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Abstract

A numerical example of privately issued money is used to illustrate the fiscal theory of the price level, and to show that the fiscal theory is best understood as a subset of the backing theory of money. Government issuance of money or debt is shown to be potentially inflationary only when the government's net worth is negative, and when the government's assets do not rise in step with its liabilities. The backing theory is used to examine whether inflation can be avoided by a sufficiently tough central bank, and to criticize the view that fiscal policies affect inflation through their wealth effects.

Introduction

The fiscal theory of the price level is a special case of the backing theory of money. The simplest version of the fiscal theory holds that the value of government-issued money is determined by the present value of that government's future surpluses, in the same way that the value of corporate stock is determined by the present value of the corporation's future surpluses. The backing theory is more general, and says that money is valued according to the overall assets and liabilities of its issuer. In the special case where a government has no liabilities other than the money it has issued, and no assets other than future surpluses, the backing theory is identical to the fiscal theory. But money can be issued by governments, by central banks, and by individuals, and assets and liabilities can take many forms. They can differ in risk, seniority, and convertibility, as well as time to maturity and denomination. The backing theory holds that the normal valuation procedures that are used for various kinds of liabilities can be applied to the valuation of money. The fiscal theory, while correct as far as it goes, is needlessly narrow, and sometimes even misleading, in its valuation rules for money.

I use a numerical example that explains the backing theory in the case of privately-issued money. The example illustrates that the same rules that apply to private money also apply to government-issued money. In the course of this example, I use the backing theory to clarify and extend the fiscal theory, and to address some of the controversies that have surrounded the fiscal theory. On a more fundamental level, I find that a correct theory of money looks less like high-brow economic theory, and more like an exercise in accounting.

The Backing Theory of Money

Assume that a landlord collects rent (or “surplus”) of 50 oz. of silver per year from his land. At a market interest rate of 5%, this perpetual stream of rent has a present value of 1000 oz., and this would be the price of his land, should he choose to sell. Assuming the landlord has no other assets or liabilities, his net worth is 1000 oz., as shown in line 1 of table 1. Note that if we replaced “rents receivable” with “taxes receivable”, table 1 could equally well describe the financial position of a government. In what follows, the landlord is always analogous to a government.

Table 1

Assets	Liabilities
[1] Rents receivable worth 1000 oz.	1000 oz. net worth
[2]	+20 oz. paper bills (spent wastefully)
[3]	-20 oz net worth
[4]	+40 oz. paper bills (spent wastefully)
[5]	-40 oz net worth

If the landlord is well-known, he could buy his groceries by writing paper bills ('dollars') and paying them to the grocer in lieu of silver. The grocer would accept the dollars because the landlord accepts them in payment of 1 oz. of rent. These dollar bills could serve as money in the landlord's town. Assuming the landlord spends 20 of these dollars wastefully (line 2), so as not to acquire any new assets, his issuance of these dollars reduces his net worth by 20 oz. If he then issues another 40 dollars and spends them wastefully, his net worth falls by another 40 oz. and the town's money supply triples, from $20 to $60.

As long as the landlord is willing and able to accept each dollar in payment of 1 oz of rent, each dollar must be worth 1 oz. in the open market, even though the quantity of dollars has tripled. The usual elements of the quantity theory of money, such as money supply, money demand, and velocity of money, are irrelevant to the value of these dollars. (I am referring only to the value of the dollar relative to silver. I have discussed possible effects on the value of silver relative to other goods in another paper. (Sproul, 2003.)) If the dollar fell to .99 oz, arbitragers would buy them and use them to pay rent, and the landlord would retire the dollars as fast as he could get them. If the dollar rose to 1.01 oz., then not only would the landlord eagerly issue more dollars, but other landlords would try to issue dollars of their own, and arbitragers would sell dollars short.

The fiscal theory is no more applicable to the landlord's dollars than is the quantity theory. Let M represent the quantity of money issued by the landlord. Let E be the exchange value of the dollar (oz./$, or the inverse of the price level), and let B represent the annual rent payment, denominated in silver and paid in perpetuity. For a market interest rate of R, the simplest version of the fiscal theory says that ME=B/R. A blind application of this equation to the landlord's dollars would imply that when $20 have been issued, each dollar would be worth 1000/20=50 oz., and when another $40 are issued, the value of the dollar would fall to 1000/60=16.67 oz.

Any accountant knows better than this. As long as the landlord's net worth is positive, each dollar is worth 1 oz., whether there are $20 or $60 in circulation. In fact, the landlord could issue as many as 1000 dollars and spend them wastefully before his net worth fell to zero. If the landlord then issued another $250, then the equation ME=B/R would yield E=1000/1250=.8 oz/$. Since there would be $1250 laying sole claim to assets worth 1000 oz, this would be the correct value of E.

Thus, a corrected version of the fiscal theory equation is

[1]	ME=B/R	[for net worth<=0]
[2]	E=1 oz./$	[for net worth>0]

The fact that the landlord's positive net worth provides a cushion against inflation provides an answer to Cochrane's (2001, p. 40.) suggestion that governments should issue equity-like securities:

> In sum, equity-like securities are useful for governments for the same reasons that equity is a useful addition to debt for corporate finance. Nominal debt acts as an equity-like security, but has the disadvantage that unavoidable fluctuations in “government equity” subject us to the unpleasant costs of inflation. If we can invent alternative monitoring institutions, we could have a true “government equity” that did not require inflation. The development of such government equity seems a ripe challenge for financial innovation.

The problem with this suggestion is that the cushion that would be provided by government equity is the same cushion that is already provided by a government's net worth. In fact, this cushion against inflation could be made even more effective simply by giving a government's money the senior claim to the government's assets, ahead of bonds and other obligations. That way, an insolvent government with large bond obligations could default on its bonds while still fully backing its currency. Thus, even a government (or a landlord) with negative net worth could still keep the value of its money at par against silver.

Line 6 of table 2 continues where line 5 of table 1 left off, with the landlord's net worth still 940 oz. The

landlord issues another $60 and spends it on a desk, thus doubling the money supply. Once again the quantity theory is irrelevant, and the value of the dollar remains at E=1 oz./$ even though the money supply has doubled. This time there is no decline in the landlord's net worth, since the new dollars are not spent wastefully, but on a desk worth 60 oz. If the landlord were to issue 60,000 new dollars, and spend them on assets worth 60,000 oz., his net worth would still be unchanged at 940 oz. Whether this would affect the value of the dollar depends on the degree of leverage that is considered acceptable for the landlord. We cannot say how much leverage is appropriate, but leveraging $60,000 of paper money against a net worth of 940 oz. would almost certainly be too risky, and the dollars would lose value. On the other hand, issuing $120 of paper money against a net worth of 940 oz. would probably be considered riskless, and the landlord's dollars would be valued at their par of 1 oz./$.

Table 2

[6] +desk worth 60 oz.	+60 oz. paper bills (spent on a desk)
[7] +foreign bonds worth 2000 oz.	+bonds worth 2000 oz. (spent on foreign bonds)

In line 7 of table 2 the landlord takes on 2000 oz. of new long-term debt, which he uses to buy 2000 oz. worth of zero-coupon bonds issued by a foreign government. This leaves net worth unchanged at 940 oz., so the total of 2120 oz. worth of liabilities could still be considered low-risk enough for the dollar to stay at par with silver. (In the interest of simplicity I will not analyze the effect of risk on the value of the dollar, although interested readers will note that equations [1] and [2] imply that the dollar would be valued like a put option.)

The fiscal theory says that "when rational, forward-looking agents believe that newly issued government debt is only partially backed by future taxes, debt issue is inflationary." (Sims, 2011, p. 48.) But tables 1 and 2 show common cases where the issuance of new liabilities (either bonds or currency) is not inflationary—either because the new liabilities are offset by new assets, or because they are covered by a cushion of positive net worth. To account for this, the fiscal theory equation must be modified again. Let D=the present value of long term debt, and A=the present value of the desk, the foreign bonds, plus any other silver-denominated assets the landlord might acquire. Equations [1] and [2] then become:

[3]	(M+D)E=B/R+A	[for net worth<=0]
[4]	E=1	[for net worth>0]

Equation [3] is just the accounting identity that Liabilities=Assets. Once we recognize that money is the liability of its issuer, it becomes clear that the value of money is determined by considering *all* assets and liabilities. Thus, as we modify the fiscal theory of the price level to make it more realistic, we find that it looks more and more like the backing theory of money. The backing theory, in turn, is more a matter of accounting than economics.

Everyone knows that governments have other assets besides future tax collections. The backing theory implies that those other assets would matter when valuing a government's liabilities. But this rather obvious point seems to be entirely missing from the fiscal theory literature. Cochrane (2001, p. 5.), for example, correctly compares money to stock, and notes that a stock split will halve the price per share, since twice as many shares are laying claim to the same assets. But Cochrane does not mention the more relevant case of a firm that issues new stock in exchange for new assets. If a firm doubles its outstanding shares of stock, while also doubling the assets backing those shares, the price per share will

not change. When central banks and governments issue new money, they normally get equal-valued assets in exchange. A central bank might get government bonds in exchange for its money, while a government might get office furniture or fighter jets in exchange for its issuance of money. In both cases, the issuer's assets rise in step with its issuance of money, so the value of money stays the same, just like the case of newly-issued stock. This idea contradicts the fiscal theory's proposition that the price level must rise when new government spending is not fully covered by new taxes.

Table 3.a

[8.a] +100 oz. of silver	+100 oz. paper bills (spent on silver)
[9.a]	-bonds worth 900 oz. (retired)
[10.a]	+900 oz. in paper bills

In line 8.a of table 3.a, the landlord prints 100 oz. of new paper bills and spends them on silver. This allows him to make his dollars directly convertible into silver. This new form of convertibility would not affect the value of his dollars, though it might broaden their appeal to the public. In lines 9.a and 10.a, the landlord prints 900 new paper dollars and uses them to buy back and retire 900 oz. worth of the bonds he previously issued. This is a simple swap of one liability for another, and would also have no effect on the value of the dollar.

Table 3.b shows an alternative to table 3.a. Instead of the landlord issuing dollars on his own account, he establishes a separate set of books called a central bank. Lines 11.b and 12.b of table 3.b show the same transactions as table 3.a, but the 900 oz. worth of bonds now shows as an asset of the central bank. To simplify the landlord's bookkeeping, line 13.b shows him assigning his central bank to take responsibility for the $120 issued before the central bank was formed. To cover this obligation, the landlord also gives 120 oz. worth of taxes receivable to the central bank. If the central bank were re-absorbed by the landlord, the landlord's T-account would once again be as shown in tables 1 through 3.a. Table 4.a shows the changes to the landlord's assets and liabilities that result when the central bank becomes independent.

Table 3.b. The central bank becomes independent…

[11.b] +100 oz. of silver	+100 oz. paper bills (spent on silver)
[12.b] +bonds worth 900 oz.	+900 oz. in paper bills
[13.b] +120 oz. taxes receivable	+120 oz. in paper bills (previously issued)

Table 4.a.…which changes the landlord's assets and liabilities

[14.a] –100 oz. silver	-100 oz. paper bills
[15.a]	+900 oz. bonds
[16.a]	-900 oz. paper bills
[17.a] –120 oz. taxes receivable	-120 oz. paper bills

Convertibility

Table 3.b gives a useful perspective on what it means for a currency to be convertible. As long as the central bank has at least a small stock of silver with which to redeem its dollars (and enough other

assets to buy more silver should the need arise), the dollar would not be called fiat money. People would see that the value of the dollar is fully determined by its convertibility into silver. But the central bank might suspend convertibility into silver, while announcing that after some arbitrary number of years (n), the bank will be liquidated to pay the holders of its dollars. In the mean time, the bank could put all its assets into securities that earn the market rate of interest R. If the bank's dollars have no printing and handling costs, then after n years, each dollar could be redeemed for $(1+R)^n$ oz. of silver. This means that immediately after suspension, each dollar will be worth 1 oz., and will grow in value at R% per year. If the dollar were worth either more or less than this, arbitrage would be possible.

If printing and handling costs are 2% per year, while R=5%, then each dollar will be worth 1 oz. today, and will grow in value at 3% per year. If printing and handling costs are 5%, the dollar will be worth 1 oz. today, and will stay at this value until the central bank is liquidated. Note that in every case, the value of the dollar is the same whether it is convertible or inconvertible. The irrelevance of convertibility should not be surprising, since the dollar's acceptability for rent made the landlord's dollars worth 1 oz./$ even before he acquired any silver, and before convertibility into silver was even offered. In fact, the landlord's promise of eventual liquidation makes it unnecessary even for the landlord to accept his own dollars for rent.

What should be surprising is that economists place any importance on metallic convertibility. As I have argued elsewhere (Sproul, 2003), economists observe that a currency is not convertible into metal, and then wrongly conclude that the currency is not backed by any assets, even when those assets are publicly displayed on the central bank's balance sheet.

Insolvency, Inflation, and Bank Runs

Suppose that the landlord's foreign bonds fell in value from 2000 oz. to 1000 oz. (Table 5.a). Assuming the central bank is now independent, this would leave the landlord with 1940 oz. worth of assets (1000 oz. foreign bonds +880 oz. taxes receivable +the 60 oz. desk) backing his own bonds, which are nominally worth 2000 oz., but are now worth 1940/2000=.97 oz., a 3% fall from their former value. This means that the 900 oz. worth of bonds owned by the central bank are now worth .97x900=873 oz. The central bank has no net worth to cushion this loss of assets, so this leaves the central bank with (100+873+120=) 1093 oz. of assets backing (100+900+120=) $1120 in paper bills (Table 3.b and 5.b). The backing theory yields an exchange value of E=1093/1120=.976 oz/$. Note that this provides a counter-example to Kocherlakota's (2011, p.1.) claim that a sufficiently tough central bank can control the price level regardless of the government's behavior. As long as the central bank holds government bonds, a fall in the value of those bonds can affect the price level no matter how tough the central bank is. Of course this also suggests that the central bank could improve its control of the price level by not holding its own government's bonds.

Table 5.a. The landlord becomes insolvent...

18.a. -1000 oz. loss on foreign bonds	-1000 oz. net worth

Table 5.b. ...which makes the central bank insolvent

19.b. -27 oz. loss on landlord's bonds	-27 oz. net worth

The dollar's fall to .976 oz./$ could be prevented if the landlord bailed out the central bank. Since the landlord has negative net worth, he would have to selectively default on 27 oz. worth of his bonds (Not

the bonds owned by the central bank!), then hand 27 oz. worth of assets to the central bank. This would restore the dollar to 1 oz./$ and raise the central bank's net worth to zero, even as the landlord sinks deeper into insolvency. Of course, it is unusual for governments to bail out central banks. It is more common for the central bank to bail out the government with loose money policies. If this drives the central bank's net worth below zero then the central bank's money must lose value.

With the dollar worth .976 oz., any attempt by the central bank to maintain convertibility at 1 oz./$ will result in a Thailand-style run on the central bank. Of the 1120 paper bills held by the public, the first 1093 can be redeemed at the bank for assets worth 1 oz. each, and the last 27 bills in line will be worthless. This run on the central bank would result in inflation, the collapse of the central bank, and a disappearance of the community's money stock.

Cochrane (2001, p. 3.) has commented that:

> No one thinks that open market operations—a revenue-neutral exchange of transaction-facilitating debt (money) in exchange for non-transactions-facilitating debt (bonds) could have stopped the fall of the Ruble or the Baht.

Actually, central banks are not as helpless as this statement suggests. For example, once the dollar has fallen to .976 oz., it is true that no amount of ordinary open-market operations could *raise* the dollar back up to 1 oz./$. But the central bank could easily *stop further decline* of the dollar by suspending convertibility of the dollar into silver. This would leave the central bank with 1093 oz. worth of assets backing 1120 paper bills, so as before, the value of the dollar would be .976 oz. Once the decline of the dollar had been stopped, the bank could then accommodate any increase in the demand for dollars with an ordinary open market exchange of new dollars for an equal value of bonds. Banks have taken this course of action many times, most prominently when the Bank of England suspended convertibility in 1797 and then issued new money by every available means. Unfortunately, suspensions are now less common as a means of handling monetary crises, since widespread belief in the helplessness of central banks and governments has led to a reliance on expensive and wasteful bailouts.

Once convertibility has been suspended, open market operations become complicated by uncertainty about the correct exchange value of the dollar. If the true value of the dollar is .976 oz., but the central bank issues a new dollar in exchange for a bond worth only .975 oz., then monetary policy is too easy. The central bank's assets will not keep up with its issuance of money, and the value of the dollar can fall (assuming the central bank has negative net worth). Conversely, if the central bank issues a new dollar in exchange for a bond worth .977 oz., monetary policy is too tight, and deflation can result.

The bank can reduce this difficulty by dealing in bonds that are denominated in its own currency. This way, the bank need only take care that when it issues a new dollar, it receives assets worth a dollar in exchange. This saves the bank from having to consider the exchange rate between dollars and silver, but it introduces a new complication of inflationary feedback. For example, if the bank mistakenly issues a new dollar in exchange for a bond worth $.99, then the bank's liabilities begin to outrun its assets, and the dollar loses some value (relative to silver). But since the bank's bonds are themselves denominated in dollars, the bank's bonds lose more value. This loss of backing reduces the value of the dollar still more, and a vicious circle of inflation, loss of assets, and more inflation is set in motion.

To account for inflationary feedback, the backing theory equations [3] and [4] must be changed again. As before, let A= the present value of the desk, the foreign bonds, and all other *silver-denominated*

assets, while L=the present value of any *dollar-denominated* bonds owned by the bank. Equations [3] and [4] then become

[5] (M+D)E=B/R+A+LE [for net worth<=0]
[6] E=1 [for net worth>0]

For example, look at the central bank's T-account in table 3.b. Consider the simple case where the central bank is independent, so that it has no chance of getting any additional assets (or liabilities) from the government. From table 3.b., M=1120, D=0, B/R=120, A=100+900=1000, and L=0. Equation [5] then yields E=1 oz./$.

Now suppose that the central bank trades 400 oz worth of its (silver-denominated) bonds for an equal value of bonds that are denominated in dollars. This does not change M, D, or B/R, but now A=100+500=600, and L=400. Once again, this yields E=1 oz./$. But if the bank's silver-denominated bonds were again to fall in value by 27 oz., then A becomes 573, and equation [5] yields E=.963 oz./$. Note that the inflationary feedback created by the bank's $400 of dollar-denominated bonds exaggerates the effect of the 27 oz. loss, yielding E=.963 rather than E=.976, as it had in the case when the bank held no dollar-denominated bonds.

A Determinate Price Level

Once the central bank is holding significant amounts of dollar-denominated assets, the question arises as to what, if anything, is tying down the value of the dollar. After all, the bank appears to be backing its dollars with more of its own dollars. At the same time, the bank does not offer metallic convertibility. Even if the landlord still accepts the central bank's dollars for rent, the fact that he has allowed the dollar to float against silver appears to leave the dollar with no determinate value. Fortunately for dollar holders, the bank's promise of eventual liquidation still provides a determinate value for the dollar. As explained above, the bank need only make a credible promise to redeem each dollar for assets worth $(1+R)^n$ ounces of silver after n years, in order to make the dollar trade in the market at 1 oz./$ today. That promise is made credible by the fact that the central bank's assets currently have adequate value to cover that distant promise. Until that day arrives, the bank can make loans and conduct open-market operations so as to accommodate public demand for currency, only taking care to maintain its ability to eventually buy back all its dollars at the appropriate value. Writers on the fiscal theory ((McCallum (2003), Buiter (2001), Woodford (1995), Cochrane (2001)) have disagreed about whether the fiscal theory yields a determinate price level. Of course, nobody doubts that the price level is determinate when money offers metallic convertibility. But this example makes it clear that a credible promise that the bank will eventually be liquidated in order to pay off dollar holders will yield a determinate price level just as surely as will metallic convertibility.

The Wealth Effect

The wealth effect is notably absent from the backing theory, but it features prominently in most writings on the fiscal theory. Sims describes the wealth effect as follows:

> Increases in nominal debt in the hands of the public that are not accompanied by any expected future tax liabilities or by any increase in the price level leave the public with apparently increased wealth, which they will try to spend, until the price increases erode their wealth or expectations about future taxes or economic growth make them scale back spending. (Sims, 2010, p. 48.)

This view of the wealth effect is based on the mistaken belief that a loan gives purchasing power to the borrower without reducing the purchasing power of the lender. The mistake arises from observing that the lender can use the borrower's IOU to buy goods, while forgetting that the borrower must pledge property to cover that IOU. For example, the landlord in our example might own land worth 1000 oz. A lender might be willing to lend up to 700 oz to the landlord, in exchange for a 700 oz. lien on the land. The lender would then have the 700 oz. IOU instead of the 700 oz. of cash, while the borrower would have the 700 oz. of cash instead of the 700 oz. worth of lien-free land. Nobody's purchasing power is affected by the loan, since nobody's net worth is changed. There is no "apparently increased wealth", and therefore no upward pressure on prices.

Suppose, as Sims says, that the government issues and sells a new bond that is not adequately backed by future taxes. How is the government able to fool the public into buying this bond? Are government officials smarter than bond traders? If the public overpays for those bonds, then the public is poorer and the government is richer. Vice versa if the public underpays. In either case, the increased wealth of one sector is offset by reduced wealth in the other.

In contrast to the tangled logic of wealth effects, the backing theory says that if the government issues new bonds that are not adequately backed by future taxes (or by the government's net worth, or by the government's newly-acquired assets) then those bonds will only be bought at a discount. If this reduces the value of the assets backing the government's money, then that money will lose value.

Conclusion

The fiscal theory of the price level is an overly narrow special case of the backing theory of money. The backing theory recognizes that money is an ordinary liability of its issuer, and as such is valued according to the total assets and liabilities of its issuer. This broader perspective leads us to give proper consideration to cases where newly-issued money is backed by newly-acquired assets, or by the net worth of the money issuer.

The backing theory implies that money is valued according to the same rules by which we value stocks, bonds, and other liabilities. While consideration must be made for differences in seniority, risk, and time to maturity, money is no different in this respect from stocks and bonds.

The backing theory yields a determinate price level based on the money-issuer's assets and liabilities. The price level does not depend on wealth effects, and is only indirectly related to whether the central bank is tough or soft.

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