Notes on Fiscal Policy in a Low-Interest Rate Environment:

The Treasury as Renaissance Banker for the Twenty-First Century

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January 18, 2014
Draft 1.4

I. Introduction

Let us take GDP to be our numeraire, and let us suppose that the future will be like the past since 1930: the future is likely to produce a growth rate of nominal GDP that is permanently (or at least for a very extended period) greater than the interest rate the government must pay on Treasury debt.

In such a scenario and with such a numeraire, the interest rate on government debt in negative. The government does not have to promise to give those from whom it borrows access to its taxing power over a greater share of GDP in the future in order to borrow a sum equal to a given share of GDP today. Instead of a government that wishes to borrow having to pay in terms of share of GDP—having to transfer resources in terms of adding to its lenders' command over valued goods and services as a share of GDP—there is a sense in which private savers pay the government, giving it access to their command over a given share of GDP today, and accepting a smaller share of future GDP, in return for the government's keeping their money safe, and thus allowing them to preserve their capital and transfer their purchasing power from the present into the future.

In such a situation the government is then something like a Renaissance bank. It provides safety and insurance against all kinds of financial risks. And there is a sense in which the Treasury's operations are then a profit center. To borrow money is thus a way for the Treasury to profit, in the sense that a Treasury that borrows can sustain a level of spending on currently-produced goods and services that is a larger share of GDP than it could command via a given level of taxes alone

If economic growth takes the form in part of extensive growth—of increases not in GDP per capita for a constant population but of increases in population, either through natural increase or immigration—then there are subtleties. If the increase in GDP comes from immigration, then the Treasury's profits arise in the social-welfare accounting from immigrants' assumption of their pro-rata share of the debt upon entry. If the increase in GDP comes from natural increase, then the profits arise in the social-welfare accounting from the requirement that the weight of each generation in the social-welfare function be invariant to its parents' fertility decisions, and thus to a diminishing marginal social welfare of more people analogous to the diminishing individual marginal utility of more per-capita commodities. If you take the opposite view that parents' decisions to have more children increase the weight of their descendents relative to themselves in the social welfare function—a perfectly respectable position—then it may well be that even sustainable debt-to-annual GDP trajectories can impose unboundedly large long-run social welfare costs in the far future via the imposition of a debt burden per future individual that goes to zero more slowly than the population grows.

But these are issues that are more in the province of utilitarian moral philosophers than of economists.

From economists perspective, the key is that in an economy in steady-state growth maintaining a stable debt-to-annual-GDP ratio of D/Y, whenever $g > r$ the government derives resources:

(1) $R = (g - r)(D/Y)$

from the negative amortization of its outstanding debt. When the interest rate is in excess of the growth rate, the sustainable primary government spending share of GDP G in steady-state is less than the tax share T by an amount that depends on the interest-growth rate gap and the debt-to-annual-GDP ratio:

(2) $G = T - (r-g)(D/Y)$

But when it is the growth rate that is in excess of the interest rate, it is the case that the sustainable primary government spending share of GDP is greater than the tax share T by the amount:

(3) $G = T + (g-r)(D/Y) = T + R$

This is a form of seigniorage. But it is a form of seigniorage derived not from the fact that the government has a monopoly or an edge in providing liquidity services, but rather that the government has an edge in providing the service of promising to safely transfer purchasing power from the present to the future.

II. Dynamic Efficiency

But how can a government have such an edge? The conventional growth-theoretic analysis identifies “the” real interest rate r with the marginal product of capital:

(4) $r = F_K$

and states that maintaining a constant capital-output ratio cannot be a characteristic of an optimal growth path if $r < g$. Reducing any long-lived agent or linked chain of agents’ capital holdings right now and planning to maintain that reduction at all times in the future by $d(K/Y)$ not only frees up resources $d(K/Y)$ for extra consumption now, but also frees up resources $d(K/Y)(g-r)$ for extra consumption in every future period. Hence optimal plans for any agent or linked chain of agents involves spending down capital until a K/Y ratio is reached at which it is no longer the case that $r < g$.

In a world with a constant price of risk ρ associated with physical capital in which risk-bearing services are supplied elastically at cost, the risk-free real rate would then be:

(5) $r = F_K - \rho$

and the same argument would go through. *At the margin,* any long-lived agent or linked chain of agents is indifferent between bearing risk and laying it off, and so, if $g > r = F_K - \rho$, *at the margin* a long-lived agent or linked chain of agents with a plan involving a constant capital-output ratio K/Y that reduces its holdings of capital by d(K/Y) now and at all times in the future not only frees up resources d(K/Y) for extra consumption now, but also frees up resources d(K/Y)(g-r) for consumption in each future period.

The issue is complicated further, of course, by the fact that F_K is comfortably higher than g by a large margin. It is ρ, the wedge between the marginal product of capital on the one hand and the safe real interest rate on the other—think of it as the equity premium—that is the issue, and the equity premium has no rationalization consistent with reasonable degrees of risk aversion save an astonishing shortage of "patient capital" and a remarkable failure of financial markets to mobilize what the consumption capital asset pricing model tells us is the proper risk-bearing capacity of the economy as a whole.

The conclusion seems inescapable: a situation in which $r < g$ is not a possible equilibrium in a world with long-lived agents or with linked chains of agents. An economy in which $r < g$ appears possible only in the context of an overlapping-generations structure in which there are risks to individuals that are not risks to the economy as a whole, or to the government.

III. Uncertainty About Future Patience and Impatience

Should the growth rate of the economy be reliably and permanently less than the interest rate on government debt, then optimal fiscal policy is also relatively simple. Optimal fiscal policy balances considerations of productive efficiency against considerations of intergenerational equity. Debt should be incurred either when the benefits of current government programs flow to the future or when equity weighs in favor of transfers to today's generation, and debt should then be amortized gradually by smoothed taxes.

But what if the growth rate of the economy *might* be permanently greater than the interest rate on government debt, but might not? What then?

Consider a government deciding whether or not to undertake a utility-generating project *right now*, which will yield an improvement in social welfare U and which it wishes to finance by issuing a debt D. Next period the government will learn which régime the economy is in, and it will learn that the economy is either permanently in a $g > r_p$ régime with patient agents or a $g < r_i$ régime with impatient agents. If it is in a $g > r_p$ régime with patient agents, its job is done: it forgets that it has debt to amortize, and lets time erase its salience. If it is in a $g < r_i$ régime with impatient agents, it then amortizes the debt via tax-rate smoothing, levying enough distortionary taxes, with a deadweight loss of ξ per unit of revenue raised, in order to keep its future debt-to-annual-GDP ratio constant.

In the impatient-agent $g < r_i$ régime, the annual interest cost that must be financed in order to amortize the debt and achieve a constant debt-to-annual-GDP ratio is simply:

(6) $(D/Y)(r_i\text{-}g)$

And the flow cost to the economy of raising these taxes is:

(7) $A/Y = (1+\xi)(D/Y)(r_i\text{-}g)$

The remaining question is that of what discount rate this flow cost should be evaluated at. That agents are impatient suggests that they value present benefits highly relative to future costs, and so it is plausible that we should take them at their preferences and discount the costs at the same rate r_i. Then the present valeu of future costs is simply:

(8) $PV(A) = (1+\xi)D$

The r_i-g that must be financed each year in the numerator of the annual cost of debt amortization is cancelled by the r_i-g in the denominator that appears when we take the long-run present value.

With a probability μ that the economy will not be in the patient but rather in the impatient régime, then the expected cost of financing a unit of government expenditure now is simply:

(9) $C = \mu(1+\xi)D$.

Hence the project should be undertaken if its benefit U > C is such that:

(10) $U > C = \mu(1+\xi)D$

The shakiest step in this argument is the assumption that μ can be properly interpreted as a simple *probability*. It is not even clear how to begin thinking about whether one is neutral to or in some sense averse to risks as to who and what kind of person one might turn out to be.

IV. An Overlapping-Generations Model

Consider the simplest Diamond overlapping-generations model. An infinitely-lived government can sell bonds, levy taxes, and make purchases of a durable utility-yielding public good.

Agents live for two periods, start young, age into old, with one unit of young is born each period. Agents inelastically produce one unit of output when young. All the agents young in a generation are the same one of two types: impatient (i) young or patient (p) young.

Impatient (i) young have a utility function:

(11) $U_i = C_y + C_0/(1+ r_i-g) + P$

Patient (p) young have a utility function:

(12) $U_p = C_y + C_0/(1+ r_p-g) + P$

with $r_i > g > r_p$, and where P is utility from the government's public-goo purchases

This linear utility immediately implies that when the young are patient (p), demand for government bonds by the young is infinitely elastic at an interest rate of $r_p-g < 0$, and, similarly, when the young are impatient (i), demand for government bonds is infinitely elastic at an interest rate of $r_i-g > 0$. Note, also, that agents derive no consumer surplus from their borrowing and lending operations: they simply move them along the same (linear) indifference curve. Thus the only sources of social welfare will be the government's tax and public-good spending policies.

In each period, the government has to:

- pay off its old bonds D_{t-1} with either $(1+r_i-g)D_{t-1}$ or $(1+r_p-g)D_{t-1}$, depending on whether the old were patient or impatient when young.
- sell its new bonds D_t
- use any surplus from its debt management to purchase units of the public good
- cover any deficit from its debt management by levy distortionary taxes that yield an amount τ at a price of reducing the consumption of the young by $\tau(1+\xi)$.

And let the government's social welfare function be linear: a sum of the utilities of agents from their private decisions and taxation and of the amount of public good purchased.

<u>Suppose that the initial young are impatient, that there is a probability μ each generation that the new young are of a different type, and that patience is an absorbing state:</u> As long as the young remain impatient, there is nothing for the government to do. The young work, produce, and consume. When, however, the economy flips and the new generation born is patient, the government then issues 1 unit of debt, which it spends on the public good. And in each generation thereafter issues an extra $g - r_p$ of debt to top off the real debt stock, so that each new generation of young can push all of their consumption to when they are old, and spends the proceeds buying more of its public good.

<u>Suppose that the initial young are patient, that there is a probability μ each generation that the new young are of a different type, and that impatience is an absorbing state:</u> If this generation's young are patient, but next generation's young are guaranteed to be impatient—then the government has to decide on whether to issue. Once the young turn impatient, there is absolutely no reason to postpone repaying the debt. If the government were to issue one unit of debt, spends it on the public good, and then tax the next generation's young $(1+r_p-g)$ to pay off the debt, there would be an expected net addition to social welfare of:

(13) $1 - (1+\xi)(1+r_p-g)$

which will be positive if:

(14) $(g-r_p) > \xi/(1+\xi)$

If this generation's young and next generation's young will be patient, then the net addition to social welfare will be:

(15) $1 + (g-r_p) - (1+\xi)(1+r_p-g)$

If the young for three generations will be patient, then the formula will be:

(16) $1 + 2(g-r_p) - (1+\xi)(1+r_p-g)$

And for n generations of patient young:

(17) $1 + n(g-r_p) - (1+\xi)(1+r_p-g)$

Thus if there is a probability μ that each new generation enters the absorbing state of impatience, the expected number of patient generations is $1/\mu$. Since the net benefit is linear in the number of patient generations, the net benefit is:

(18) $1 + (g-r_p)(1/\mu-1) - (1+\xi)(1+r_p-g)$

which will be positive as long as

(19) $1 + (g-r_p)/\mu - (g-r_p) > (1+r_p-g) + \xi(1+r_p-g)$

(20) $(g-r_p)(1/\mu + \xi) > \xi$

(21) $(g-r_p) > \xi/(\xi + 1/\mu)$

If not, then because of the linear costs, it is not worth incurring even one red cent of debt.

Whether debt should be incurred as a way of assisting patient households in transferring wealth from the present into the future depends on the benefits and costs. The benefits from incurring and maintaining the debt depend on the value of the debt as a way of providing the economy with safe assets—on the value of (g-r_p.). The costs depend on thes chance that the debt will have to be unwound rapidly—on the value of μ. And the costs depend on how painful it will be to raise the explicit or implicit taxes—the value of ξ—needed to pay down the debt should asset prices shift to a configuration in which households are not patient but rather impatient.

In assessing the net benefits (or costs) formula:

$$(22) \quad NB = (g-r_p)(1/\mu + \xi) - \xi$$

It is important to construe the benefits (and costs) broadly. In the model the benefits come from the fact that government debt provides the economy with the safe savings vehicles that the financial system so desperately needs if it is to satisfy patient households' wish to transfer wealth from the present into the future. But there are other benefits as well: to name only the two most important, the increase in resource utilization in a depressed economy, and the surplus from public investment.

The costs should similarly be assessed broadly. In the model, the costs are the burden of the distortionary broad-based taxation needed to retire the debt when households become impatient and when thus the government's debt operations turn from a profit to a cost center. But what if there are limits to the size of the primary surpluses that the political system will allow the government to run? Then the costs are not the limited and known costs of imposing distortionary taxes but rather the unknown costs of "fiscal dominance”—of the rest of the government deciding on what the gap between spending and taxes is going to be, and on the central bank’s then having to somehow raise the money to cover that gap, either through inflation-driven seigniorage or through a financial repression-driven tax on the banking sector.

V. Conclusion

Since 1900, with the exception of the Great Depression itself, the interest rate on U.S. Treasury debt has been lower than the growth rate of the economy. Looking forward into the future, this pattern appears more likely than not to continue.

The fact that, for Treasury debt, r < g does not mean that the U.S. economy is dynamically inefficient in any standard sense: the marginal product of capital has been, is, and is likely to remain high in the U.S. economy. The fact that for U.S. Treasury debt r < g appears, instead, to point to a serious financial market failure: a failure on the part of the private market to adequately mobilize the risk-bearing capacity of the economy as a whole. This leaves the U.S. government as an organization that can provide a very valuable service to savers: that of providing them with a safe nominal savings vehicle that they can use to reliably transfer wealth from the present into the future. And, after the debacle of securitization and the rating agencies in the 2000s, it is difficult to see the U.S. government facing serious potential competition from private-sector entities capable of promising to create analogous AAA-class agents for a long time to come.

A government that can borrow at less than the economic growth rate is in a very different position from the standpoint of public finance questions of debt management than a government that must pay more than the economic growth rate. In the second case the Treasury's debt-management operations are a drain on public resources available to fund welfare-increasing programs. In the first case the Treasury's debt-management operations are a profit center, both increasing private well-being directly by providing highly-valued savings vehicles and allowing for reductions in steady-state tax rates as well.

In a situation in which r < g, a national debt is then truly and unambiguously what Alexander Hamilton said it could be: a national blessing.

Whether or not a government should undertake to borrow when r < g depends, as always, on the benefits and the costs. But when r < g the benefits are not just the value of the public goods and public services provided by the government but also the value of the financial service of safe-asset creation that Treasury debt provides. The costs depend on (a) the risk that the situation will change, that households will become impatient, and the debt will need to be amortized, and (b) the costs of amortization—either through broad-based but distortionary taxes, via rapid fiscal dominance-induced inflation, or through the costs of the implicit taxes levied on the financial sector in the event that the debt is dealt with via financial repression.

Should our future indeed be one in which there is a high chance of a standard configuration of asset prices and returns in which $g > r$ for U.S. Treasury debt, much of standard wisdom about optimal fiscal policy will need revision. Economists need, as part of their diversified intellectual portfolio, to think through the issues. We all need to take steps—even if only hesitant and uncertain steps—to thinking through these issues…