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Can a tighter monetary policy actually lead to a higher rate of inflation?

Gonzalo Moya
San Jose State University

San Jose State University

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Professor Jeffrey R. Hummel

Can a tighter monetary policy actually lead to a higher rate of inflation?

By Gonzalo Rafael Moya Villanueva

B.S. Applied Mathematics (Economics and Actuarial Science).

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1. <u>Introduction</u>

This year, Thomas John Sargent won the National Academy of Sciences (NAS) Award for Scientific Reviewing, the Mathematical Sciences Research Institute (MSRI) Prize in Innovative Quantitative Applications, and the Nobel Memorial Prize in Economic Sciences for his "empirical research on cause and effect in the macroeconomy" [1]. It is therefore a great honor for me to write my paper on "Some Unpleasant Monetarist Arithmetic", a paper he published in 1981 along with Neil Wallace [2].

Previously, in 1973, Sargent and Wallace had published another paper together: "The Stability Models of Money and Growth with Perfect Foresight", where they showed that a once-and-for-all rise in the money supply produces a one-time-only increase in the price level instead of setting off a process of ever-accelerating deflation; thus keeping the system at its steady state equilibrium rather than being dynamically unstable (as in "saddle points") [3].

"Some Unpleasant Monetarist Arithmetic" was inspired by Milton Friendman's "The Role of Monetary Policy", a paper published in 1968 and based on his own presidential address delivered the year before at the 18th Annual Meeting of the American Economic Association (AEA). In it, Friedman argued that monetary policy could not exert substantial control over the long-run levels of real output, unemployment, or real rates of return on securities, only over the inflation rate [4].

Sargent and Wallace proposed themselves to correct Friedman's statement, claiming that even inflation cannot be permanently influenced by monetary policy. Moreover, they showed how a tighter monetary policy can actually lead to a *higher* rate of inflation instead: if the fiscal authority does not adjust its budgets accordingly (thus accumulating a large amount of debt during this time of low seigniorage revenue), later on it will need to be bailed out by the non-independent monetary authority with a policy much looser than the one before tightening it.

Thus, if economists during the Great Contraction accused monetary policy to be like a *string* that you could pull on it to stop inflation but could not push to halt recession [4], then Sargent and Wallace

would say monetary policy is more like a *spring*, as pulling on it to stop inflation will only make it accumulate potential energy, ready to go wild once this pulling force is removed [5].

2. Some Unpleasant Monetarist Arithmetic.

Sargent and Wallace defined a "monetarist economy" as one where the monetary base is closely connected to the price level and where the monetary authority can always raise revenue from money creation (i.e. "seigniorage" or "inflationary finance" [6]). Their purpose was not to prove that the monetary authority had limited control over inflation *only* in a monetarist economy but *even* in one that satisfies these two monetarist assumptions.

The people's demand for bonds ultimately determines the interest rate the government must pay on them, and also sets an upper limit on the real stock of bonds relative to the size of the economy (i.e. debt as a percentage of GDP). These two restrictions combined do not allow the government to finance its budget deficits solely on issuing bonds forever: an increase in its supply of public debt will (other things equal) increase the interest it must pay on it, and if the government plans to pay past debt merely by issuing new one as in a Ponzi scheme [7], then it must increase its supply at a constantly increasing rate, thus reaching faster to this upper limit of debt-GDP ratio.

Sargent and Wallace argue that whenever the fiscal authority dominates over its monetary counterpart, it will autonomously declare its budgets at each period, taking independence away from the announcements by the monetary authority regarding its growth rates for base money, as it eventually will have to come to its rescue with a loose monetary policy that boosts its seigniorage revenue. This statement is not far-fetched at all if we take into account the historic evidence regarding the power of the fiscal authority to not just appoint, but also pressure and ultimately replace its monetary similar if the latter does not accommodate its needs[8].

It could be argued that (non-inflationary) tax revenue is another source of liquidity for the government besides seigniorage and bond issuance, so the amount of debt does not need to increase exponentially. However, Sargent and Wallace's mathematical model only requires the real return on government securities (R) to be larger than the growth rate for real income and population (n) for the ratio of government borrowing (B) to population (N) to converge dangerously to this upper limit. Moreover, their model already uses the letter "D" for "deficit", implying that it is not the budget itself but the amount of expenditure *exceeding* taxation what the government is really trying to cover.

This "monetarist arithmetic" may indeed seem "unpleasant", but it is all built upon a discrete dynamical system based on a government's simplified cash flow equation, where its "cash outflows" are these deficits (D) and the reimbursement of past debt plus interest (B+RB), and the "cash inflows" are – as stated before- the new bond issuance (B) and the real seigniorage revenue, defined as the difference in the stock of high-powered money (H) divided by the price level (p).

Hence, the reasoning behind Sargent and Wallace statement that "Tighter money now can mean higher inflation eventually" is the following: (1) If budgets are fixed, a current lower seigniorage must imply a current higher bond issuance. (2) A current higher bond issuance implies a future higher reimbursement of past debt plus interest. (3) A future higher reimbursement of past debt plus interest necessarily requires future higher seigniorage once the upper limit of debt-GDP ratio is reached or even closely approached, as at this point the monetary authority will realize that the revenue of additional seigniorage is much larger than the marginal revenue of further bond issuance [9].

Thus, according to Sargent and Wallace, Friedman's assertion that monetary policy can exert long-run and substantial control over the inflation rate is true only when the monetary authority completely dominates over its fiscal counterpart, so that whenever it independently announces the growth rates of base money at each period, the fiscal authority adjusts its government budgets accordingly.

3. <u>Tighter Money Now Can Mean Higher Inflation Now.</u>

The problem comes when the monetary authority wrongly believes that it dominates and -at what is arbitrarily called "time zero"- autonomously declares the growth rates for the next "T" periods. Then, the fiscal authority -being the actual dominant- decides to ignore this announcement and leaves its budgets unaltered, thus increasing its deficits until period T is reached, when the monetary authority has to declare a new policy. By now though, the monetary authority has realized his true -dominated- position and decides to adjust to this new level of government debt by setting up a loose policy -much looser than the one before time zero- in order to generate the necessary revenue in the form of seigniorage to cover for this debt gap.

The bigger problem comes when the people in this economy -aware of the increase in government debt- rationally predict what will be the new monetary policy after time T (a loose one that yields higher inflation) and start altering their behavior before time T arrives in order to try to avoid this seigniorage-tax burden. Hence, no longer can we expect the "velocity of circulation" component of the equation of exchange to be constant, but increasing due to a diminishing demand for money as time T approaches.

In the growth version of the equation of exchange, since it is being assumed that the monetary authority will not change its policy before time T, then this change in current velocity will not alter the change in the monetary base. If we additionally assume the change in real output to be unaltered by the change in velocity, then this increase in current velocity will be fully reflected in an increase to the current price level. That was the reasoning behind Sargent and Wallace's conclusion about their second model: "tighter money today leads to higher inflation not only eventually but starting today".
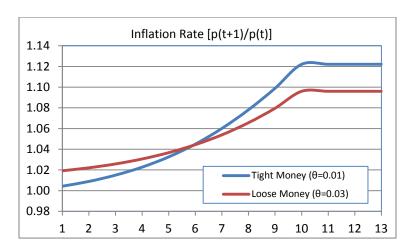
4. <u>Concluding Remarks.</u>

Sargent and Wallace agree that saying "tighter money today lacks even a temporary ability to fight inflation" is extreme and overstates the actual limits on tight money. However, they do believe that fighting current inflation with a tight monetary policy works only temporarily -and it eventually leads to higher inflation- whenever there is a lack of total independence by the monetary authority from its fiscal similar. It should not be understood from here though, that they recommended a loose monetary policy from the beginning, as in "What's the point?"
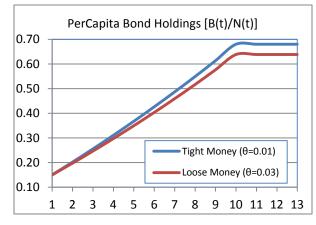
Sargent and Wallace assumed at all times that the reason why the fiscal authority leaves his budgets unaltered after its monetary counterpart announces tighter policies is because the former knew that the latter would give in first. However, if the monetary authority remains firm after time "T", or better yet, sets up policy not only for the first T terms but indefinitely, then the fiscal authority will be the one who has to concede and adjust his budgets accordingly. As they said, "this form of permanent restraint is a mechanism that effectively imposes fiscal discipline".
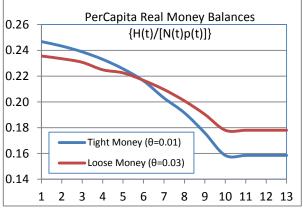

I took the liberty to plot in Excel tables B2 and B3 from their Appendix B, "A Model in Which Tighter Money Now Can Cause Higher Inflation Now". As the title suggests, this appendix B is based on Sargent and Wallace's second mathematical model, the one that includes a more realistic demand for money, one that depends on the expected rate of inflation. Although the outcome of this second model was exaggerated as the authors themselves admitted, it elucidates the importance of rational expectations and the consequences of the agents' predictive behavior. Compare, for example, to the dynamical graphs shown in advanced macroeconomic textbooks [10][11].

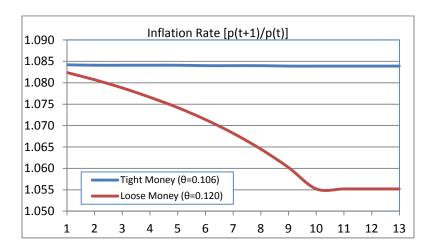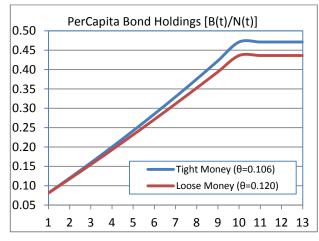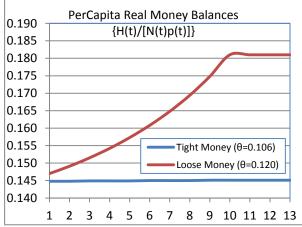Table B3. "An Intermediate Example of the Potential Effects of Tight and Loose Money" (γ_1=2, γ_2=1.5).

Both tables have the common parameter values: R=0.05, n=0.02, T=10, d(t≤T)=0.05, d(t>T)=0, H(0)=100, N(0)=1000, B(0)=100, b(1)=1.4999. Where "R" is the real return on bonds, "n" is the population growth, "t" is time, "T" is the monetary policy horizon, and "d" is the real government deficit net of interest payments per capita. "H(0)", "N(0)" and "B(0)" are the initial stock of high-powered money, population size, and real interest-bearing government debt, respectively. "b(1)" is per capita bond holdings at t=1.

Additionally, "γ_1" and "γ_2" are the parameters of this realistic demand for money, "γ_2" in particular measures its susceptibility towards the expected rate of inflation. "Θ" is the rate of growth in "H".

Table B2. "Another Spectacular Example of the Potential Effects of Tight and Loose Monetary Policy" (γ_1=3, γ_2=2.5).

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