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Jens Reich, *Seigniorage: On the Revenue from the Creation of Money* (New York: Springer International Publishing, 2017), pp. 148, $109.99 (hardcover). ISBN: 9783319631233.

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Jens Reich has written a learned book providing a useful overview of both the history of, and the history of economic thought about, seigniorage. Reich further outlines an analytical approach within which to derive conditions for optimal seigniorage targets by monetary and fiscal authorities. It is an ambitious work that discusses seigniorage in the context of the alternative institutional arrangements in which seigniorage has historically been collected by creators of money, either by minting coins, creating convertible banknotes and bank deposits, or by issuing inconvertible forms of money that provide no actual or potential real services.

Reich begins by considering seigniorage from a historical and institutional perspective, introducing the three institutional arrangements that serve as ideal types (commodity money, credit money, and fiat money) for the analytical models of seigniorage to be introduced in subsequent chapters. The intuitive appeal of this demarcation of ideal types is obvious, but, as I observe below, the analytical usefulness of Reich's demarcation between commodity and fiat ideal types is doubtful in at least some respects.

In chapter 2, elaborating on his tripartite demarcation of ideal monetary types, Reich surveys the history of thought on seigniorage, classifying the discussions of earlier writers according to the implicit or explicit ideal type in terms of which those discussions were conducted.

After the two introductory chapters, Reich turns in chapter 3 to an analytical discussion of the seigniorage that can be derived from the supply of a pure fiat currency. The next three chapters present similar analyses of the seigniorage from supplying a commodity currency (ch. 4), supplying a credit currency (ch. 5), and the more historically relevant cases of seigniorage from a mixed commodity-credit system and a mixed fiat-credit system (ch. 6). In chapter 7 Reich broadens his focus and attempts to consider seigniorage not in isolation but as one of many sources of revenue available to finance government expenditures. In the concluding chapter, Reich broadens his focus in another direction to consider the role of seigniorage in monetary theory.

The earliest discussions of seigniorage relate to deviations between the metallic content of coins and their nominal face values corresponding to a legal specification of the metallic content of those coins. Because the normal wear and tear caused by using coins in exchange erodes their metallic content, any coinage inevitably includes coins of varying metallic content, implying a tendency—widely known as Gresham's Law, though like the Lucas Critique it was recognized and understood before being canonized under the name of the author of an especially influential articulation of that tendency—for full-bodied coins to be hoarded and worn coins to be offered in payment. The systematic deviation between the face value and the metallic content of coins gave issuers of coins an incentive to exploit the overvaluation of coins by issuing underweight new coins, a predictable, and not necessarily dishonest, response to market incentives.

Because market forces imply that coins would usually circulate at a value greater than their metallic content, the strict demarcation between a pure metallic and a fiat currency is rarely consistent with historical evidence. But the historical range of overvaluation across various metallic coinages was certainly wide, and some metallic coinages did maintain their overvaluation while others suffered progressive devaluation or debasement over time.

In discussing the history of thought about seigniorage from minting, Reich observes that there are two different mechanisms whereby seigniorage can be derived from a metallic currency: first, charging a tax on newly minted coins; and second, reducing the metallic content of the coin. By imposing a mint tax, the mint can extract payment from those seeking to increase their holdings of that coinage, confining the burden of seigniorage to those bringing metal to be coined at the mint. Reich further suggests that a mint tax, by reducing the quantity of new coins issued by that mint, tends to reduce prices quoted in terms of that coinage, presumably by increasing the premium on that coinage relative to its gold content, raising the premium of coins from that mint above their face value.

However, as a mint tax increases the value of a coinage above its face value by reducing the quantity of coin in circulation, the reduction in prices quoted in terms of those coins will encourage local goods to be exported to markets where prices are higher and discourage imports into the local market. The resulting balance-of-trade surplus would entail an influx of coins minted elsewhere, thereby limiting the extent to which a mint tax could depress local metallic prices below the metallic prices quoted in terms of coinages elsewhere.

Reich's dichotomy between seigniorage via mint tax versus seigniorage via reduction of metallic content of coins is therefore, even in theory, less clear-cut than he supposes. If prices in terms of a metallic coinage are determined by the metallic content of coins, a mint tax will not affect prices because it does not affect the metallic content of the coins in circulation; it will affect only the proportion of locally minted coins in the total circulation. The optimal mint tax cannot be determined without considering the elasticity of supply coins minted elsewhere.

Reich's discussion of the value of commodity currency is also marred by an uncritical acceptance of the classical doctrine that the value of a commodity currency is determined by the cost of production of the currency. But for a commodity like gold, whose total stock is very large relative to output in any short or intermediate period, the standard stock-flow analysis shows that causation in the short or intermediate run flows from the value of the commodity to its cost of production, not from cost of production to the value of the commodity.

This focus on the cost of production as the key determinant of value in a commodity money system also seems to mislead Reich into assuming that when a government earns seigniorage from a commodity currency by reducing the metallic content of that currency, debasement of the currency necessarily follows. It seems that Reich either has overlooked the many historical examples of governments or central banks issuing convertible paper currencies against which less than 100 metallic reserves were held, or he is classifying a paper currency convertible into gold or silver to be a fiat currency. In either case, Reich's demarcation of ideal types seems inappropriate for the task he has set for them.

The importance of convertibility in a theory of seigniorage is a point that would have behooved Reich to explore in greater depth than he has done in this volume. Reich properly points out the deficiency in John Maynard Keynes's (1923) treatment of the inflation tax as a revenue source for governments with insufficient conventional sources of revenue to fund their expenditures. By taxing the holding of cash balances to fund current expenditures, a government reduces the amount of cash balances that will be held, thereby reducing the potential future revenue that can be raised by way of inflation. A single-period analysis therefore provides a misleading guide for a profit-maximizing currency monopolist.

Recognizing the time-inconsistency problem, Earl Thompson (1997) and Thompson and Charles Hickson (2000) suggested that the classical nineteenth-century gold standard grew out of the creation of the Bank of England at the end of the seventeenth century. By issuing banknotes redeemable in gold at a fixed rate, the bank provided England with a source of emergency revenue that enabled the government to finance its war with France, seeking to restore the Stuart monarchy overthrown in the Glorious Revolution. Having provided lenders with a credible promise that borrowed funds would be repaid in terms of pounds of constant gold content, the government of William and Mary was able to borrow through the Bank of England the funds to finance its wartime expenditures, even if the gold standard were temporarily suspended and the pound sterling depreciated. Relying on Thompson's insight, I have suggested (Glasner 1989) that the presumption that the issue of currency is rightly monopolized by the state is related to the revenue-raising capacity provided by such a monopoly, enabling the sovereign to raise funds in wartime when other sources of tax revenue are less readily accessible than currency debasement.

In discussing the third of his ideal monetary types, credit (bank-supplied) money, Reich effectively criticizes Milton Friedman's (1969) criterion for monetary optimality that monetary policy aim at a rate of deflation such that the nominal rate of interest falls to zero, effectively making money costless to hold and causing the demand to hold money to be satiated. Reich points out that Friedman's optimality condition presumes that the creation of additional balances of credit money is costless at the margin. However, the assumption that the cost of creating credit money is zero is false inasmuch as it would imply that banks incur no default risk in lending to borrowers, and devote no resources to evaluating and monitoring loan applicants to estimate the likelihood of repayment. Unless banks can lend at a rate above their cost of obtaining funds, they cannot profitably supply deposits or banknotes to their customers. Deflation sufficient to force the nominal rate of interest to zero would eliminate the margin required for bank profitability.

However, Reich doesn't consider the possibility of an alternative system in which bank intermediation was eliminated by a 100% reserve requirement on all bank sight liabilities, so that conventional bank deposits would have to be financed by service charges to depositors. Through its control over quantity of money, the monetary authority would cause a deflation sufficient to drive the nominal interest rate to zero. This arrangement would combine Friedman's optimality criterion with the Chicago

100% reserve banking proposal described by Henry Simons (1936). But even so, the system would be subject to at least two defects.

First, without conventional bank commercial banking, there would be no market mechanism whereby the quantity of money would respond endogenously to changes in the demand of the public to hold cash balances. With the quantity of money fixed by the monetary authority under a quantity rule, excess demands for or supplies of money could be accommodated only through changes in spending, the public either increasing spending to reduce unwanted cash holdings or reducing spending to accumulate desired cash holdings.

Second and potentially more serious, the conventional assumption that the real rate of interest is invariant with respect to changes in the price level or the rate of inflation is simply not sustainable, especially near the zero lower bound, as I have explained elsewhere (Glasner 2018). An increase in expected deflation at the zero lower bound cannot be accommodated without breaching the zero lower bound on nominal interest rates. If market or political resistance prevents negative interest rates from being set, an increase in expected deflation caused by an anticipated excess demand for money would lead to a destabilizing crash in asset prices as market participants tried to shift from real to monetary assets.

Despite my reservations on some specific points, Reich has performed a valuable service in surveying and categorizing the extensive literature on seigniorage. Anglophone readers, in particular, will benefit from exposure to a wide range of sources that might not otherwise come to their attention.*

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*The views expressed herein do not necessarily reflect the views of the Commission or of individual Commissioners.