The market value of a central bank*

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PRELIMINARY AND INCOMPLETE

Abstract

The fiscal capacity of a central bank is given by the present value of the seignorage from issuing banknotes plus the market value of its assets minus non-required reserves. Its size determines the solvency of a central bank and constrains unconventional monetary policy. We estimate this capacity for the US, as well as its elasticity with respect to inflation. To do so, we use balance-sheet information to measure the market value of central bank assets and how it will fall with inflation. We also estimate annual seignorage and how it varies with inflation and use options data for inflation to recover stochastic discount factors with which to value cash flows to the central bank. Our results suggest that the fiscal capacity of the Fed is large, but insensitive to plausible changes in inflation.

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1 Introduction

Almost all central banks produce a stream of positive cash flows that they return to their shareholders. What is the market value of this stream? Since central banks do not usually trade shares of their capital, unlike other corporations, this question has largely been unanswered. Yet, it is interesting from at least a few different perspectives.

First, it is important because the value of the central bank capital gives an estimate of the fiscal capacity of the central bank. It has long been argued that a fiscal expansion that is financed by printing money can be an effective way to escape a recession. While this is still up to debate, figuring out how far can a central bank go in backing fiscal deficits would put an upper bound on how large these policy interventions can be.

Second, and related, a policy proposal to the European sovereign debt crisis was for the Eurosystem to buy bonds of troubled countries, and accept a partial default on their payments. As this would subtract from the dividends that the Eurosystem pays to its other member countries, it would amount to a fiscal transfer within the Euro-zone, using the central bank as an intermediary. The size of these transfers is bound above by the market value of the central bank, which must be estimated before this policy option is pursued.

A third policy question is how much revenues are generated by the ability to print money and the associated inflation tax. From one perspective, there is a large literature studying the trade-offs of using inflation versus other taxes as a form of government revenue, but very few studies measuring the size of the inflation tax base and the present value of its revenues. From the opposite perspective, it has long been noted that dollarization implies losing seignorage revenues, but there are few reliable estimates of what those revenues would be. In considering whether to dollarize as opposed to fixing its exchange rate, countries would like to know what is the size of the revenues that they are giving away.

Fourth, a small literature in the past few years has asked whether central banks can

become insolvent. The answer is yes, once one realizes that insolvency for a central bank does not mean heading to a bankruptcy court, but rather it means private agents not wanting to hold the central bank's liabilities so that hyperinflation results and the monetary system controlled by the central bank no longer works. However, for a central bank to become insolvent, separately from the solvency of the overall government, it must be that the central bank is independent form the rest of the government, and so it does not require positive fiscal transfers from the Treasury to conduct its operations.[1] The present value of the transfers from the central bank to the Treasury provides an empirical measure of the intertemporal solvency of the central bank, and gives an upper bound to the losses that a central bank can take as a potential result of unconventional monetary policies.

To inform these different debates, this paper answers two related questions: How much is the central bank worth? And, how does the value of the resources that it generates depend on inflation? Ultimately, inflation is the main (or almost only) lever at the disposal of central banks, so the second question asks to what extent they can increase their market value in order to expand their fiscal capacity, allow for larger transfers within the monetary union, increase fiscal revenues, or eliminate fears of insolvency. We answer these two questions for the Federal Reserve. On the first question, we find that the market value of the central bank is considerable, between 18% and 22% of GDP (preliminary estimates). On the second question, we consistently find that the market value of the central bank is quite insensitive to the inflation rate, and for the Federal Reserve even declines with it.

To reach these conclusions, we take the following steps. We start by proving that the market value of a central bank is equal to the present discounted value of its seignorage flows plus the market value of its assets minus the value of excess reserves. The latter are straightforward to read out of the central bank balance sheet, and are insensitive to inflation

[1]Hall and Reis (2013) and Bassetto and Meisner (2013) studied the circumstance where these fiscal transfers would be needed in some periods, while Reis (2013) and Del Negro and Sims (2014) focussed instead on their present value.

because they are almost exclusively overnight. Measuring the market value of assets is harder, because central banks tend to report the face value of their holdings and often do not discriminate between securities of different maturities. Working through their financial reports and other sources of data, we provide these estimates, and following the methods in Hilscher, Raviv and Reis (2014), we measure by how much the nominal asset holdings fall with inflation.

The hardest term to measure is the present value of seignorage. We make three contributions to the literature to provide these estimates. First, we show how to estimate seignorage functions directly, as an alternative to the usual approach of estimating money demand functions. Second, we use option contracts on inflation to extract the appropriate stochastic discount factors to value the flows of seignorage. Third, we take into account the long-run risk that comes with the growth rate of the economy and which will affect the base for seignorage.

Our paper is one of the first to take on this empirical challenge. The literature on the costs of dollarization used past average seignorage revenues and divided those by a constant real interest rate to estimate the market value of the central bank. However, most economies that consider dollarization expect future inflation to be very different from past inflation, and this calculation assumes away all the uncertainty on future inflation, growth and real interest rates that financial economists have typically found to be crucial in valuing future cash flows.

More recently, Buiter (2012) estimated the fiscal capacity of the ECB using a simple rule of thumb. If nominal income grows at a constant rate of g% per year, if velocity is fixed ay v, if seignorage is earned on all of this broad measure of the money stock, and if the real interest rate with which to discount future cash flows is constant and if it is equal to the risk-free rate r, then the present value of seignorage is g/rv.[2] This insightful calculation

[2]To derive this, recall the quantity theory equation $M_tV_t = P_tY_t$ where P_tY_t is nominal income, V_t is

reveals the key determinants for calculating the present value of seignorage. But each of the five ifs above are empirically easy to reject, so one needs to move beyond this rule of thumb to come up with credible empirical estimates. In fact, we will show that our estimates differ by a factor of more than 2 relative to the ones that would come from this roule of thumb.

The rest of this paper is structured as follows. Section 2 derives the market value of central bank capital theoretically, identifying the key objects that have to be measured. Section 3 estimates the market value of the assets held by the central bank and how it depends on inflation. Section 4 focuses on the present value of seignorage, introducing both the data that we use as well as our new approach to estimating and discounting annual seignorage. Section 5 brings the estimates together to answer our two questions for the Fed, and discusses the limitations of these estimates and as well as how to interpret them given the peculiar institutional features of each of the three different central banks. Section 6 concludes.

velocity and M_t is broad money, and equate seignorage with ΔM_t. Then the present value of seignorage as a ratio of GDP is $\mathbb{E}\sum_{t=0}^{\infty}(1+r_{0,t})\Delta M/P_tY_t$ where $r_{0,t}$ is the rate at which future seignorage flows can be discounted. With all the assumptions in the sentence, it is easy to see this expression become equal to g/rv