contrast to other commodities, money is not used up in consumption or production; its only use is in exchange for consumer or producer goods. Why then do people hold it? If future events were always known with absolute certainty, a person could schedule their affairs such that all funds received were instantaneously spent. Indeed, in such a world there would be no need to retain money at all. But in the real world, it is precisely because a person never knows what the future might bring that he holds money.

When the social reservation demand for money changes, it can neither be measured nor observed directly. Whether market participants hoard money, or dishoard it, the amount of money in their wallets and their bank balances in the aggregate remains exactly the same ceteris paribus. There is no special place from which money flows, or to which it flows, when the demand for cash balances changes.

Nevertheless, it is possible to observe the *effects* of the change. Suppose, for example, prices-in-general are falling, and yet the supply of goods in the market has not changed. From this it can be deduced that the exchange demand for goods must have fallen. But let us also suppose the money stock

has not changed. This leaves only the reservation demand for money as the causative factor for the reduction in the demand for goods and the ultimate cause of the price deflation.

Price deflation that occurs as a result of an increase in the reservation demand for money has been termed "cash building deflation."[23] Care must be taken in using this term, however, because as noted above, all things being equal, the amount of money people "build" in the aggregate stays the same even when market participants attempt to hoard it. Furthermore, the "cash" that is hoarded refers to all forms of money, not just currency. Cash building deflation is not to be confused with bank credit deflation that occurs when a large number of people demand currency simultaneously, or when other factors cause a contraction in the amount of fiduciary media. Bank runs induce *monetary* deflation, but hoarding money induces only *price* deflation and has no effect on the total quantity of money. Indeed, unlike bank credit deflation, which is associated with recessions, the effects of cash building deflation are entirely benign.

The opposite of cash building deflation is price inflation that results from a *decrease* in money's reservation demand. This is particularly acute during a hyperinflation, when associated with unrestrained money printing. Mises (1990A) detailed the three stages of this process in his analysis of the German hyperinflation of the 1920s. This episode is a useful lesson in demonstrating how a reversal of the public's expectation of price deflation towards price inflation causes the demand for cash balances (reservation demand for money) to fall, and is a major factor in accelerating the upward movement of prices.[24]

During the first world war, the German government resorted to monetary inflation in order to fund their military operations. In this first stage, the German people largely believed prices would return to their pre-war level after hostilities were over, and so curbed much of their spending in anticipation of the mark's higher purchasing power. Thus, the demand for cash balances was high, suppressing much of the adverse effect of the money printing on prices, but masking a dangerous condition that would in time reveal itself. Because prices were only rising modestly, it seemed like a dream come true for the German government, who, for a while at least, could print money with virtual impunity.

After the war was over, however, prices continued to rise, and a slow but perceptible shift in the psychology of the public began to take hold. In

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[23]Salerno (2003).
[24]Also, see Rothbard (2008) pp. 67–74 and Bresciani-Tirroni (1937).

this second phase, expectations of price deflation turned to the realization that prices would continue to increase. As a result, the reservation demand started to fall and people began to spend the money they had previously been hoarding. Prices now started to rise faster than the money supply, and as the PPM continued to fall and the cost of living seemed to outstrip the public's available cash balances, there were calls for the government to engage in additional rounds of money printing to alleviate the apparent shortage.

At this point if the government had halted all money creation and reduced spending, disaster could have been averted. Unfortunately they did the precise opposite, taking the easy way out, and caving into the public clamor. Thus began the third and final stage, where money printing and prices chased each other upward at an ever-increasing rate with tragic consequences. As the price level continued to accelerate, doubling at ever-shorter intervals, the public's expectations transitioned from merely inflationary to hyperinflationary, and the reservation demand for money fell virtually to zero. In this final "crack-up boom," people attempted to rid themselves of their cash as fast as possible before it lost all value. As a consequence, production plummeted, speculation ran rampant, the currency collapsed, and most of the population were reduced to a life of barter and utter impoverishment.

Since an increase in money's reservation demand, ceteris paribus, leads to a reduction in the exchange demand for goods, and a decrease leads to an increase in the demand for goods, it might be surmised that these events are equivalent to a change in the so-called velocity of money. According to this theory, when the velocity of money slows down, prices fall, and when it speeds up, prices rise. However, as Rothbard has demonstrated, this concept is deeply flawed.[25]

Advocates of this notion relate prices to velocity though Irving Fisher's equation of exchange, which states that the stock of money, M, multiplied by the velocity of money, V, is equal to the price level, P, multiplied by the volume of all goods traded, Q. (MV=PQ). Unfortunately, the equation is a dead end. First, the general price level, P, represents the average price, of the array of prices, of all goods in the economy. But as has been shown, it is not possible to quantify P as a single number. It is an abstract concept only. The best that can be said is prices-in-general may move a certain way, but it is not possible to predict by how much, nor even that they move by the same amount. Second, V is defined as the fraction of the money supply that turns over in a given period of time. However, because V is defined only by

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[25]For a brilliant critique of the velocity of money concept and Fisher's equation of exchange see Rothbard (2004) p. 831.

referring to the other terms in the equation, it is not an *independent* variable, and it makes the equation a trivial truism.

Consider an equation which is not trivial, Newton's second law, which states Force = Mass x Acceleration. Because we can comprehend force, mass and acceleration independently, Newton's discovery of their interrelation makes a genuine contribution to the understanding of the natural world. But now consider the equation of exchange, MV=PQ. Let us overlook the problem of quantifying P for multiple goods, and consider the case of just one good. Let us say its price, P, is $10/unit. Suppose Q is 5 units/yr, and the total quantity of money in the economy, M, is $100. From the equation, we calculate that V = $^1/_2$ per yr. But note how we arrive at this number. We take P, multiply it by Q, and divide by M. However, this is precisely how V is defined in the first place. In essence, Fisher said let V=PQ/M. He then rearranged the terms and proudly proclaimed to the world that he had discovered that MV=PQ. Unlike, Newton's second law, Fisher's equation tells us nothing new. The problem is that V does not exist independently in the world of human action since it cannot be comprehended without referring to P, Q, and M. It is simply an invented variable, defined in terms of the other variables. If one of them changes, V changes also, but the cause of the change is not a praxeological phenomenon; rather, it is because the relation is a tautology.

When the reservation demand for money increases, and the exchange demand for goods decreases, it does not necessarily mean buyers spend less money *per unit of time*. It means they spend less money *per unit of good*, and the quantity of goods demanded will be less. Mutatis mutandis*, the same argument holds true when money's reservation demand decreases. Nowhere does time enter the picture.

Let us take the stock market as an example. Imagine two different stocks, A and B, both of which at the opening bell are trading at the same price. Suppose over the course of the day, the first stock is thinly traded and the second traded very actively. The amount of money changing hands in a given period of time for stock A might be half that of stock B. But that does not mean A's price must fall to half of B's. The velocity of money tells us nothing regarding the direction of their prices. Indeed, during stock market panics, the velocity can be far greater when prices are falling than when they are rising. What is true for individual goods, or individual stocks is true for the market as a whole. A change in the speed at which money changes hands tells us nothing about the present or future direction of prices.

5. Factors Affecting Prices in Particular Sectors

The non-neutrality of money

As has been shown, it is a fallacy to believe that a single number can be ascribed to a so-called price level for all goods and services or to its inverse the purchasing power of money. The exchange ratios between different goods are constantly changing, and are a reflection of the shifting value scales of market participants. Thus, the purchasing power of money constantly changes with respect to each good individually, and is never brought to bear on the market as a whole, affecting all goods to the same extent.[26]

It is equally erroneous to believe that any *new* influx of money will affect the prices of goods evenly. Even if an equal proportion of money were somehow magically deposited into every market actor's account overnight, not everyone would spend the money immediately, or in a way that reflected his previous spending habits. Overall, prices would increase, but some prices would rise more than others. Furthermore, *in general,* while people would be no better off than they were before, it is not true to say that *no one* would be better off. Those who rushed to spend the money first, before prices had risen, would benefit at the expense of those who decided to wait.

When new money in the form of fiduciary media is created, it enters the economy through the banking system. As a result, a relatively few number of market participants—the recipients of credit—receive the new money first. Not every borrower receives the same amount of money, or uses it in the same way. Nevertheless, since the receivers of credit are certainly in a position to offer more for goods and services than those who have not so benefited, prices will initially be driven up in those sectors where they are active.

It takes time for the price changes to diffuse throughout the economy, from one sector to another, as the new money changes hands. While this process is going on, it is clear there are those, besides the original recipients of credit, who are in a position to benefit if they can sell their goods or services at the higher prices while purchasing the goods they require at the older prices. As such, they are able to gain at the expense of those who must do the opposite. Because they enjoy a temporarily higher purchasing power before the full impact of the monetary inflation has been felt, the process gives rise to a redistribution of income and wealth in their favor, at the expense of those who are not so fortunate. When all the price changing possibilities are exhausted, the wealth of market actors have been affected

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[26]See Mises (1990B).

unequally, and the final array of exchange ratios that exits in this new paradigm are different from what they would otherwise have been.[27]

Fiduciary media and the business cycle

In a purely free market economy the rate of interest is a reflection of the pure rate and is determined by time preference; i.e., the preference by market actors for present over future goods. When the social rate of time preference falls, the prevailing rate of interest falls. Consumption is voluntarily curtailed while investment increases. The added investment lengthens the production structure, resulting in more roundabout processes that in time lead to increased production, new and more plentiful consumer goods, and a higher standard of living.

In an economy where intervention exists, as is the case where banks are permitted to engage in fractional reserve lending, an increase in fiduciary media lowers the rate of interest below that which would normally exist, given the prevailing social rate of time preference. Overall investment is increased, but the amount of voluntary saving is reduced, the difference amounting to "forced saving" arising out of the newly created money. If the loans are predominantly extended to businesses, as is usually the case, the artificially low interest rate sends erroneous signals to entrepreneurs to engage in longer term projects in higher order (early stage) industries, that would otherwise not be started. Nonspecific factors of production are drawn into the higher order processes as their prices are bid up. The production structure is lengthened beyond that which would normally prevail, given the level of consumption. In fact, the ensuing boom causes an increase in consumer spending, leading to a more than proportional rise in the prices of consumer goods, and drawing factors to late stage processes, such as retailing. This overconsumption is not in harmony with the malinvestment that is occurring in the higher stages of the production structure. Eventually, it becomes apparent there are not enough real resources available to complete the projects that were started. The malinvestments have to be liquidated, businesses declare bankruptcy, and loans cannot be repaid. As a result, banks are forced to reduce the amount of fiduciary media, the fractional reserve process is thrown into reverse, and the boom comes to an end.

The economy thus enters a recession. Provided there is no additional money creation from the central bank, or legislative meddling with the

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[27]As long as the monetary inflation remains in place, the transfer of wealth continues, with those on fixed incomes particularly hard hit. Moreover, the relation between creditors and debtors is altered, since borrowers are in a position to be able to repay the principle on their loans, at a later date, using devalued currency.

readjustment process by the government, interest rates rise to reflect the pure rate, the money stock contracts, and prices of most goods, including labor, fall, while the factors of production are transferred to industries where they are most needed. Misallocations of capital that occurred during the boom are reallocated during the recession, and the structure of production is shortened as it is reorganized. Seen in this light, the recession is thus the curative for the excesses of the boom, allowing consumption to come back into harmony with investment. Nevertheless, the productive structure that exists after the readjustment is never the same as it would have been absent the boom. Scare resources have been squandered, serious losses of capital goods have occurred, and the productive output per capita has fallen, resulting in a general impoverishment of society.

The scenario portrayed above is a feature of fractional reserve banking. However, since 1913, booms and busts have always been triggered by the Federal Reserve. Since recessions are always painful, there is a great temptation by the government, through the central bank, to alleviate their symptoms by expanding the monetary base. This has the effect of increasing bank reserves and allowing the banks to engage in a new round of lending before the excesses of the previous boom have been fully resolved. This might temporarily halt the recession, but it merely causes more malinvestment and sets in motion the tragic cycle yet again. The recession is never allowed to do its work, and as a result the general health of the economy declines relative to what it would have been absent the intervention. Under these circumstances, the money supply never contracts, and prices, far from falling during the recessionary periods, continue to rise, in both nominal and real terms.

Some authors have made the argument that if a significant portion of the credit expansion is in the form of consumer rather than business loans, the economic effects would not necessarily result in a recession. However, it must be remembered that most consumer credit is used by households for the purchase of durable consumer goods, which are in reality true capital goods. The economic effects of consumer credit when used in this way are indistinguishable from those that stem from credit extended to businesses for the purchase of capital equipment. Even if loans are used directly for current consumption, that is to say, for non-durable consumer goods, then provided the credit satisfies a more or less constant demand with respect to overall consumption, it merely frees up additional credit for capital intensive processes that would otherwise not have arisen.

Only if the credit expansion results in an increase in consumption *without* credit being extended to businesses in the higher stages of the production structure, and without additional capacity being freed for those

sectors, does the analysis of the business cycle have to be modified. In this circumstance, prices of consumer goods rise while those for capital goods diminish in relative terms, as higher order, early stage processes are liquidated. A credit expansion such as this results in very rapid capital consumption, a production structure that is immediately shortened without there having been a prior lengthening, and an even hastier impoverishment of society. Indeed, the effects of this kind of credit expansion are precisely the opposite of the kind of growth that results from an increase in voluntary saving.[28]

Time loans and the business cycle

It is clear that genuine time loans do not create fiduciary media and do not have any effect on the money supply. But do they cause or exacerbate the business cycle? Barnett and Block (2009A) argue that to the extent that time deposits are not intertemporally matched to loans, they do have an effect.

Suppose in order to provide a $100 loan with a term of two years, a bank uses money from a one-year $100 CD at year zero to fund the first year, with the intention of issuing another one-year $100 CD at year one to fund the remainder of the term. This is shown below:

		Time (year)		
		0	1	2
Depositor 1	$100	------------------>		
Depositor 2	$100		--------------------->	
Borrower	$100	-->		

At first glance, the economic effect might seem to be no different than if the bank were to fund the loan from a single depositor for the entire period. Assuming all goes according to plan, no fiduciary media will be created, since at no time will more than one person have access on demand to more than $100. As long as the bank finds another depositor for the

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[28]See Huerta de Soto (2006) pp. 406–408.

second year, the value of the bank's deposits will always exactly equal the value of the loan.[29]

What incentive might a bank have to borrow short and lend long in this way? Consider that under normal circumstances, ceteris paribus, a longer term loan has a higher interest rate than a loan of a shorter duration, firstly, because it is less liquid and therefore its interest rate carries a liquidity premium, and secondly, because a longer term loan carries a greater risk of default, which adds a further premium associated with risk. As a result, all things being equal, interest rates on loans increase as a function of time to maturity. Put another way, while the pure rate of interest—which reflects the social rate of time preference—is the same throughout the time structure, the *natural* rate—which includes risk, liquidity and PPM premiums—is higher for longer term loans than shorter term ones.

Given this state of affairs, banks can exploit the difference in interest rates, and generate a greater return by borrowing short and lending long if they feel the current spreads are too wide. If, however, a situation exits in which banks, *in the aggregate*, have on their books a greater number of short term deposits relative to long term loans—we are still assuming their aggregate *value* is the same—it demonstrates a relative unwillingness by depositors to accept the existing premiums being paid to banks on longer loans, and a relative reluctance by borrowers to pay the premiums being paid by these same financial institutions at the short end. In other words, the public views the interest rate spreads as not wide enough. Absent the banks' intervention stipulated in this scenario, either borrowers would have to pay higher premiums to entice depositors to invest in long loans, or depositors would have to accept lower premiums to convince borrowers to accept shorter ones. It is clear, therefore, that if intertemporal mismatching by banks is pervasive, it has the effect of narrowing the spread; that is, lowering the long rate and increasing the short rate, and thus altering the capital structure compared to the purely matched scenario.

The consequence of this kind of "carry trade" is a relative increase in investment in the higher orders of the time structure of production, and a relative decrease in the lower orders. If, as Barnett and Block (2009B) believe,

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[29]However, according to Barnett and Block (2009B), there is a clear ethical problem with respect to the money titles. At year zero, depositor 1 has a note giving him title to $100 a year from now, whereas the bank's note from the lender grants the bank the title in two years. Thus two people have claim to the same $100 at the end of the first year. Even if, in a year's time, the bank does find another depositor to pay back depositor 1, at the outset, the bank is in effect misrepresenting the claim it gives to the first depositor. Moreover, it has created a loan of longer duration than would have occurred without it acting as an intermediary.

the practice amounts to fraud and represents an interference with the voluntary actions of market participants, then the over/under investment is necessarily *mal*investment, not in harmony with consumer value scales.[30] As such, it distorts the production structure, contributing to the business cycle. It does so, however, *without* causing monetary inflation, ceteris paribus. In contrast, fractional reserve lending, artificially lowers the rate of interest for *all* loans, causing added investment (malinvestment) across the entire production structure, with relatively more in the higher orders, and achieves this in conjunction *with* an increase in the money supply.

The effect of a change in demand for a particular good

Consider the case where the demand for a particular good, or group of goods—call these, X—falls because of a decrease in credit concentrated on X. If such credit originates from time deposits, the demand for other goods rises, ceteris paribus, because money that would otherwise have been spent on X is now being spent on other goods. Neither the money supply nor the exchange demand for goods-in-general has changed. Money has simply shifted from one sector of the economy to another.[31]

Now consider the case where the reduction in demand for a particular good or goods is caused by a decrease in fiduciary media, but the money supply does *not* contract because of an offsetting increase in the level of reserves. Like the previous example, the exchange demand for goods-in-general does not decrease, ceteris paribus, and the contraction in credit does *not* cause a general price deflation.

But what if in either of these circumstances the reservation demand for money *increases,* causing a reduction in the general exchange demand for goods anyway? Now the prices of most goods and services do indeed decrease, but this situation is *not* caused by a contraction in credit. As will be shown in the next section, this last example is precisely what happened in the

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[30]If the practice is fraud, it is necessarily *mal*investment because it involves violent intervention in the market. If it is not fraud, then the economic effect is the same, but the result cannot be considered "bad," because it originates in the voluntary actions of market participants. See Block and Davidson (2010) for a similar argument concerning the malinvestment caused by fiduciary media. Business cycles are intuitively bad, but the *reason* they are bad is because they caused by the issuance of fiduciary media, and fiduciary media involve violent intervention.

[31]Cf. Rothbard (2004) p.817 "For each individual good, the price will also increase when the specific demand for that good increases; but unless this is a reflection of a drop in the social reservation demand for money, this changed demand will also signify a decreased demand for some other good, and a consequent fall in the price of the latter. Hence, changes in specific demands will not change the value of the PPM."

financial crisis of 2008. Contracting credit caused a fall in demand for particular assets, but demand in general fell because of an increase in the reservation demand for money.

Other factors affecting prices in particular sectors

New technology, changing consumer tastes, and the discovery of new resources can all affect prices in certain sectors of the economy. For example, in recent years, technological innovation in the electronics industry has created ever more advanced and more plentiful high-technology goods such as computers, cellphones, high definition televisions, etc., causing not only their performance to increase, but their prices to fall. Greater supply has led to growth deflation occurring in that particular sector, despite monetary inflation.

In a recession, the reservation demand for certain assets falls when they need to be liquidated. An example of this situation occurred during the real estate market collapse. Under most circumstances, a real estate owner has a reservation demand for his property, either to live in it himself or to rent it to others. This applies to everyone, except the home builder, whose reservation demand, if any, once the property has been built, is based on speculation. When there is a reservation demand, the supply curve slopes upward to the right; that is to say, the property owner would normally only sell if the price were sufficiently high. However, when a large number of borrowers default simultaneously, and lending institutions are saddled with many foreclosed properties, the situation is different. In these circumstances, unless banks have an interest in using the repossessed real estate directly, or holding it for speculation, both of which are unlikely prospects, their reservation demand is close to zero. The supply curve for these properties is a vertical line, because the banks have to sell at whatever the market will bear. Looked at another way, the *total* demand (reservation demand + exchange demand) for real estate falls, putting further downward pressure on prices.

Summary

The following table presents an overview of the major variables that cause price inflation and deflation, and their effect, if any, on the business cycle:

VARIABLE	GENERAL PRICE INFLATION/DEFLATION?	BUSINESS CYCLE?
Fiduciary Media	Yes	Yes
Reserves from Fed open market ops	Yes. Yes x 2 if fiduciary media changes	Yes. if fiduciary media changes. Otherwise no.
Currency withdrawals & deposits by public	Yes if change in reserves affects fiduciary media. Otherwise no.	Yes if change in reserves affects fiduciary media. Otherwise no.
Loans from time deposits	No.	Yes if intertemporally mismatched. Otherwise no.
Reservation demand for money	Yes.	No.
Stock of goods	Yes.	No.
Reservation demand for goods	Yes.	No.

6. The Data: Inflation and Deflation During the Financial Crisis

We now turn to an analysis of the data, using the theoretical arguments outlined above, to explain the movement of prices in the wake of the financial crisis of 2008.

Figures 4 and 5 show the Consumer Price Index (CPI), and the Producer Price Index (PPI) for all commodities, from Jan 2007 to Jan 2011. Consumer prices were rising fairly rapidly until the middle of September 2008, and then dropped sharply over a period of about six months. Beginning in April 2009, prices-in-general started to increase again, but at a slower pace. Producer prices traced a similar pattern.
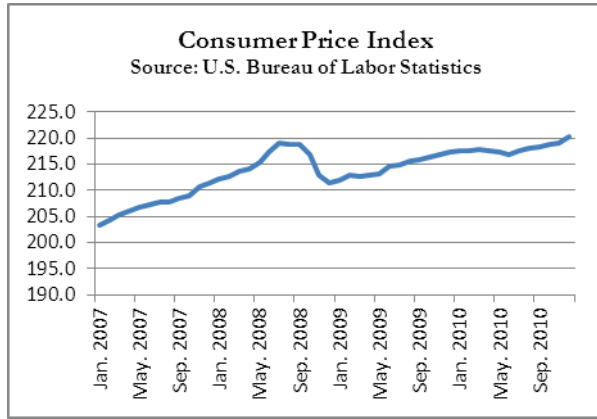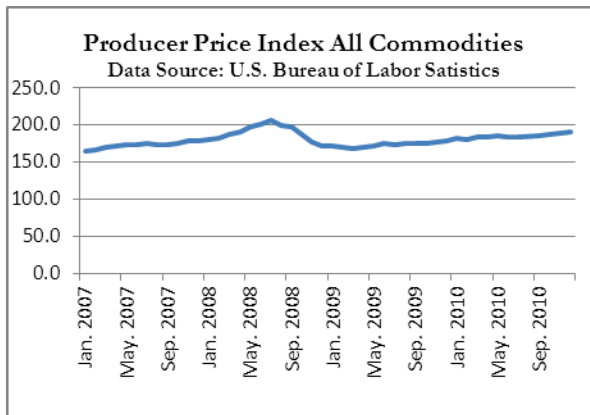
Figure 4

Figure 5

During this time, however, the money supply steadily grew as shown in Figure 6.[32] From October 2008 until Jan 2011, the year on year rate of *monetary* inflation increased, *despite* the allegedly huge contraction in credit.[33]
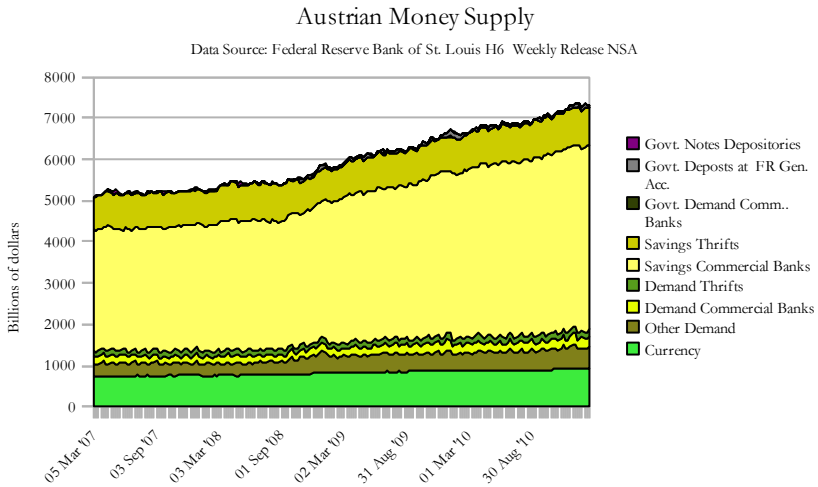
Austrian Money Supply

Data Source: Federal Reserve Bank of St. Louis H6 Weekly Release NSA

Figure 6

For the three year period prior to October 2008, Austrian money supply growth never rose above 5.5% per year. By November 2009, however, it had reached 16.7% per year. In absolute terms, the money supply grew from $5515 billion in October 2008 to $7245 billion in January 2011, a total increase of 31.4% in just over two years.

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[32]For the components included in the Austrian Money Supply, see section 2 of this article.

[33]Numerous articles appeared in the mainstream media, including the Wall Street Journal, The Financial Times, and The Economist, citing a very significant credit contraction. However, while credit did fall somewhat during this period, the evidence for a massive credit "crunch" is not borne out by the data. See below. Also see articles by Robert Higgs (2009) and Richard Ebeling (2009) refuting the notion of a severe credit crunch.
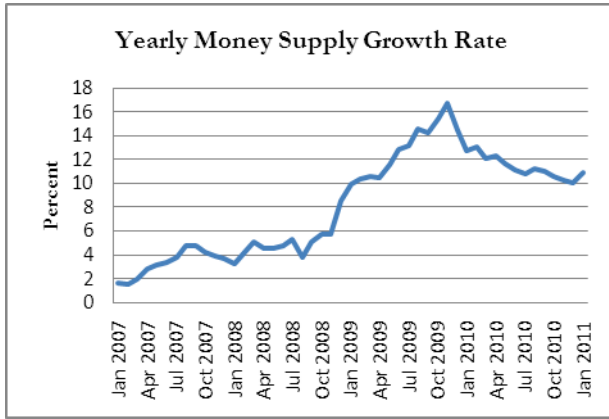
Figure 7

If the money supply was growing rapidly during this period, why did prices-in-general not rise nearly as fast? It is important to note, at the outset, that while credit can directly affect *particular* prices in those sectors where it expands or contracts the most, it can only affect the *general* price level through its effect on the quantity of money. Because the money supply expanded, it follows that at no time could the credit contraction be responsible for a general price deflation or reducing the rate of price inflation. Referring to Figure 1, there are only three other factors that could act in opposition to monetary inflation to keep the price level suppressed. Of these, it is reasonably certain that neither a sharp increase in the production of goods, nor a sudden decrease in the demand to hold goods, was responsible.[34] The most likely factor was a dramatic increase in the reservation demand for money. Uncertainty and fear was at its greatest between the end of 2008 and the beginning of 2009, which corresponds to the noticeable drop in the CPI and PPI during this period. After that, prices started to rise again, but slower than the growth in the money supply, so it is reasonable to assume the demand for cash balances continued to remain high and was very influential in restraining price inflation.

It must be emphasized that a fall in the amount of credit stemming from reduced saving and investment does not *directly cause* an increase in the reservation demand for money. One is *not* the flip side of the other. Indirectly, a fall in credit might influence the public's demand for cash balances, but this is a psychological phenomenon, not an economic one. There is no praxeological reason why reductions in credit must cause it to

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[34]Price deflation that results from an increase in the supply of goods is referred to as "growth deflation." See Salerno (2003) for an in-depth account of growth deflation.

increase.[35] Moreover, credit can only affect *general* prices by its effect on the money supply, and even then, only by changes in fiduciary media. The reservation demand for money, on the other hand, can affect prices independently of the quantity of money.

Why did the money supply increase despite a credit contraction? Figure 8 shows the sources of money for the money supply.[36]
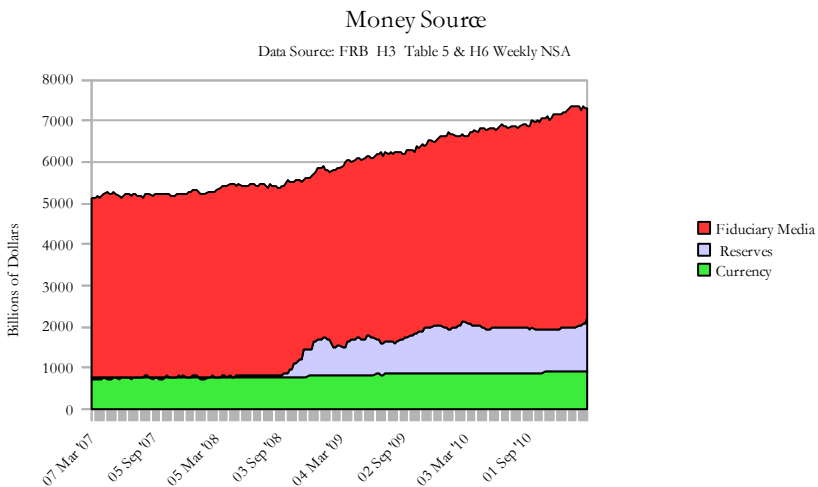

Figure 8

Prior to September of 2008, which marked the beginning of the financial crisis, the total value of bank reserves held at the Federal Reserve was approximately $45 billion. Relative to currency of $800 billion and fiduciary media of $4500 billion, it was so small that it is barely visible on the chart. The ratio between reserves and fiduciary media up until this point was approximately 1% and had been at this level for several years. However, from 10 September 2008 to 12 November 2008, a period of only *two months*, the Federal Reserve injected over $560 billion of new money into the system,

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[35]As Rothbard (2004) p. 774 explains, all things being equal, there is no causal connection between the reservation demand for money and consumption/investment preferences.

[36]Fiduciary media has been calculated by subtracting reserves and currency from the total money stock.

causing reserves to jump to over $600 billion, an increase of 1200%. During this same period, fiduciary media fell from 4596 billion to 4095 billion, a drop of 11%. Fiduciary media did not immediately expand, in what would be a normal response to such a dramatic increase in reserves, because (1) banks were scrambling to shore up their balance sheets, and (2) the Fed was offering interest on excess reserves held at the Federal Reserve, which disincentivized further fractional reserve lending.[37] The reserve ratio thus rose to 15%.

It is noteworthy that the expansion of reserves was so great—greater than the contraction in fiduciary media—that the money supply grew. It is important to reemphasize that reserves contribute to the money supply. They do *not* lie dormant, in a kind of economic limbo, having no effect until banks use them for lending purposes. For every dollar of reserves the Federal Reserve creates, there is a corresponding dollar in someone's demand account, and this is so, whether or not the banks use the reserve to create fiduciary media. Thus, all things being equal, when reserves increase, the money supply grows, even if banks do not "lend them out." If banks curtail lending, and fiduciary media shrinks, but reserves are growing, *and growing faster than the contraction of fiduciary media*, then the money supply still expands. It does so more slowly than it would have done absent the credit contraction, but it expands nevertheless.

Figure 9 is a chart of Federal Reserve liabilities. The bottom two components (currency in circulation and reserve balances) are the monetary base, and correspond to the same two components in Figure 8 above.

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[37]This it did through the Economic Stabilization Act of 2008, which permitted the Fed to offer commercial banks interest on their excess reserves.
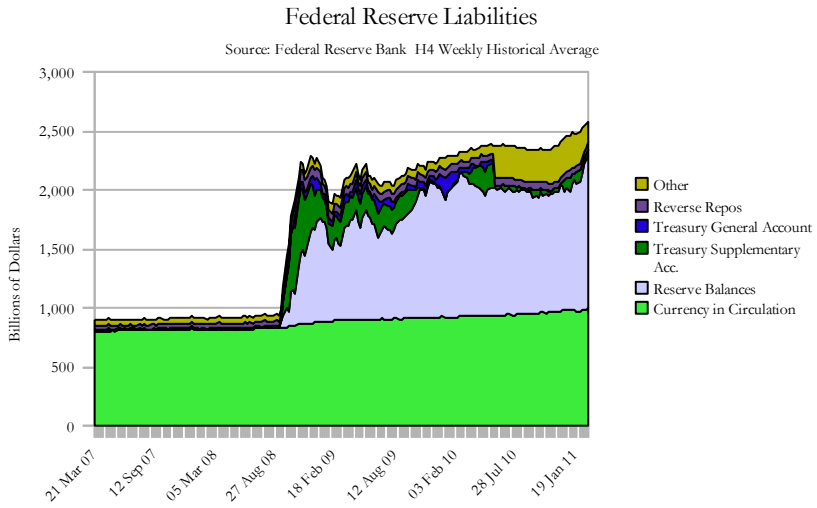
Federal Reserve Liabilities

Source: Federal Reserve Bank H4 Weekly Historical Average

Figure 9

How and why did the Fed engineer such a massive increase in the monetary base? Figure 10 shows Federal Reserve assets.

Federal Reserve Assets

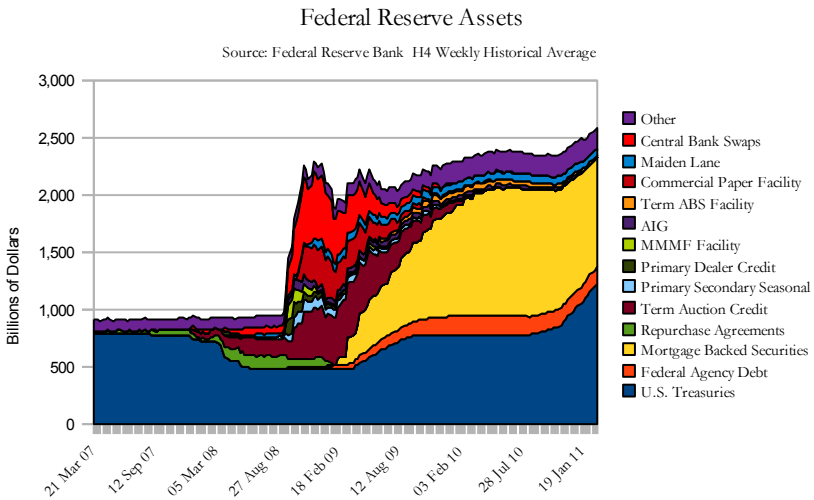Source: Federal Reserve Bank H4 Weekly Historical Average

Figure 10

By October 2008, it was clear that numerous financial institutions had on their books loans that simply could not be repaid, and as borrowers defaulted, the capital ratios of many banks fell below proscribed limits. Acting as the lender of last resort, the Fed initiated a massive asset acquisition program to help restore the banks to health. During the first few months of the crisis, it bought loans through its term auction program, and its commercial paper facility, and engaged in central bank swaps. However, by the first quarter of 2009, it was clear that banks were still in trouble. Thus, the Fed began a new program to buy mortgaged backed securities, replacing some of the previously acquired debt, but increasing the overall total. This maneuver simultaneously increased reserves and relieved the financial institutions of their most "toxic" of loans, resurrecting the banks' capital ratios by assailing the problem from both sides, so to speak. Meanwhile, the Fed also began to buy back many of the treasuries it had previously sold, which increased bank reserves yet further, to an extent that more than compensated for the reduction in fiduciary media.
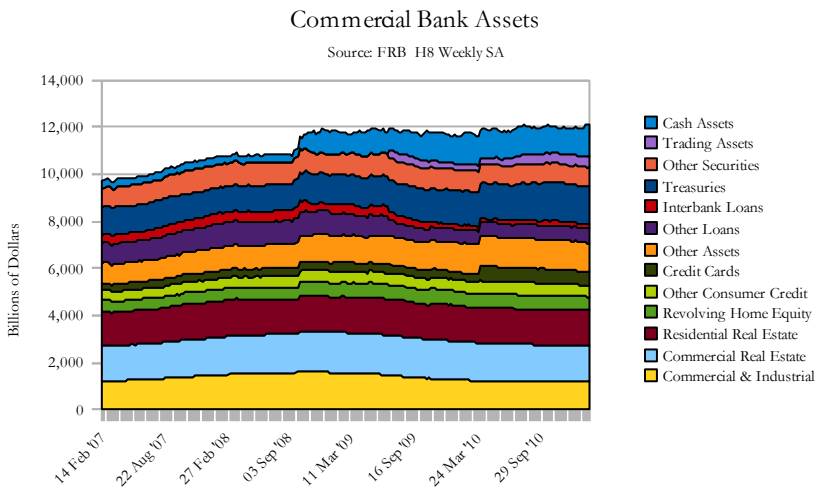

Figure 11

Figure 11 depicts commercial bank assets from January 2007 to January 2011.[38] The total book value of all loans, not including interbank loans,

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[38]NB: "Commercial bank" in this instance does not include savings banks, thrifts, credit unions etc. As such it does not show the total lending by *all* financial institutions.

reached a peak of $7023 billion on 17 October 2008. Thereafter it fell by 13.3% to reach a low of $6088 billion on 24 March 2010. By January 2011, the total value of loans had recovered somewhat to $6287 billion. Total commercial bank assets did not fall during the entire period, however, because of the Federal Reserve's intervention. Much of the approximately $1000 billion worth of loans that disappeared from the commercial banks' balance sheets were bought by the Federal Reserve and replaced with cash—i.e. electronically created money—which became part of the banks' reserves.

Bank credit originates from demand deposits—which results in fiduciary media—and time deposits—which do not. During the first two months of the crisis, fiduciary media fell by 11%, but thereafter it steadily rose, and by March 2010 it reached pre-crisis levels. As of January 2011, it stood at $5254 billion, fully 14% *higher* than it was prior to the start of the crisis. Since fiduciary media reached a low in December 2008, but *total* credit bottomed out only in March 2010, it is possible to deduce that bank credit sourced from time deposits accounted for the difference. This is borne out by an examination of commercial bank liabilities shown in Figure 12.
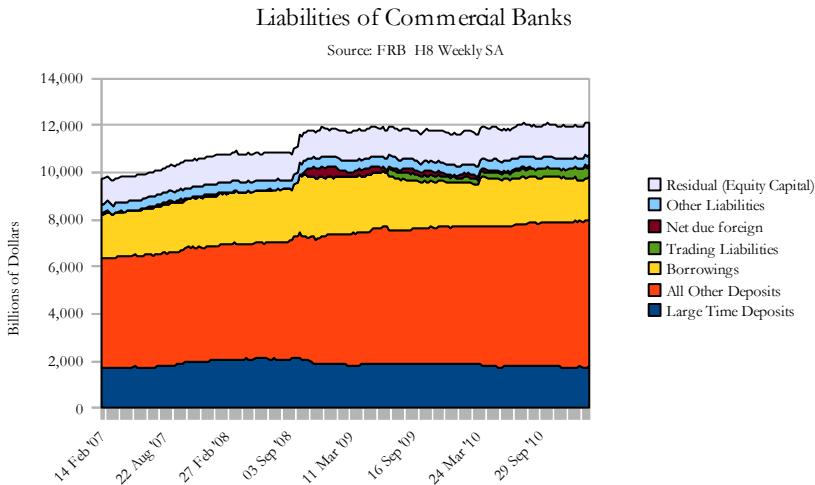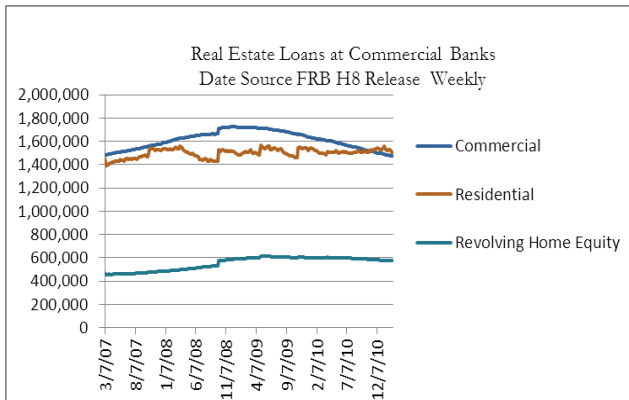

Figure 12

While demand deposits steadily grew, large time deposits contracted from a high of $2149 billion on 17 September 2008 to $1756 billion on 26 January 2011, a fall of 18%. Thus it is clear that the credit contraction was in large part caused by a reduction in loans sourced from time deposits, bonds and other forms of lending, and not exclusively by a reduction in fiduciary media.

It has been shown that despite a high rate of monetary inflation, *overall* prices fell, or stayed relatively flat, not as a result of the reduction of credit, but rather because of an increase in the reservation demand for money. However, the prices of *particular* assets, such as real estate did indeed fall as a direct result of the credit contraction.

The boom in real estate was caused by the monetary expansion from 2001 to 2006, and represented a huge misallocation of capital that occurred from an abundance of newly created money and artificially low interest rates. There were a number of factors why real estate was the focus of the boom. The government-sponsored enterprises of Fannie Mae and Freddie Mac[39] encouraged banks to issue many new loans that would otherwise never have seen the light of day. The Community Reinvestment Act, an affirmative action law, required banks to issue a certain percentage of new mortgages to persons who would normally have been unqualified, resulting in numerous loans that fell below traditional lending standards. And mortgage securitization, the practice of purchasing loans from banks, pooling them into trusts, and issuing securities based on the assembled pool, divorced purchasers of these securities from any knowledge concerning the underlying risk, and encouraged banks to issue loans without due regard to that risk.

On 2 January 2002 the total value of all real estate loans (commercial, industrial, home equity) on the books of commercial banks was $1755 billion. Over the course of the next few years, this figure steadily rose, but did not reach a peak until 6 May 2009 when it stood at $3,889 billion. Residential real estate loans, however, peaked in late 2007 at approximately $1600 billion.

Real Estate Loans at Commercial Banks
Date Source FRB H8 Release Weekly

Figure 13

In most markets residential real estate price were falling by late 2007. It is clear that the inevitable bust, which was the consequence of the boom, caused real estate prices to fall because credit was contracting, or not expanding as fast, in that particular sector.

The demand for housing fell because loans were increasingly harder to attain. At the same time, the supply of housing rose as an increasing number of mortgages became delinquent. However, at no time was the money supply contracting. Indeed the rate of monetary inflation after 2008 was higher than it had been previously. Therefore, it is not true to say that the credit contraction "spilled over" into other areas of the economy, depressing prices-in-general. Only prices in specific sectors were directly affected by the reduction in lending.

Summary

- In the wake of the 2001 recession, money creation by the Federal Reserve and the commercial banks led to a boom that was consistent with Austrian business cycle theory. From 2001 to 2004 interest rates fell, money was plentiful, and loans were readily available.

- Various government incentives and directives led banks to issue a large number of loans in the real estate sector. In conjunction with increased mortgage securitization, much of the credit was issued to borrowers without due regard to risk.

- The recession that started in late 2007 was the inevitable consequence of the boom.

- The credit contraction caused prices in *particular* sectors to fall, most noticeably real estate, where most of the loans had been concentrated and where prices had been bid up.

- A large number of loan defaults caused banks' equity capital to fall, leading to a financial crisis, and prompting massive intervention by the Federal Reserve in October 2008.

- Even though the amount of fiduciary media fell in 2008, Federal Reserve expansion of the monetary base exceeded this contraction, and thus the money supply continued to grow. Indeed, the *rate* of money supply growth increased.

- By mid-2009, fiduciary media began to increase again, but overall credit continued to contract because banks were reducing the total dollar value of their time deposits.

- Because the money supply was growing, the contracting credit did not directly cause a *general* fall in prices in 2008. Instead, prices fell because of an increase in the reservation demand for money, almost certainly as a result of uncertainty surrounding the financial crisis.

- During 2009 and 2010 the *rate* of monetary inflation reached over 15% because *both* reserves and fiduciary media expanded together, but price inflation was only modest because the reservation demand for money remained high.

7. Forecast Scenarios

Trying to predict future events is a risky proposition, for not only are the future facts not known, it is not known how the external agents will react to them. Predicting the nature and extent of future exogenous variables requires not the logic of economics, but rather the application of such disciplines as psychology, political science, and technology, none of which can provide an answer that is certain. Moreover, the prognosis requires examining the current data, predicting how the principal actors will respond, deducing the outcome, and with the forecast set of data, repeating the process all over again. The challenge is that at every step along the way, the forecaster has to be correct; at every fork in the road he must be accurate. And yet there are an almost infinite number of forks at every point in time, and an infinite number of points in time, and therefore an infinite number of roads along which the prediction could travel.

With that caution in mind, a few possible future scenarios are discussed here. The two major influences on the exchange demand for goods-in-general are the money supply and the social reservation demand for money. The size of the money supply is almost exclusively dependent on actions by the Federal Reserve and the financial institutions. Therefore, the three most apposite exogenous variables to consider are public expectations of inflation/deflation, Federal Reserve policy, and commercial bank lending.

What is the probability of future price deflation? Let us assume that moderate monetary inflation continues. Unless there is a dramatic increase in the supply of goods and services—enough to overcome the rate of monetary inflation—there would have to be a significant increase in the reservation demand for money for prices to fall. But the demand for cash balances is already high, and the likelihood of it moving higher seems remote given that

prices have already started to rise, and public expectation seems to be turning from price deflation to inflation.

What if there is another recession and a further contraction in fiduciary media? Given the Federal Reserve's past performance and recent statements by its chairman, Ben Bernanke, it seems likely that the Fed would never allow the money supply to shrink. As was the case during 2008, any contraction in fiduciary media would be met with further expansions of the monetary base. Indeed, the Federal Reserve has not allowed the money stock to contract since 1931, a period of time when bank runs were a common phenomenon and the U.S. was still on a gold bullion standard. It seems very unlikely to do so now. Therefore the chance of sustained price deflation at any time in the foreseeable future seems very remote indeed.

What are the chances of hyperinflation? Hyperinflation, defined as runaway price inflation *and* monetary inflation is a unique phenomenon that requires both unrestrained central bank money printing, and a rapidly falling reservation demand for money. There is no point at which one can say specifically where public expectation turns from inflationary to hyperinflationary, and where the crack-up boom begins. Boyapati (2010), in an excellent section of his paper on the motives of the Federal Reserve, believes that when a central bank is firmly under the control of the banking establishment, as opposed to the government, it is very unlikely to engage in policies that could lead to hyperinflation. The central bank's primary interest is to increase the money supply in a sustainable manner, thereby ensuring a steady transfer of wealth from the majority of the population to those who are the beneficiaries of money creation, without the extremely disruptive effects that high rates of monetary inflation can bring. Politicians, on the other hand, being more short-term oriented, and perhaps less educated on the adverse effects of monetary inflation, are more likely to resort to unrestrained money creation when they have greater control of the central bank.

Let us assume the Fed is unlikely to engage in the kind of money creation that occurred in the German hyperinflation of the 1920s, and that the rate of monetary inflation continues to be moderate. If the reservation demand for money were to fall from its presently elevated position, prices would start to rise fairly significantly. If the Fed did nothing, public expectations of inflation would increase, and the *rate* of price inflation would likely increase also, outstripping the rate of monetary inflation in short order. Eventually, assuming the Fed continued to do nothing, the rates of monetary and price inflation would converge.

The Fed could of course attempt to counteract rising prices by engaging in a policy of disinflation—reducing the rate of monetary

inflation—as Fed chairman Paul Volker did in the 1970s, but even so, it would take time for the effects to be felt. Unless there was a fairly dramatic reversal of the current loose monetary policy, it would be hard to turn public expectation around, and thereby reverse the falling demand for cash balances.

What if there was another financial crisis? In the crisis of 2008, the reservation demand for money rose because of great uncertainty surrounding the financial markets. Seemingly, there was no safe place to invest, and public expectations of inflation were low. But if a financial crisis occurred while public expectations of inflation were high, the situation would be very different. In this case, it would not be safe to *hold* money, so there would be a flight into real assets, which would further increase the rate of price inflation. Even if another financial crisis resulted in a severe contraction in credit, it is unlikely the *money supply* would contract, given central bank policy. More likely the contraction would not occur in fiduciary media, but rather in other forms of credit—which have no effect on the money supply—as investors fled from bonds, time deposits and other fixed term investments. Money would in this case move into hard assets such as food, raw materials, and precious metals. Under this scenario, a rapidly decreasing demand for cash balances would increase the rate of price inflation.

As of February 2011, the reserve ratio is at extremely high levels as shown in the chart below.
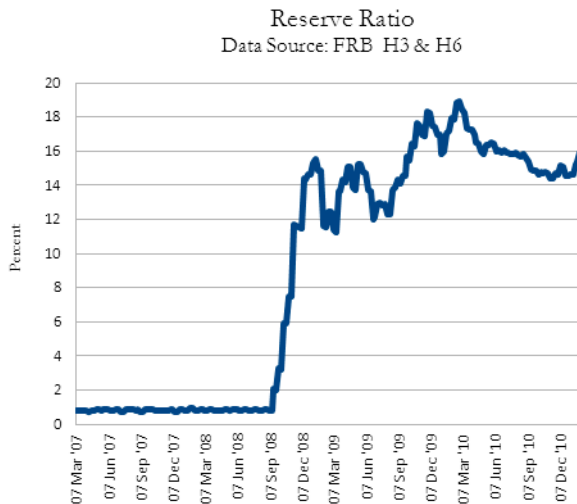

Figure 14

If the reserve ratio were to fall back towards historical norms—that is, if banks were to increase the amount of fiduciary media relative to reserves—there would be a very rapid increase in the rate of monetary inflation. What are the chances of this happening? The Economic Stabilization Act of 2008 authorized the Federal Reserve to pay banks interest on excess reserves—reserves in excess of the minimum required. Banks view this option as more attractive than issuing new loans at a time when their capital ratios are close to the minimum and market interest rates are low. Thus the issuance of fiduciary media is constrained and the reserve ratio remains high. Provided the Federal Reserve does not abandon the program, and continues to offer competitive interest rates, it would seem that the possibility for monetary inflation through the issuance of fiduciary media remains slim.

Some commentators have worried that if *price* inflation takes hold and market interest rates rise, the Fed would have to offer increasingly higher rates of return to stay competitive. Since the interest is paid with newly created money, which *adds* to the reserves, this by itself increases the money supply. The concern is that as the money supply grows, interest rates have to increase further, and the Fed could be boxed into a corner, where rising interest rates and additions to reserves chase each other upwards in a reinforcing spiral.

However, what these authors overlook is that the Federal Reserve can always reduce the level of bank reserves, at any time of its choosing, through the sale of its assets. What if it ran out of assets to sell? This is unlikely. Any institution that is permitted to create money out of thin air, can, in conjunction with the government, create assets. The government simply issues new treasury bonds, which it then "sells" to the Federal Reserve. The Fed "pays" for them with newly created money, but the money does not enter circulation; rather it is held dormant in a special account. Meanwhile, the treasury bonds can be sold by the Fed to the public through its open market operations. In September 2008, at the Fed's request, the Treasury created the Supplementary Financing Account, specifically for this purpose.[40] Provided the public is willing to buy the bonds, the Fed has the ability to reduce the level of bank reserves, and hence constrain the issuance of fiduciary media.

Therefore, fears that the Federal Reserve would allow commercial banks to be fully "loaned up" at their current level of reserves, or that the Fed would at some point in the future be unable to reduce the level of reserves, are probably overblown. A more likely situation is that lending

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[40]See Pollaro (2010) for a more detailed explanation of the Treasury Supplementary Financing Account.

would start to increase, but the Fed would not act quickly enough. The process of halting the fractional reserve process takes time, but there is always the danger that acting too quickly could jeopardize the banks' balance sheets and precipitate another recession. If the Federal Reserve were too slow to respond to a fall in the reserve ratio, monetary inflation could be very significant before the process was stopped.

8. Conclusion

The deflationist's focus on bank credit deflation is misplaced because of a basic misunderstanding of how credit affects prices. A fall in the amount of bank credit can only affect prices-in-general when it leads to a reduction in the amount of fiduciary media, and only when the decrease in fiduciary media causes a contraction in the money supply, and, furthermore, only when the fall in the money supply leads to a reduction in the exchange demand for goods. Assuming that an increase in the supply of goods does not offset the fall in demand, then, and only then, does a credit contraction cause a general price deflation.

During the financial crisis of 2008, a contraction in bank credit led to a relatively small reduction in the amount of fiduciary media, but Federal Reserve intervention ensured that this was more than offset by an increase in the level of bank reserves. During the entire time, the money supply never contracted. A temporary general price deflation occurred only because the reservation demand for money rose to an extent that more than offset the rise in the money supply, but this was quickly overcome by later increases in the rate of monetary inflation.

The credit contraction did lead to a fall in the prices of certain assets in particular sectors of the market such as real estate, consistent with Austrian business cycle theory, but the fall in credit logically could not have been responsible for the general price deflation.

The rise in the reservation demand for money was most likely precipitated by fear and uncertainty surrounding the credit contraction in the financial markets. However, the effect, if any, is only a psychological one; there is no praxeological relation. Indeed, when public expectation turns from price deflation to price inflation, the social reservation demand for money can fall regardless of the level of credit.

As of January 2011, the prospect of sustained price deflation seems very unlikely. If the reservation demand for money falls, price inflation will start to outstrip monetary inflation. The further consequences will depend on the reaction by the Federal Reserve, the banks, and the population at large.

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