



# An endeavor to estimate seigniorage before the end of and immediately after the Pacific War<sup>☆</sup>



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## ABSTRACT

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This is the first research paper to analyze seigniorage in Japan before, during, and after the Pacific War. As a result of logically categorizing various definitions of seigniorage (opportunity cost approach, monetary approach, and inflation tax), we conclude that these differences pivot on the issue of whether to confine the scope of debts, which is reduced by unexpected inflation, to the usual general government debt or to expand it to the integrated government debt including the monetary base of the Bank of Japan. We also point out the possibility that, in light of the degree of reduction in government debt as a percentage of GDP during and after the Pacific War, the monetary approach or inflation tax (the cases of confining the taxation base to the usual general government debt) are appropriate means to estimate seigniorage obtained by the general government. *J. Japanese Int. Economies* **41** (2016) 1–16. Nomura Securities, 2-2-2, Otemachi, Chiyoda-ku, Tokyo 100-0004, Japan; Faculty of Economics, Hosei University, 2-17-1 Fujimi, Chiyoda-ku, Tokyo 102-8160, Japan.

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## 1. Introduction

The purpose of this research paper is to estimate and examine seigniorage in Japan over a specific period of time before the end of and immediately after the Pacific War (1927 to 1960).

The authors draw attention to seigniorage in this particular period of time due to the following three reasons and attentiveness to related issues: First, to the best of the authors' knowledge, there is no previous study on estimating seigniorage in Japan before the end of and immediately after the Pacific War (1927 to 1960). However, between 1945 and 1947, in particular, unexpected high inflation occurred, recording a Consumer Price Index as high as approximately 115% to 289%. It is of great significance, therefore, to

attempt an estimation of seigniorage keeping its relation with inflation tax in mind.

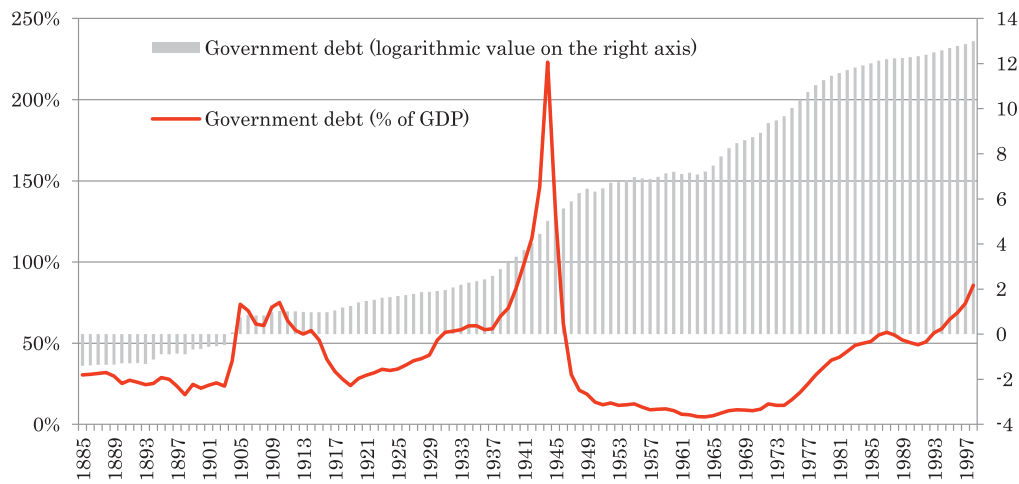
Second, although "seigniorage" generally means "the profit derived from issuing currency," specific definitions of the term vary as elucidated in previous studies by Drazen (1985), Neumann (1992) and others. Buiter (2007), for instance, defines seigniorage ( $S$ ) in three ways. First, seigniorage is defined by "opportunity cost approach," which is expressed by " $S = iM$ ," where monetary base is  $M$  and nominal interest rate is  $i$ . The second definition is based on "monetary approach" and is expressed by " $S = \Delta M$ ," which denotes addition to the monetary base. The third definition is based on the revenue from inflation tax on the monetary base, which is expressed by " $S = \pi M$ ," where inflation rate is  $\pi$ . It is also highly worthwhile to theoretically reconsider which basic ideas and definitions are reasonable to use in estimating seigniorage, using the high inflation event such as that which Japan experienced between 1945 and 1947.

Third, with the development of ballooning outstanding government bonds, we believe that an analysis of seigniorage in the years before, during, and soon and after the Pacific War should provide us with useful indications in considering the future direction of Japan. The outstanding government bonds as a percentage of GDP in Fiscal 2014 climbed to approximately 156% (general government debt soared to approximately 200%), coming close yet again to the

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**Fig. 1.** Trends of government debt (logarithmic value, % of GDP).

Note: We use a logarithmic scale for the government debt after dividing it by 1 billion yen. The years up to 1912 are calendar years and the subsequent years are fiscal years.

Prepared by the authors on the basis of data supplied by the Bank of Japan, Ministry of Finance, Cabinet Office; Kazushi Ohkawa, Nobukiyo Takamatsu, and Yuzo Yamamoto (1974); Toshiyuki Mizoguchi and Noriyuki Nojima (1993).

level immediately before the end of the Pacific War. Reinhart and Sbrancia (2011) points to the following three collapse cases after government has fallen into a heavily indebted situation: 1) debt restructuring (e.g. default on government bonds), 2) financial repression, and 3) substantial debt reduction caused by sudden high inflation. The Bank of Japan is currently engaged in a massive buying operation of government bonds as part of its quantitative and qualitative monetary easing measure with a 2% inflation target. Subsequently, the long-term interest rate has remained at historically low levels, thus creating a situation similar to point 2) “financial repression.” However, such a situation cannot necessarily go on forever in an open economy. On the contrary, as Japan experienced immediately after the end of the Pacific War, we also cannot rule out the possibility that point 3) “substantial debt reduction caused by a sudden high inflation” will be chosen for political reasons. Fig. 1 shows trends of government debt (as a percentage of GDP and as a logarithmic value). The government debt (as a percentage of GDP) increased towards the end of the Pacific War, and then it dramatically decreased due to high inflation immediately after the end of the War. Now, after about 70 years since the end of the War, Japan’s government debt is once again showing an upward trend. We believe that analyzing seigniorage before the end of and immediately after the Pacific War should have a certain significance in considering future directions for Japan.

On the basis of the reasons and recognition of issues mentioned above, this paper intends to estimate and examine seigniorage before the end of and immediately after the Pacific War, while reviewing the definitions of seigniorage. This paper is organized as follows. In Section 2, we organize previous studies in terms of the definitions of seigniorage and revisit those definitions. In Section 3, we explain about the data that we use in estimating seigniorage. In Section 4, we estimate seigniorage based on several definitions and outline the content. In Section 5, we examine the effect of the black market price and the wartime financial exploitation in Southeast Asia. Finally, Section 6 summarizes and describes future issues.

## 2. Seigniorage

### 2.1. Definition of seigniorage

As discussed in Section 1, seigniorage is defined in various ways. It could be argued that even among economists, there is no

consensus for the concept of “the profit derived from issuing currency.” Hence, in this Section, we first organize definitions by outlining representative concepts of seigniorage that have been discussed in previous studies by Drazen (1985), Neumann (1992) and Buiter (2007).

Definitions of seigniorage fall roughly into the following two main categories: 1) the case defined by “transfer of wealth from private sector to government sector” associated with the increase in the monetary base, and 2) the case defined with an emphasis on the “direct revenue of the Central Bank.” The former main category (defined by “transfer of wealth from private sector to government sector” associated with the increase in monetary base) is further subdivided into three types of seigniorages, which are defined by “opportunity cost approach,” “monetary approach,” and “inflation tax on the monetary base.”

As discussed in previous studies by Phelps (1971, 1972), Marty (1978), and others, the first-mentioned type “opportunity cost approach” defines seigniorage based on the interest revenue of the Central Bank. The Central Bank raises funds, free of interest, from the monetary base (through the issuance of currency), and purchases financial assets such as government bonds through equivalent exchange. In doing so, it can earn revenue from its own financial assets such as interest. The “opportunity cost approach” considers seigniorage as the interest revenue thus gained from the monetary base. It is also called “opportunity cost seigniorage” as the Central Bank is able to raise funds free of interest. Let the nominal interest rate  $i_t$  in period  $t$  be  $i_t$ , monetary base be  $M_t$ , commodity price be  $P_t$ , and real GDP be  $Y_t$ , then the opportunity cost seigniorage ( $S_{1,t}$ ) as a percentage of GDP is expressed as follows:<sup>1</sup>

$$S_{1,t} = i_{t-1} \frac{M_{t-1}}{P_t Y_t}$$

Second, the “monetary approach” type considers seigniorage as an increase in the monetary base as discussed in previous studies by Cagan (1956), Marty (1967), Friedman (1971), and others. It directly regards the issuance of currency as seigniorage and is called “monetary seigniorage.” Monetary seigniorage ( $S_{2,t}$ ) also appears

<sup>1</sup> Nominal GDP is used as the denominator in this paper. However, many previous studies use nominal commodity prices for the definition. We define seigniorage with the use of nominal GDP, considering subsequent calculation. Incidentally, Buiter (2007) and others defined seigniorage by using nominal GDP as the denominator.

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