Risk in Mises' Unstable Equilibrium Model

Dante Bayona

Abstract:

The first section of this paper develops an unstable equilibrium model based on Mises' ideas about fractional reserve. Recent *causal-realist* studies (Salerno, 2018) can support the claim that this model is praxeologically consistent.

The second section of the paper relates the inverse of fractional reserve to two ratios of leverage and risk used in finance: the Debt-to-Equity ratio and the Equity Multiplier. Debt structure could be another way to understand capital structure. While economists recognize the effects of a credit expansion on the real economy (increased demand, more employment), little attention has been given to the increase in risk that results from the same expansion. If this is not considered, one might mistakenly think that increasing money-credit only has positive consequences.

Finally, combining the two previous sections, the paper describes a business cycle bubble. It analyzes the chain of events and consequences of an external shock on the economy, and it compares that to the mainstream stable equilibrium model.

Keywords: Austrian school, risk, unstable equilibrium, Keynes

JEL Classification: D50, E14, E32, E44, G01

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In general, demand curves are useful only because they allow some predictions to be made regarding the effects of changes in supply. Hence each point on the demand curve must represent an attainable equilibrium between demand and supply. It is extremely difficult to imagine any other possible use for a demand function.
—James Buchanan

The Chicagoans' insistence on attainable alternatives and comparative-static predictions suggests a reluctance to consider questions of disequilibrium, of equilibrating processes, and of the stability or instability of equilibrium.

—Leland B. Yeager

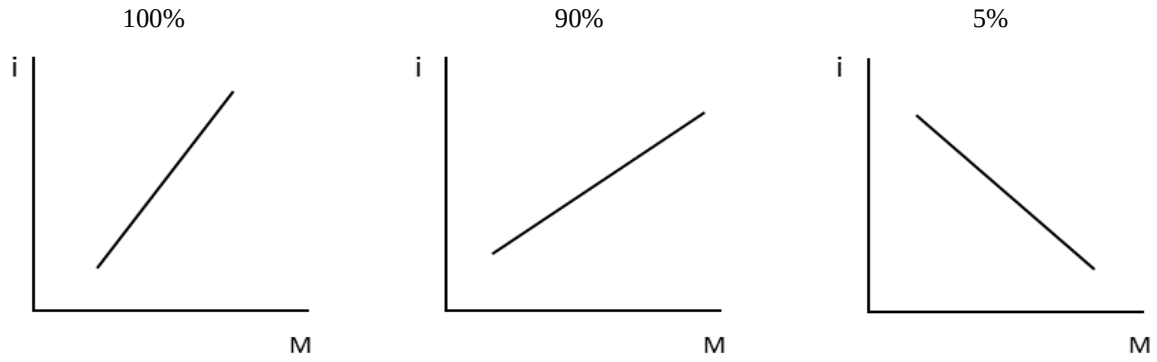
1. Introduction

Contrary to what the standard supply curve theory suggests, when the central bank *lowers* the interest rate, banks offer *more* loans, *not less*. Then, should we use a downward sloping curve to represent the supply for loanable funds?

Perhaps 300 years ago the supply curve for loanable funds was upward sloping, when it was necessary to back the money supply with gold. At that time the supply curve for loanable funds was a reflection of the supply curve for gold, which to this day is upward sloping. But that changed with the generalization of the fractional reserve system.

Under a fractional reserve system, the lower the level of cash banks are required to keep in reserve, the more money banks have available to lend (and to charge interest on). Thus, under the old system, for a given level of gold, the amount of loanable funds increased more and more as the required reserve decreased more and more. Graphically it is as if the supply curve rotates clockwise as the fractional reserve decreases.

LOANABLE FUNDS AT DIFFERENT LEVELS OF FRACTIONAL RESERVE



The amount of loanable funds depends on the inverse of the fractional reserve and on the amount of cash in circulation, as will be shown later. The inverse of the fractional reserve can be called the “Misesian multiplier” since this factor captures the Misesian idea of business cycle by credit expansion.

2. A downward sloping supply curve

The downward sloping supply curve for loanable funds can be explained as follows: for a given level of fractional reserve, if the central bank lowers the interest rate, banks will now be able to lend more cheaply, and more loans will be granted. These new loans return to the banks in the form of new deposits and, given the fractional reserve, banks will be able to use most of these new additional funds to make even more loans. The process repeats itself until the multiplier effect is exhausted. While the first batch of savings is expensive to find, the following batches are cheaper. Thus, when interest decreases, the quantity supplied of loanable funds increases. This is why the supply of loanable funds has a negative slope.

The central bank can lower the interest rate by reducing the rate it pays to banks on their reserves, or by lowering the rates banks can charge to each other. When the central bank sells assets, injecting money into the economy, the downward sloping supply shifts to the right and the

fractional reserve multiplies the supply of loanable funds again. For financial institutions that create credit without deposits from the public (*shadow banking*) the Misesian multiplier idea also applies, but instead of reserve requirement they have capital requirements.

From a *causal-realist* perspective, for praxeologists, the demand curve has a negative slope reflecting the fact of scarcity in the economic world. Thus, the more we have of a good, the lower the value we assigned to the last unit available that helps us to achieve a goal. The supply curve is upward sloping reflecting the fact of scarcity in the economic world as well. Thus, in order to induce you to give up one more unit of something scarce you have (or produce), you must get paid more and more. But what happens when the curves no longer reflect scarcity?

In economics, downward sloping supply curves are used to represent economies of scale —the larger the scale of production, the lower the cost of production— and also to represent the backward-bending section of the labor supply[1,2,3]. In the case we are analyzing here, for the producer of money, with regard to his/her scale of value: the more money returns to the bank, the more credit-money can be created —given fractional reserve—, the lower its marginal utility with respect to other goods, then the lower the price required to give up a marginal unit of it.

Under a 100% reserve gold standard —or if stocks and bonds were used as money[4]— an increase in the quantity of gold banks have would shift the upward sloping supply curve to the right. In that system the central bank cannot lower the reserve requirement, therefore loans that return to the bank cannot multiply themselves. In that system the only way to reduce the interest

[1] Salerno, "The 'income effect' in causal-realist price theory."
[2] Klein & Salerno, "Giffen's paradox and the Law of Demand."
[3] Rothbard, "Man, Economy and State."
[4] Bayona, "A model of free banking money."

rate, from the supply side, is an increase in gold reserves. And even that reduction in interest rate would not have a multiplier effect on loans. Yet, the downward sloping supply curve reflects all these conditions, it reflects the multiplier —*quasi economies of scale*— effect of fractional reserve and interest rates.[5]

2.1. How does a market behave when both supply and demand curves have negative slopes?

In a *classical* market with a positively sloping supply and a negatively sloping demand, the supply curve is always to the right of the demand curve above the point where the two curves intersect. Any price above that point creates an excess supply that pushes the price down. In the same classical market, the demand curve is always to the right of the supply curve below the point where the two curves intersect. And if the price falls below that point, there is an excess demand that pushes the price up. The intersection point is *stable* in the sense that buyers and sellers, through excess supply and excess demand, agree to maintain that arrangement.

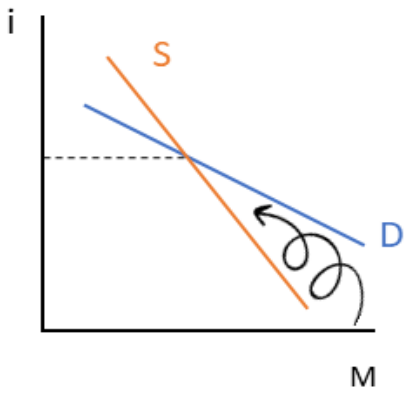
In this classical market, if an external shock moves either of the curves, the market always moves towards another point where both curves intersect again, it moves from one equilibrium point to another equilibrium point. *Equilibrium* understood as the point where, at a given price, the quantity supplied is equal to the quantity demanded.

In contrast to the above, in a market where both curves have negative slopes, the final state will depend on which curve is more vertical.

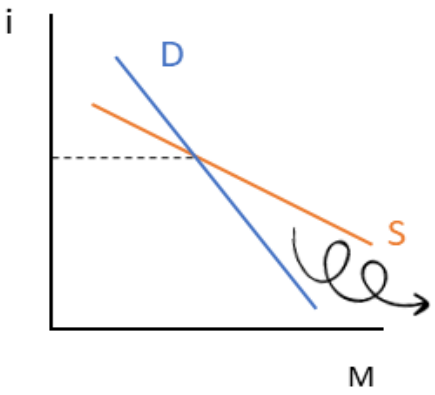
[5] According to some economists, fractional reserve is now irrelevant in our economic world. Yet, one wonders if they can imagine what would happen is tomorrow the central bank increases the reserve to 100%. Would those economists say that nothing will happen? See, Ihrig, Weinbach & Wolla, “R.I.P. Money Multiplier.”

EQUILIBRIUM

STABLE



UNSTABLE



If the supply curve is to the right of the demand curve above the point where the two curves intersect, any price above that intersection creates an excess supply that pushes the price down. That happens because any price above that intersection point decreases both the quantity demanded and the quantity supplied, but the quantity demanded decreases faster. Under the same intersection point the demand curve is to the right of the supply curve, and any price below that intersection creates an excess demand that pushes the price upwards. In this type of market, if an external shock moves either curve, the market moves from one intersection point to another intersection point, the market moves towards another *stable equilibrium* — just as in the case of the positively sloping supply curve. It is an *equilibrium* because at the new price the quantity supplied and the quantity demanded balance each other, and *stable* because buyers and sellers, negotiating through excess supply and excess demand, agree to maintain that equilibrium,[6,7]

[6] Tinbergen, "Unstable and Indifferent Equilibria in Economic Systems," 37.

[7] CFA Institute, "Supply and Demand Analysis: Introduction," 21.

But what happens when, having both curves negative slopes, the demand curve is more vertical than the supply curve? In this case, since the demand curve is to the right of the supply curve above the point where both curves intersect, any price above that intersection creates an excess demand that pushes the price to even higher levels, further away from the original intersection. That happens because any price above that intersection decreases both the quantity demanded and the quantity supplied, but the quantity supplied decreases faster.[8]

In this situation, what would happen if an external shock moved either curve? Will the market return to equilibrium? The answer is no, as I will explain shortly.

The expansion of loanable funds will affect the economy's structure of production. The new loans will increase the number of new buildings, houses, factories, tractors, etc. This change in the structure of production has been represented by a change in the structure of the economy's *Hayekian triangle*. Yet, instead of focusing on the assets side of the economy's balance sheet, we can analyze what happens on *the right side of the balance sheet*, that is, the structure of debt, owner's equity, and the leverage between them.

3. Risk as a budget constraint to credit expansion

To what extent will banks issue credit? Banks will expand lending up to a sustainable level of risk. One of the factors to consider when analyzing the risk of giving a loan is the applicant's debt/income ratio. The higher the ratio, the riskier the customer. Thus, if one applies for a mortgage, the higher one's debt-to-income ratio, the less banks are willing to grant the loan.

[8] An example from microeconomics could be the case of a market with negatively sloping supply due to economies of scale. While the price increase reduces both the quantity supplies and the quantity demanded, the quantity supplied decreases more. An example of macroeconomic disequilibrium, which is the interest of this paper, will be explained later.
See also, Bayona "Un Modelo Misesiano de Desequilibrio General."

Notice that both components of the ratio are affected by the expansion of the supply of loanable funds. The denominator of the ratio (income) increases in different ways. For example, the loan the bank gives to one of its customers becomes income to the person who is paid with that loan. This process repeats many times until the multiplier effect wears off. The numerator of the ratio (debt) is also influenced by the credit expansion. Every credit expansion is debt expansion. "Debt" is credit's evil twin.

Then, if every credit expansion is related to risk —debt and income—, what can be said about the relationship between fractional reserve and the economy's risk?

Let us imagine that there is $100 of savings deposited in the bank and that fractional reserve is 98%. Assuming maximum expansion,[9] the total supply of loanable funds will expand up to $102.04 —equals to (1/0.98) x $100. Of that, $2.04 is credit-money created by the banks. In that state, debt/income = 2% = 2.04/102.04. Now, what happens if fractional reserve is reduced to 10%? That will multiply the $100 of savings up to $1000 of loanable funds —that is, (1/0.10) x $100. Here the credit-money created by the banks is $900, that is $1000 minus the first $100. Loans have increased from $2.04 to $900. Debt/income has increased to 90% = 900/$1000. The economy's risk has increased. Thus, by reducing fractional reserve from 98% to 10% the debt/income risk ratio increased from 2% to 90%. Notice that the risk ratio is the complement of the fractional reserve ratio: 2% risk is the complement of 98% fractional reserve, and 90% risk is the complement of 10% fractional reserve.

$$\text{Risk} = \frac{[(1/r)*M1 - M1]}{M1} = [(1/r) - 1]*100\%$$

Where: r = fractional reserve

[9] Huerta de Soto, Dinero, crédito bancario y ciclos económicos.

When thinking about the sustainable level of debt, it is important to consider the level of fractional reserve. In our example, when fractional reserve is 98%, that is, when debt is $2.04 and the total income is $102.04, if debt grows at 5% per period and income grows at 4% per period, it takes 409 compounding periods for total debt to grow to be 100% of total income. Yet, when fractional reserve is 10% —that is, when the $100 of savings grows to $1000 through fractional reserve—, it only takes 14 compounding periods for total debt (growing at 5%) to get to be 100% of total income (growing at 4%). When the numerator of (Total Debt/Total Income) increases faster than the denominator risk increases.

In theory, if starting from a given level of income and a given level of debt, we make the economy grow through fractional reserve to a level compatible with its available factors of production, making sure we can always at least cover the debt service —that is, the product of the initial level of debt, the rate of growth of that debt, and the interest rate to be paid (that also depend on fractional reserve)—, we could determine the optimal rate of fractional reserve.

We can relate fractional reserve to two ratios of leverage and risk: the Debt-to-Equity ratio (Total debt/Total Equity) and the Equity Multiplier (Total Assets/Total Equity).[10] We are interested in the level of debt created by banks, through fractional reserve, on top of the monetary base issued by the central bank (M1). We will use the monetary base instead of income in the ratios. In our example, when we reduce the reserve requirement from 98% to 10%, the

[10] Mises, Human Action, 262:

> "Today there is, among businessmen and accountants, unanimity with regard to the meaning of capital. Capital is the sum of the money equivalent of all assets minus the sum of the money equivalent of all liabilities as dedicated at a definite date to the conduct of the operations of a definite business unit. It does not matter in what these assets may consist, whether they are pieces of land, buildings, equipment, tools, goods of any kind and order, claims, receivables, cash, or whatever."

debt-to-equity ratio increases from 0.02 to 9 —that is, from 2.04/100 to 900/100. And the equity multiplier changes from 1.02 to 10 —that is, from 102.04/100 to 1000/100. Both ratios indicate that the economy has been financing growth with debt. These ratios can be expressed in terms of the fractional reserve as follows:

$$\text{Debt to Equity} = \frac{\text{Total Debt}}{\text{Total Equity}} = \frac{[(1/r)*M1 - M1]}{M1} = \frac{M3 - M1}{M1} = \frac{1}{r} - 1$$

$$\text{Equity Multiplier} = \frac{\text{Total Assets}}{\text{Total Equity}} = \frac{(1/r)*M1}{M1} = \frac{M3}{M1} = \frac{1}{r}$$

Where: r = fractional reserve

The example above was done by changing the fractional reserve level, but a similar result can be obtained by changing the interest rate. Thus, if the central bank lowers the interest rate, banks will be able to lend more, more money will come back to the banks as deposits, and once again that will create more loans. Levels of income and debt will multiply, and the risk level will also multiply.

Finance borrows the word *leverage* from physics, but the word is inaccurate in finance because it misses the risk inherent in this field. Financial institutions use leverage to magnify their profits, yet by doing that they not only multiply their potential profits but also their potential losses. *Leverage* in physics has nothing to do with risk. When financial institutions use leverage, they are actually multiplying their risk, they are *doubling* (tripling, quadrupling …) *down their bets*.

Let us say that I use my savings to buy one stock for $100 and in a year the stock price goes up to $110. I made a 10% profit. If at the end of the year the price goes down to $90, I made

a loss of 10%. There is no leverage in this operation. Now, let's say that I only have $10 of savings and my brokerage company gives me a loan for $90 to buy the stock. If the stock price goes up to $110, I made a 100% profit —that is, the $10 gain in price divided by my original investment of $10, after I sell the stock to pay my debt.[11] But what happens if the price falls to $90? In this case I lost my original $10, that is, I have a loss of 100% of my initial investment, after I sell the stock to pay my debt. As we can see, leverage multiplies the risk of winning and losing. The Misesian multiplier (1/r) is also the equity multiplier of the economy.

Capital	Debt	Asset $_{t=0}$	Asset $_{t=1}$	Profit / loss
100	0	100	110	10%
10	90	100	110	100%
10	90	100	90	-100%

What could happen if, when the price goes down to $90, everybody who bought the stock on credit tries to sell it at the same time? Everybody trying to minimize losses would push down the price even more. Yet, it is for the 100% quick buck that traders use *risk* leverage.

While all economists recognize the effects of a money-credit expansion on the real economy (increasing demand, more employment, etc.), little attention has been given to the increase in risk for the economy that results from the same expansion. If the higher risk in the economy is not considered, someone might mistakenly think that increasing money-credit has only positive consequences. But all credit expansion increases the risk of bad debts. There is no such a thing as a free lunch.

[11] A price increase of the assets bought with credit reduces the loan risk (debt/equity), and some people can use that increase in value as collateral for another loan —for example: a home equity line of credit, or more margin loans for trading—, but that might be due to a generalized wave of cheap credit in the economy.

Many Austrian economists have focused their analysis on the expansion of productive processes due to the increase in the availability of loanable funds, but not every expansion of credit expand the economy's productive capacity. This is clear when we consider the case of derivatives. While the proceeds from issuing stocks and bonds are used to increase productive capacity, derivatives do not increase productive capacity.[12] And while a fraction of derivatives is used to hedge, most of derivatives are used for speculation. It is true that a producer of oranges can hedge the risk of the price falling strongly next year by entering into a futures agreement with a buyer of oranges who wants to hedge the risk of price increasing strongly next year. But most of futures are settled in cash these days, meaning that buyers and sellers do not care about the delivery of the physical commodity. If they do not care about the physical commodity, what are they doing it for? They speculate with borrowed money. How can the Hayekian Triangle account for this speculation if the amount of real oranges for next year already covered by hedging does not change? In a similar way, credit default swaps are mostly used for speculation rather than for insurance. It is true that bondholders can protect themselves against the risk of their company going down by using CDSs, yet most of CDSs are used to bet on the performance of the company by people who do not own any bonds in the company, and they do it with borrowed money. While the legality of allowing everybody to buy life insurance policies against your life, or the legality of lending money to addicts and traders to gamble is something to be studied, the fact is that all that can be, and it is, financed with cheap credit. The problem is not speculation in itself, the problem is that in the end some of those traders will end up breaking the banks due to the high levels of debt and risk. According to Brooksley Born, the notional amount of (leveraged) derivatives grew from $28 trillion in 1997 to almost $673 trillion on the eve of the

[12] Born, "Financial Regulatory Reform: Imperative for Our Future." (2012)

crisis in June of 2008, “an amount more than 10 times the GDP of all the countries in the world.”[13,14] Can the Hayekian Triangle take into account such a credit expansion on non-productive speculative activities?

4. Effect of a negative supply shock

Let us assume that banks are prudent and expand credit to an optimal level using some method of risk management. What might happen in the loanable funds market if, starting from an unstable equilibrium situation, a negative supply shock occurs? What happens, for example, if banks learn that there was widespread fraud in the credit evaluation of applicants, or what if they discover that the quality of the assets that were used as collateral for loans was actually very poor? As lending risk increases, banks decide, as a precautionary measure, to liquidate risky lines of credit, to request more collateral or margin for loans, or to increase their cash reserves for bad debts. That is, they reduce the supply of credit. Graphically, the supply curve for loanable funds shifts to the left, and this triggers a series of events. As the amount of available loans shrinks, fewer loans return to banks in the form of deposits, and as those deposits shrink, a second

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[13] Ibid.

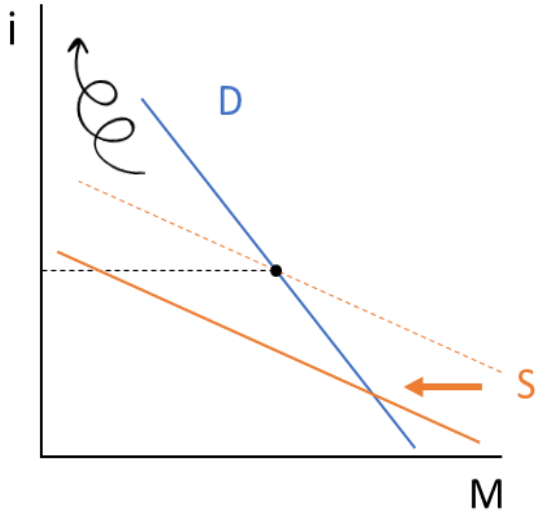
> “After the CFTC granted this exception from exchange trading in 1993 the over-the-counter derivatives market began to grow exponentially and by 1997, when I was chair of the CFTC, it had grown from a very small market to over $28 trillion in notional amount…
>
> With only about $5 billion in capital, LTCM managed to acquire $1.25 trillion in notional amount of over-the-counter derivatives without the knowledge of any federal regulator or even of its derivatives counterparties, which included most of the major over-the-counter derivatives dealers. When the market turned against it, LTCM suddenly threatened to default on its obligation to these counterparties…
>
> After that act passed, the over-the-counter derivatives market grew exponentially to almost $673 trillion in notional amount on the eve of the crisis in June of 2008, an amount more than 10 times the GDP of all the countries in the world.”

[14] According to the Bank for International Settlements (BIS), the *notional* value of outstanding over-the-counter (OTC) derivatives was $632 trillion at end-June 2022, and the gross market value of outstanding OTC derivatives was $18.3 trillion for the same period. That is a leverage of 34. https://www.bis.org/publ/otc_hy2211.htm

reduction in lending occurs. That repeats several times until the reverse multiplier effect is exhausted. As the supply curve shifts to the left, at the original level of interest rate, an excess demand appears that pushes up the interest rate towards disequilibrium.

SUPPLY NEGATIVE SHOCK

UNSTABLE EQUILIBRIUM



When credit implodes, income reduces, but debt does not disappear. Debt is the *rigidity* of the system. The implosion causes the economy's risk ratio (debt/income) to increase more than before. Facing a higher risk, banks have little incentive to lend more, even if the central bank decides to print more money or lower the *nominal* interest rates. If risk is higher than before, banks will require a higher *real* interest rate —one that accounts for a higher risk— from borrowers to lend them money. If banks start collapsing, that will reduce credit-money even more.

Given this situation there are two ways to reduce the economy's risk: decreasing the numerator (debt), or increasing the denominator (income) of the ratio. One possible way to

reduce the numerator is to buy banks' bad debt, buying their bad mortgages.[15] On the other hand, is it possible to increase income quickly? That is unlikely, because in order to achieve that the economy has to be put back on track first. Regulators can also recapitalize financial institutions in bad condition to increase equity and to reduce their individual risk. Until the debt/income ratio does not return to a sustainable risk level, banks will not expand debts again.

From a global perspective, if the cheap credit-money is sent to other countries, the credit implosion could originate a debt crisis in those countries since interest and exchange rates could increase sharply — Mexico (1982), Thailand (1997), Russia (1998).

In short, fractional reserve creates a high-risk level unstable equilibrium, and a negative supply shock could originate an economic implosion from where it is difficult to recover due to the high levels of debt created during the credit expansion.

As we saw before, when both curves, supply and demand, have negative slopes, two situations can occur: a stable equilibrium and an unstable equilibrium. We have an unstable equilibrium when supply falls faster than demand (when the price increases over the intersection point), that is, when the supply side is very sensitive to fractional reserve, that is, when the required reserve is very small.

While in mainstream we analyze situations where the market moves from one equilibrium to another equilibrium, now we have a situation where the market no longer equilibrates. There is no second point of intersection. The first point of intersection was an *unstable equilibrium*. *Equilibrium* because at a given price the quantity supplied and the quantity demanded were equal, and *unstable* because buyers and sellers interacting no longer reestablish

[15] Bernanke, The Courage to Act.

an equilibrium. Mises' model can be expanded to a general disequilibrium model[16] that corrects the naïve Walrasian model that with only positive sloping supplies only allows for equilibrium at all times.

5. Comparing the effects of a negative supply shock on a market in unstable equilibrium versus its effects on a classical market

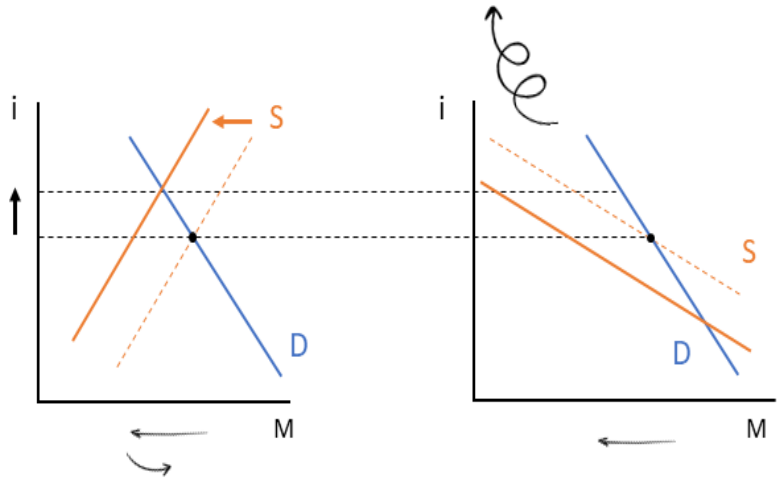
If the loanable funds market has a positively sloping supply curve —the classical market—, the result of the negative supply shock is a relatively fast return to equilibrium. As the supply curve shifts to the left, at the previous level of interest rate, an excess demand appears that pushes interest upwards. As the interest rate starts increasing, on the new supply curve some people start saving more, as the classical theory of savings suggests. On the original demand curve, the quantity demanded decreases. Finally, supply and demand meet again. At the final intersection the interest rate is higher, and the initial reduction in loanable funds has been partially offset by an increase in savings.

In the loanable funds market in unstable equilibrium, at the original level of interest rate, the excess demand pushes the interest rate to higher levels, and there is no increase in savings to offset the decrease in loanable funds. At the higher interest rate, supply decreases faster than demand, and the market does not return to equilibrium.

[16] Bayona, "Un Modelo Misesiano de Desequilibrio General."

SUPPLY NEGATIVE SHOCK

CLASSICAL MARKET UNSTABLE EQUILIBRIUM



5.1. Two supply curves coexisting

It is reasonable to think that if the interest rate rises the original group of savers —in our example, the owners of the first $100 deposited in the bank— will be willing to save more. But we cannot ignore the fact that after that a large part of the supply of loanable funds originated through the multiplier effect of fractional reserve. Thus, the total supply of loanable funds is composed of the original cash in circulation plus all the credit-money created by the banks. The level of fractional reserve will determine the relative weight of each component in the total supply of loanable funds. Probably the component with the greatest weight is credit-money and therefore, the negatively sloped supply curve dominates the positively sloped supply curve. Thus, the two supply curves coexist in the loanable funds market but, in net, when the interest rate rises the quantity supplied decreases.

A 2012 documentary suggests that in England for every 3 pounds created by the central bank, 97 pounds are created by private banks (i.e. through fractional reserve).[17] And in 2013 a documentary by financier Ray Dalio argued that for every 5 dollars created by the US central bank, 95 dollars were created by private banks.[18]

5.2. Keynes' loanable funds market as an unstable equilibrium

In *The General Theory*, Keynes tried to explain what was happening in the loanable funds market using the classical model of supply and demand. That is the only graph that appears in his book. And he concluded that such a model was useless for explaining what was going on in the economy.[19] Keynes stated:

> The classical theory of the rate of interest seems to suppose that, if the demand curve for capital shifts or if the curve relating the rate of interest to the amounts saved out of a given income [supply] shifts or if both these curves shift, the new rate of interest will be given by the point of intersection of the new positions of the two curves. But this is a nonsense theory. For the assumption that income is constant is inconsistent with the assumption that these two curves can shift independently of one another. If either of them shift, then, in general, income will change; with the result that the whole schematism based on the assumption of a given income breaks down.[20]

Notice that when the supply of loanable funds is downward sloping, a negative shock that shifts the curve to the left, has the effect of reducing income (because the reduction in credit

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[17] Oswald, 97% Owned: How is Money Created.

[18] Dalio, How The Economic Machine Works.

[19] Garrison, Time and Money,139.

[20] Keynes, The General Theory, 179.

reduces loans, and that reduces income), and that is what Keynes was looking for. In this sense Mises' model explains Keynes. Also notice the issue of Keynes trying to explain general equilibrium with tools from partial equilibrium (the "ceteris paribus").

6. Speculative bubble as unstable equilibrium

Buying something valuable when its price is low is a better investment than buying it when its price is high, ceteris paribus. Yet, during some periods we observe that people buy more of something when its price is rising. They do it because they think prices will continue rising further, then it makes sense to buy it now. Some people are so sure prices will be higher in the future that they are willing to take the risk of getting a loan to buy the asset, and banks see an opportunity to lend money. People buy houses to resell them at a higher price in the future, and traders get margin loans to *double down* their bets. Now, up to what point makes sense to keep buying the asset? Up to the point where the income generated by the asset is greater than what one pays for it. That is, up to the point where the present *fundamental* value of the *expected* future stream of cash generated by the asset —i.e., the monthly rent generated by the house one bought, or the dividends generated by the stock one is long— is greater than the present value of the cost of buying the asset. The situation when the asset price keeps rising above its fundamental value is called *asset bubble*.[21]

A credit expansion can probably work well, so to speak, up to a certain point, but after that investments will be made in projects that do not make economic sense. At the end, the

[21] James Chanos with Charlie Rose (2010):

> "What we define as a bubble is any kind of debt-fueled asset inflation where the cash flow generated by the asset itself —a rental property, office building, condo—does not cover the debt incurred to buy the asset. So you depend on a greater fool, if you will, to come in and buy at a higher price."

entrepreneurial mistake will be discovered, and those who paid in cash (with savings) over the fundamental value will realize only a loss, but those who got a loan to buy the asset not only will realize a greater loss but will be stuck with debt.

If you make a down payment of $100 and get a 15-year mortgage loan for $900 to buy a house that costs $1000, if the price goes down to $900 next year, you lose 100% of your initial investment. Plus, you have 14 more years of debt. What is going to happen to the banks that hold your mortgage if you do not make your monthly payment? What is going to happen to the mortgage-backed securities your payments support? What is going to happen if everybody starts selling their “underwater” mortgages? Facing the higher risk, banks will reduce the supply of loanable funds.

When the market realizes that future dividends do not justify the high stock prices, the bubble ends and traders receive margin calls. Now the issue is: who is willing to write off the losses? Can the failure of a large bank start a domino effect? How bad would that really be? What we know is that until the system does not return to a sustainable level of risk the economy will not recover.

We are interested in the bubble that is created by credit expansion (debt) and in what happens when the future stream of cash flows is not enough to cover the debt service. We are not interested in those who bought their houses in cash (with savings), we are interested in those who got a loan to buy the house.

7. Speculative bubble as an upward sloping demand curve

If during the bubble people demand more even though the price is rising, should not that demand be represented with an upward sloping curve instead of a downward sloping curve as

mainstream suggests? In economics the upward sloping demand curve is already used to represent Giffen goods and Veblen goods. Supposedly, poor people in Ireland bought more potatoes (inferior good) the more the price was going up because of the negative impact the higher price had on their total incomes. But in the case that we are now analyzing this is not due to a scarcity of resources but due to an abundance of new money to buy assets.

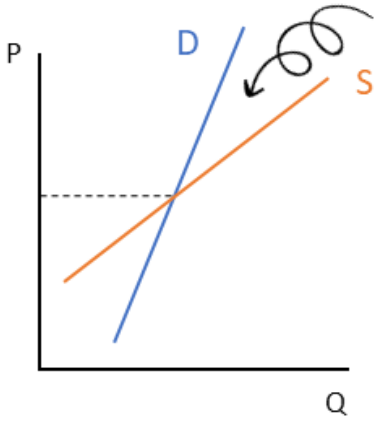
From a causal-realist perspective, as Professor Joseph Salerno has explained, the Giffen good's upward demand can be considered an illusion, because it violates the assumption that the purchasing power of money stays constant.[22] Thus, when money is introduced into exchanges, after bartering, the supply and demand of money are assumed to be constant in order to analyze only the effect of a price change on the quantity demanded. Yet, when the Giffen good's price increases, the purchasing power of money decreases simultaneously, violating ceteris paribus.

In this paper we are analyzing *that* case when the money supply is increasing and its simultaneous effect on the assets market. We are not analyzing *partial* equilibrium, but *general* equilibrium. All the markets interacting with each other (including the market for loanable funds), simultaneously may affect each other. When Keynes noticed that "the whole schematism based on the assumption of a given income breaks down" he did not realize that he was trying to do general analysis with an assumption of partial analysis.

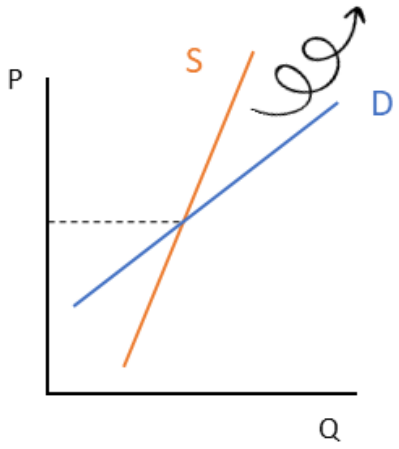
[22] Salerno, "The 'income effect' in causal-realist price theory."

EQUILIBRIUM

STABLE



UNSTABLE



In our analysis, if both curves, supply and demand, have positive slopes, then, depending on which of them is more vertical, a different type of equilibrium will be generated. Let us first analyze the case where the demand curve is more vertical than the supply curve. If this is the case, any price above the intersection generates an excess supply, because at the higher price, both the quantity demanded and the quantity supplied increase, but the quantity supplied increases more, and that creates the excess supply that pushes the price down towards the original intersection. Any price below the intersection of supply and demand generates an excess demand that pushes the price up towards the original intersection. The original intersection is a stable equilibrium. *Equilibrium* because the quantity supplied and quantity demanded equal each other at a given price, and *stable* because the forces of buyers and sellers interacting through excess supply and excess demand decide to maintain the original equality of supply and demand.

If the demand curve lies to the right of the supply curve above the point where the two curves intersect, any price above that intersection triggers a series of events that will cause

supply and demand not to equilibrate again. Any price above the intersection creates an excess demand. A price increase increases both the quantity demanded and the quantity supplied, but the quantity supplied increases less than the quantity demanded. That creates an excess demand that pushes the price even higher, further away from the intersection. Any price below the intersection creates an excess supply that pushes the price further down, away from the intersection. The original intersection is an unstable equilibrium. *Equilibrium* because supply and demand equal each other initially, and *unstable* because the forces of buyers and sellers no longer try to return to the original intersection.

While in mainstream economics buyers and sellers always move in opposite directions, in this paper they are allowed to move in the same direction, and at different speeds. This allows us to model financial panics, where both sides of the market try to get out of the market.

8. Salerno's causal-realist explanation for a upward sloping demand curve

On solving a controversy over the income effect, Professor Salerno has explained the conditions under which a demand curve could be upward sloping. On a conference on the subject he explained:

> When we advance to the monetary economy, we have to assume a third datum constant, and that is the demand for and the supply of money. That has to be assumed constant, which means that that fixes the purchasing power. […] [I]t is necessary to assume purchasing power fixed because without fixed purchasing power there would be no way to construct or formulate, for the actor, a coherent value scale upon which they are going to act. So the concept of a Giffen good [an upward sloping demand] implicitly violates the ceteris paribus assumption, because it allows the demand [or supply] for money, a basic datum, to change at the same time that the change in the [demand] of a particular good is being analyzed…

> **If you allow at the same time the purchasing power of money to change, then it may be the case that money may fall at the same time, in marginal utility rankings, as the good is. In which case you may very well wind up with a situation where you are actually buying more potatoes at a higher price…**
>
> And in fact that is why we have an illusion of an upward sloping [demand] curve under the Giffen good, because what we are allowing to happen, or what people who believe in the Giffen good are allowing to happen, is that as the price of potatoes goes up they are implicitly allowing the purchasing power of money of the heavy consumers of potatoes to be reduced, their wealth is being reduced…[23]
>
> (I added the brackets and emphasized the text)

According to this, if for some reason the marginal utility of money decreases —maybe because of an increase in the money supply—, then an upward sloping demand could appear in a different market. Yet, while Professor Salerno refers to an inferior good, second houses for speculation do not seem to fall under this category, instead they are closer to Veblen goods.

It is important to notice that while in partial equilibrium, and under strict ceteris paribus, an upward sloping demand is an *illusion*, general equilibrium —different markets interacting with each other— allows for simultaneous changes, that is what Professor Salerno does when explaining the interaction between the market for loanable funds and the market for the Giffen good.[24]

9. Effect of a negative demand shock on a bubbled market

If fractional reserve creates an unstable equilibrium in the market for loanable funds and that in turn creates an unstable equilibrium and a bubble in the assets markets, what happens if there is an external negative shock that increases the risk in the economy? The following process

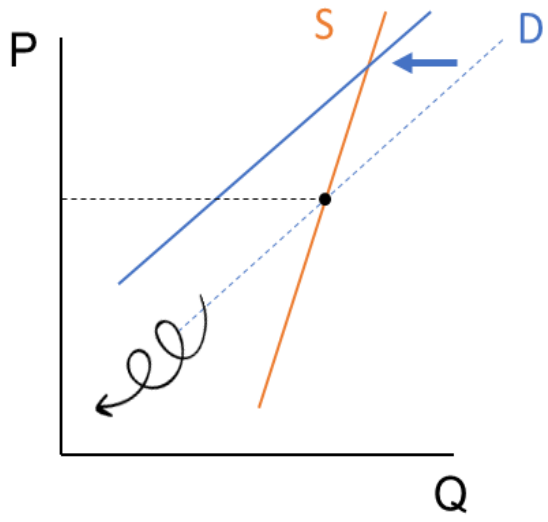
[23] Klein & Salerno, "Giffen's paradox and the Law of Demand."

[24] Buchanan, "Ceteris Paribus."

takes place. Banks will reduce the supply of credit to control risk. The reduction of credit will repeat several times due to the fractional reserve multiplier, that originates a downward spiral in the supply for loanable funds, traders will no longer have cheap money to speculate on stocks and derivatives, people will no longer have cheap money to speculate on housing. The upward sloping demand curve in the bubbled market will shift to the left. As it shifts to the left, at the initial price level an excess supply appears because the quantity demanded decreases faster than the quantity supplied, and that pushes the assets price even lower. As the price falls both sides of the market decrease their optimizing quantities, both sides start dumping the product. This is a *panic*. All those who bought assets taking on debt with the intention to sell at a higher price fail badly. All those loans become bad debt. As assets prices fall, companies' balance sheets shrink, but debt does not shrink.[25] At the end, the risk ratio, debt/assets, is even higher.

DEMAND NEGATIVE SHOCK

UNSTABLE EQUILIBRIUM



[25] As assets prices fall, the repo market also dries up.

How to reduce the debt-to-assets ratio? One way is for companies to write off their bad debt, reducing the numerator of the ratio. Another way is to increase the denominator of the ratio recapitalizing the company by issuing new equity and selling it to the government—which is what happened in the US in 2008.[26, 27]

Compared to the Walrasian model of general equilibrium, fractional reserve creates an unstable general equilibrium with a higher risk level. The probability of an economic downturn is higher than the one for a system of 100% reserve. The probability of an economic downturn should be represented with a fat tail, but the probability of economic growth beyond the unstable equilibrium should not be represented by a fat tail.

10. Unemployment in the labor market in a bubble state

A bubble in the housing market can generate a bubble in the labor market. It could be the case that construction companies demand more labor even though wages are rising. If the labor market was an unstable equilibrium also, mirroring the bubbled housing market, then as the upward sloping demand in the housing market shifts to the left, the upward sloping demand for labor would also shift to the left. At the previous wage level, the quantity of labor demanded is lower than the quantity supplied, that creates an excess supply that pushes wages even lower, and supply and demand do not meet again.

Unemployment seems to be harder and to last longer in the bubbled labor market than in the *classical* labor market. In the classical labor market when the demand curve shifts to the left, at the original wage level, an excess supply (unemployment) appears that pushes the wage down.

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[26] Geithner, Stress Test.

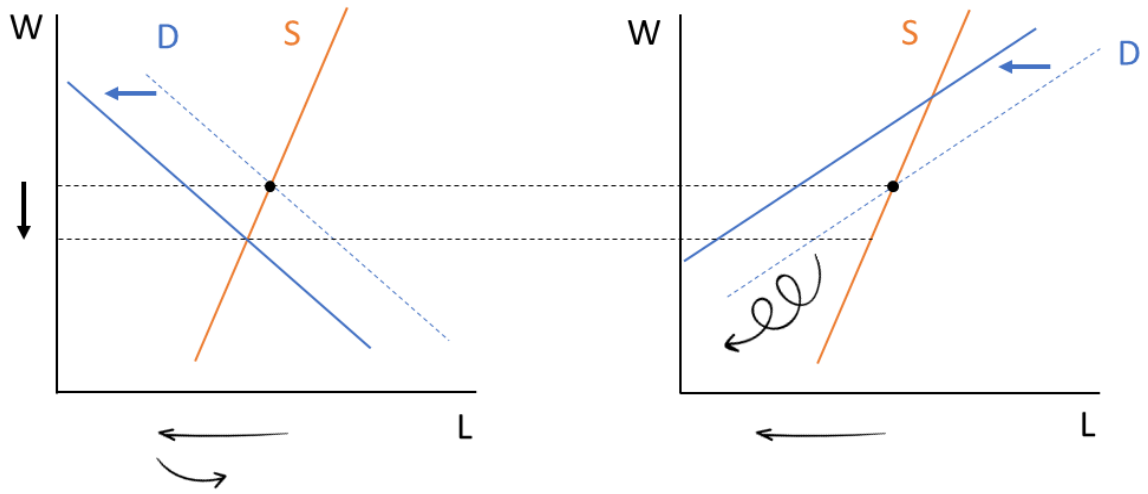
[27] Paulson, On the Brink.

That excess supply is partially offset by the increase in labor demanded on the new demand curve due to the lower wage, and supply and demand meet again. In the labor market with unstable equilibrium, there is no mechanism to partially offset unemployment. Both supply and demand move in the same direction, yet demand decreases faster. Thus, even though workers are willing to work for a lower wage, they do not find employment. If on top of that we consider the *rigidity* of debt, the classical labor market recovers faster.

DEMAND NEGATIVE SHOCK

CLASSICAL LABOR MARKET

LABOR MARKET
UNSTABLE EQUILIBRIUM



11. Conclusion

Adam Smith stated that people acting in their own self-interest achieve a social well-being that they were not looking for in the first place. That social well-being is the economically rational allocation of scarce resources that benefits everybody. Everyone acting as a buyer or as a

seller allocates society's scarce resources to the best use. Yet, in this paper we see a case where people acting in their own self-interest do not achieve equality of supply and demand, that is, society's scarce resources are not properly allocated. For a few decades now, mainstream economics has been trying unsatisfactorily to explain general disequilibrium. Mainstream economists have been trying to describe it using upward sloping supply curves and downward sloping demand curves even though, as some economists have noticed, those types of curves can only lead to equilibrium. This paper expanded the use of supply and demand curves through a new presentation of Mises' ideas.

While mainstream macroeconomics focusses on the measurement of new machinery, factories, automobiles, etc. and the value added at each step of production (GDP), little attention has been given to the way all those assets are funded and to the level of risk the economy takes while doing it. Is it important to know the level of risk traders are taking? Can GDP really help us to analyze the level of risk behind the notional value of derivatives? The Misesian multiplier can help us to bridge the gap between macroeconomics and finance.

According to Mises, the generalized discoordination in the economy is created by the fractional reserve system. And according to the interpretation of Mises given in this paper, fractional reserve is what gives the negative slope to the supply curve of loanable funds. In mainstream economics the Keynesian multiplier is well-known, yet it is Mises who correctly identified the economy's multiplier: the fractional reserve. The Misesian multiplier can also improve the monetary equation of exchange, since how many times the fractional reserve multiplies M seems to be more important than the times the velocity of money multiplies M.[28]

[28] $P.Q = (1/r).V.M$

Maybe 300 years ago when money was backed by gold, the Misesian multiplier in the equation of exchange was 1.

The legality of printing money in the current system, and the production of good money is the subject of a different yet complementary analysis.[29]

[29] Bayona, "A Model of Free Banking Money."

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