Debt to GDP Ratio from the perspective of Functional Finance Theory and MMT

YASUHITO TANAKA
Faculty of Economics
Doshisha University
Kamigyo-ku, Kyoto, 602-8580
JAPAN

Abstract: - This paper will argue that since the ratio of government debt to GDP cannot diverge to infinity, fiscal collapse is not possible. Using a basic macroeconomic model in which the interest rate of government bonds is endogenously determined, with overlapping generations model in mind, we show the following results: 1) The budget deficit including interest payments on the government bonds equals an increase in the savings from a period to the next period. 2) If the savings in the first period is positive (unless the savings are made solely through stocks), we need budget deficit to maintain full employment under constant prices or inflation in the later periods. 3) Excess budget deficit induces inflation under full employment. 4) Under an appropriate assumption about the proportion of the savings consumed, the debt to GDP ratio converges to a finite value. It does not diverge to infinity.

Key-Words: - Budget deficit, Debt to GDP ratio, MMT, Functional Finance Theory

1 Introduction

One of the most commonly used conditions for examining fiscal stability is the Domar condition ([1], [18]). The Domar condition compares the interest rate with the economic growth rate under balanced budget (excluding interest payments on the government bonds), and if the former is greater than the latter, public finance will become unstable, and the government debt to GDP ratio will continue to grow. Yoshino and Miyamoto (2020) try to modify the Domar condition by focusing not only on the supply side of government bonds but also on the demand side, while keeping the idea of fiscal instability indicated by the Domar condition. However, our interest is different from that. We consider a problem of the debt to GDP ratio from the perspective of Functional Finance Theory ([3], [4]) and MMT (Modern Money Theory or Modern Monetary Theory, [2], [13], [17][1]) using a simple macroeconomic model, and we will show that the Domar condition is meaningless.

In the next section, we examine the relation between the budget deficit and the debt to GDP ratio, and will show the following results.

1. The budget deficit including interest payments on the government bonds equals an increase in the savings from a period to the next period. (Proposition 1)
2. If the savings in the first period (Period 0) is positive (unless the savings are made solely through stocks), we need budget deficit to maintain full employment under constant prices or inflation in the later periods. (Proposition 2)
3. Excess budget deficit induces inflation under full employment. (Proposition 3)
4. Under an appropriate assumption about the proportion of the savings consumed, the debt to GDP ratio converges to a finite value. It does not diverge to infinity. (Proposition 4)

In Section 3 we consider endogenous determination of the interest rate on the government bonds by the monetary policy of the government.

In Section 4 we examine the so-called Domar condition that under balanced budget excluding interest payments on the government bonds the interest rate should be smaller than the growth rate to prevent the debt to GDP ratio diverging infinity, and we will show that it is meaningless.

2 Budget deficit and debt to GDP ratio

Using a simple macroeconomic model we analyze budget deficit and the debt to GDP ratio. In a broad sense, savings are made by government bonds, money, and stocks, of which those made by government bonds and money are analyzed as savings in this paper. The amounts of government bonds and money supply are determined by the government. Although money does not earn interest and government bonds earn interest, consumers are willing to hold a certain amount of money for reasons such as the liquidity of money. The holding of money is considered to be a decreasing function of the interest rate of the government bonds (while the holding of government bonds is an increasing function of the interest rate). The reasons for this are as follows. This part

[1] Japanese references of MMT are [5], [6], [7], [11], [12].

implicitly assumes an overlapping generations model in which people live for two periods[2]. People decide how much money and government bonds to hold so that the marginal utility of holding one more unit of money and the marginal utility of interest income from holding government bonds are equalized. Since the marginal utility of money decreases as the amount of money held increases, the amount of money held is a decreasing function of the interest rate of the government bonds.

The share of government bonds in savings is denoted by $b(r),\ 0 < b(r) \leqq 1$. r is the interest rate of the government bonds. The share of money in savings is $1 - b(r)$. The investment is financed by savings in the form of stocks, and it may be a decreasing function of the interest rate of the government bonds. However, for simplicity we assume that the investment is constant in each period. The interest rate of the government bonds is endogenously determined by the monetary policy of the government.

2.1 Period 0

First consider Period 0 at which the world starts. All variables represent nominal values. Let Y_0, C_0, I_0, T_0 and G_0 be the GDP, consumption, investment, tax and fiscal spending in Period 0. Then,

$$Y_0 = C_0 + I_0 + G_0.$$

The consumption is written as

$$C_0 = \bar{C}_0 + \alpha(Y_0 - T_0).$$

$\bar{C}_0$ is the constant part of consumption in Period 0. It is financed by the savings carried over from the previous period. Since there is no previous period of Period 0,

$$\bar{C}_0 = 0.$$

Then,

$$C_0 = \alpha(Y_0 - T_0),$$

and

$$Y_0 = \alpha(Y_0 - T_0) + I_0 + G_0.$$

From this

$$(1-\alpha)(Y_0 - T_0) = I_0 + G_0 - T_0.$$

The savings in Period 0, which is carried over to the next period, is

$$S_0 = (1-\alpha)(Y_0 - T_0) - I_0.$$

Therefore, we have

$$G_0 - T_0 = (1-\alpha)(Y_0 - T_0) - I_0 = S_0.$$

[2]In other studies, for example, [14], [15] and [16], which are according to the model by M. Otaki such as [8], [9], [10], we use an overlapping generations model to analyze the problem of budget deficit in a growing economy

Let us assume full employment in Period 0, and denote the full employment GDP by Y_f, that is,

$$Y_0 = Y_f.$$

Then, we obtain

$$G_0 - T_0 = (1-\alpha)(Y_f - T_0) - I_0 = S_0. \quad (1)$$

This is the budget deficit we need to achieve full employment in Period 0. It is determined by Y_f, I_0 and T_0. From this we get the following equation.

$$G_0 = (1-\alpha)(Y_f - T_0) + T_0 - I_0.$$

This is the fiscal spending needed to achieve full employment given T_0 and I_0. If the budget deficit is larger than this value, then Y_f increases and (1) still holds.

Unless the savings are made solely through stocks, (1) is positive.

Note that as we said at the beginning of this subsection, all variables represent nominal values.

2.2 Period 1

Next, consider Period 1. Again all variables represent nominal values. Let Y_1, C_1, I_1, T_1 and G_1 be the GDP, consumption, investment, tax and fiscal spending in Period 1. Then,

$$Y_1 = C_1 + I_1 + G_1.$$

The consumption is written as

$$C_1 = \bar{C}_1 + \alpha(Y_1 - T_1).$$

$\bar{C}_1$ is the constant part of consumption in Period 1. It is financed by the savings carried over from Period 0. Let r_0 be the interest rate of the government bonds, which is carried over from Period 0 to Period 1. Let δ be the proportion of the savings consumed. Then,

$$\bar{C}_1 = \delta(1 + b(r_0)r_0)S_0,\ 0 < \delta \leqq 1,$$

and

$$C_1 = \delta(1 + b(r_0)r_0)S_0 + \alpha(Y_1 - T_1),$$

and so

$$Y_1 = \delta(1 + b(r_0)r_0)S_0 + \alpha(Y_1 - T_1) + I_1 + G_1.$$

From this

$$(1-\alpha)(Y_1 - T_1) = \delta(1 + b(r_0)r_0)S_0 + I_1 + G_1 - T_1.$$

Therefore,

$$G_1 - T_1 = (1-\alpha)(Y_1 - T_1) - I_1 - \delta(1 + b(r_0)r_0)S_0.$$

The savings in Period 1, which is carried over to Period 2, is

$$S_1 = (1-\alpha)(Y_1-T_1)-I_1+(1-\delta)(1+b(r_0)r_0)S_0.$$

This means

$$G_1 - T_1 = S_1 - (1 + b(r_0)r_0)S_0.$$

Alternatively,

$$G_1 - T_1 + b(r_0)r_0S_0 = S_1 - S_0. \tag{2}$$

We assume that the economy grows by technological progress. The real growth rate is $g > 0$. Also the prices may rise from Period 0 to Period 1, that is, there may be inflation. Let p be the inflation rate. Then,

$$(1 + g)(1 + p) - 1 = g + p + gp$$

is the nominal growth rate.

Under nominal growth at the rate of $g + p + gp$,

$$Y_1 = (1 + g)(1 + p)Y_f.$$

Tax and investment also increase at the same rate as follows under the assumption that inflation is predicted,

$$T_1 = (1 + g)(1 + p)T_0,\ I_1 = (1 + g)(1 + p)I_0.$$

Then, the savings in Period 1 is

$$\begin{aligned} S_1 =&(1 - \alpha)(1 + g)(1 + p)(Y_f - T_0) \\ &- (1 + g)(1 + p)I_0 + (1 - \delta)(1 + b(r_0)r_0)S_0. \end{aligned}$$

It is rewritten as

$$S_1 = (1+g)(1+p)S_0+(1-\delta)(1+b(r_0)r_0)S_0. \tag{3}$$

If $\delta < 1$, we have

$$S_1 > (1 + g)(1 + p)S_0. \tag{4}$$

From (2) and (3) we obtain

$$\begin{aligned} G_1 - T_1 + b(r_0)r_0S_0 =&(1 + g)(1 + p)S_0 + [b(r_0)r_0 \\ &- \delta(1 + b(r_0)r_0)]S_0, \end{aligned}$$

and

$$\begin{aligned} G_1 - T_1 =& (1 + g)(1 + p)S_0 - \delta(1 + b(r_0)r_0)S_0 \\ &< (1 + g)(1 + p)(G_0 - T_0). \end{aligned}$$

They are budget deficits, with or without interest payments on the government bonds, we need to achieve full employment in Period 1 under nominal growth at the rate of $g + p + gp$.

If

$$\begin{aligned} G_1-T_1 + b(r_0)r_0S_0 =& (1 + g)S_0 + [b(r_0)r_0 \\ &- \delta(1 + b(r_0)r_0)]S_0 \\ <&(1 + g)(1 + p)S_0 + [b(r_0)r_0 \\ &- \delta(1 + b(r_0)r_0)]S_0, \end{aligned}$$

the economy grows at the real growth rate g without inflation. Therefore, we can say that excess budget deficit induces inflation.

2.3 Period 2

Next, consider Period 2. Also in this subsection all variables represent nominal values. Let Y_2, C_2, I_2, T_2 and G_2 be the GDP, consumption, investment, tax and fiscal spending in Period 2. Then,

$$Y_2 = C_2 + I_2 + G_2.$$

The consumption is

$$C_2 = \bar{C}_2 + \alpha(Y_2 - T_2).$$

$\bar{C}_2$ is the constant part of consumption in Period 2. It is financed by the savings carried over from Period 1. Let r_1 be the interest rate of the government bonds, which is carried over from Period 1 to Period 2. Similarly to the case of Period 1,

$$\bar{C}_2 = \delta(1 + b(r_1)r_1)S_1,$$

and

$$C_2 = \delta(1 + b(r_1)r_1)S_1 + \alpha(Y_2 - T_2),$$

and so

$$Y_2 = \delta(1 + b(r_1)r_1)S_1 + \alpha(Y_2 - T_2) + I_2 + G_2.$$

From this

$$(1-\alpha)(Y_2-T_2) = \delta(1+b(r_1)r_1)S_1+I_2+G_2-T_2.$$

Therefore,

$$G_2-T_2 = (1-\alpha)(Y_2-T_2)-I_2-\delta(1+b(r_1)r_1)S_1.$$

The savings in Period 2, which is carried over to Period 3, is

$$S_2 = (1-\alpha)(Y_2-T_2)-I_2+(1-\delta)(1+b(r_1)r_1)S_1.$$

This means

$$G_2 - T_2 = S_2 - (1 + b(r_1)r_1)S_1.$$

Alternatively,

$$G_2 - T_2 + b(r_1)r_1S_1 = S_2 - S_1. \tag{5}$$

Again we suppose that the economy nominally grows by technological progress and inflation at the rate of $g + p + gp$, then

$$Y_2 = (1 + g)^2(1 + p)^2Y_f.$$

We assume that, for simplicity, the inflation rate p is constant. Tax and investment also increase at the same rate as follows,

$$T_2 = (1 + g)^2(1 + p)^2T_0,\ I_1 = (1 + g)^2(1 + p)^2I_0.$$

Then, the savings in Period 2 is

$$S_2 =(1-\alpha)(1+g)^2(1+p)^2(Y_f-T_0) - (1+g)^2(1+p)^2I_0+(1-\delta)(1+b(r_1)r_1)S_1.$$

It is rewritten as

$$S_2 = (1+g)^2(1+p)^2S_0+(1-\delta)(1+b(r_1)r_1)S_1. \quad (6)$$

If $\delta < 1$, since

$$S_1 > (1+g)(1+p)S_0,$$

assuming

$$(1+b(r_1)r_1)(1+g) > 1+b(r_0)r_0, \quad (7)$$

we have

$$S_2 > (1+g)(1+p)S_1. \quad (8)$$

If the interest rate is constant, and the nominal growth rate is positive, (7) is satisfied. From (5) and we obtain

$$G_2-T_2+b(r_1)r_1S_1 = (1+g)^2(1+p)^2S_0 + [b(r_1)r_1-\delta(1+b(r_1)r_1)]S_1. \quad (9)$$

and

$$G_2-T_2 =(1+g)^2(1+p)^2S_0 - \delta(1+b(r_1)r_1)S_1. \quad (10)$$

Since

$$G_1-T_1 = (1+g)(1+p)S_0-\delta(1+b(r_0)r_0)S_0,$$

by the assumption in (7), we obtain

$$G_2-T_2 < (1+g)(1+p)(G_1-T_1).$$

(9) and (10) are budget deficits, with or without interest payments on the government bonds, we need to achieve full employment in Period 2.

By (3) and (6),

$$S_2 =[(1+g)^2(1+p)^2 + (1-\delta)(1+b(r_1)r_1)(1+g)(1+p) + (1-\delta)^2(1+b(r_1)r_1)^2]S_0. \quad (11)$$

If

$$G_2-T_2 =(1+g)^2S_0-\delta(1+b(r_1)r_1)S_1 <(1+g)^2(1+p)^2S_0-\delta(1+b(r_1)r_1)S_1,$$

the economy grows at the real growth rate g without inflation. Therefore, we can say that excess budget deficit induces inflation.

2.4 Period 3 and beyond

From now on, for simplicity, the interest rates in all periods are equal. Also in this subsection all variables represent nominal values, and the inflation rate is constant. It may be zero. Denote the interest rate by r. By similar reasoning for Period 3, we get

$$G_3-T_3 = S_3-(1+b(r)r)S_2.$$

and

$$G_3-T_3+b(r)rS_2 = S_3-S_2. \quad (12)$$

The savings in Period 3 is

$$S_3 = (1+g)^3(1+p)^3S_0+(1-\delta)(1+b(r)r)S_2. \quad (13)$$

Thus,

$$G_3-T_3+b(r)rS_2 = (1+g)^3(1+p)^3S_0+[b(r)r-\delta(1+b(r)r)]S_2, \quad (14)$$

and

$$G_3-T_3 = (1+g)^3(1+p)^3S_0-\delta(1+b(r)r)S_2. \quad (15)$$

(14) and (15) are budget deficits, with or without interest payments on the government bonds, we need to achieve full employment in Period 3.

From (11) and (13), we get

$$S_3 =[(1+g)^3(1+p)^3+(1-\delta)(1+b(r)r)(1+g)^2(1+p)^2 + (1-\delta)^2(1+b(r)r)^2(1+g)(1+p) + (1-\delta)^3(1+b(r)r)^3]S_0.$$

Proceeding with this argument, we obtain the following result for Period n, $n \geqq 1$.

$$G_n-T_n+b(r)rS_{n-1} = S_n-S_{n-1}. \quad (16)$$

With or without inflation in Period n, we have

$$S_n =[(1+g)^n(1+p)^n + (1-\delta)(1+b(r)r)(1+g)^{n-1}(1+p)^{n-1}+\cdots + (1-\delta)^{n-1}(1+b(r)r)^{n-1}(1+g)(1+p) + (1-\delta)^n(1+b(r)r)^n]S_0. \quad (17)$$

Similarly, for Period $n-1$,

$$S_{n-1} =[(1+g)^{n-1}(1+p)^{n-1} + (1-\delta)(1+b(r)r)(1+g)^{n-2}(1+p)^{n-2}+\cdots + (1-\delta)^{n-2}(1+b(r)r)^{n-2}(1+g)(1+p) + (1-\delta)^{n-1}(1+b(r)r)^{n-1}]S_0. \quad (18)$$

2.5 Some propositions

From (2), (5), (12) and (16) we obtain the following proposition.

Proposition 1. *The budget deficit including interest payments on the government bonds equals an increase in the savings from a period to the next period.*

(2), (4), (5), (8) and (12) mean the following result.

Proposition 2. *If the savings in the first period (Period 0) S_0 is positive (unless the savings are made solely through stocks), we need budget deficit to maintain full employment under constant prices or inflation in the later periods.*

About inflation we found

Proposition 3. *Excess budget deficit induces inflation under full employment.*

2.6 Debt to GDP ratio

Since
$$Y_n = (1+g)(1+p)Y_{n-1},$$
(17) and (18) mean
$$\frac{S_n}{Y_n} - \frac{S_{n-1}}{Y_{n-1}} = \left(\frac{(1-\delta)(1+b(r)r)}{(1+g)(1+p)}\right)^n \frac{S_0}{Y_0}. \quad (19)$$
Since δ is the proportion of the savings consumed, we can assume
$$\delta > \frac{1}{2}.$$
Then, for
$$\left|\frac{(1-\delta)(1+b(r)r)}{(1+g)(1+p)}\right| < 1,$$
it is sufficient that
$$b(r)r < 1 + 2(g+p+gp). \quad (20)$$
Note that $g+p+gp$ is the nominal growth rate. Since $0 < b(r) \leqq 1$ and r is the interest rate of the government bonds, (20) is definitely satisfied. Therefore,
$$\text{When } n \to \infty,\ \frac{S_n}{Y_n} - \frac{S_{n-1}}{Y_{n-1}} \to 0.$$

From (17), we obtain
$$\frac{S_n}{Y_n} = \left[1 + \frac{(1-\delta)(1+b(r)r)}{(1+g)(1+p)} + \cdots + \left(\frac{(1-\delta)(1+b(r)r)}{(1+g)(1+p)}\right)^{n-1} + \left(\frac{(1-\delta)(1+b(r)r)}{(1+g)(1+p)}\right)^n\right] \frac{S_0}{Y_0}.$$

Then, if
$$\left|\frac{(1-\delta)(1+b(r)r)}{((1+g)(1+p))}\right| < 1,$$
we get
$$\frac{S_n}{Y_n} \to \frac{1}{1 - \frac{(1-\delta)(1+b(r)r)}{(1+g)(1+p)}} \frac{S_0}{Y_0}$$
Therefore, the debt to GDP ratio $\frac{S_n}{Y_n}$ converges to a finite value. It does not diverge to infinity.

Summarizing the result,

Proposition 4. *Under an appropriate assumption about the proportion of the savings consumed ($\delta > \frac{1}{2}$), the debt to GDP ratio converges to a finite value. It does not diverge to infinity.*

3 Determination of interest rate

The demand for money in Period 0 is
$$(1 - b(r_0))S_0.$$
Denote the money supply by M_0. Then, r_0 is determined so that
$$(1 - b(r_0))S_0 = M_0$$
is satisfied. Similarly, let M_n be the money supply in Period n. Then, the interest rate in Period n is determined so that
$$(1 - b(r_n))S_n = M_n$$
is satisfied. As the money supply M_n increases, r_n and $b(r_n)$ must be smaller. Therefore, an increase in the money supply lowers the interest rate, and also interest payment $b(r_n)r_nS_n$ in Period 1 decreases. This is the effect of monetary policy.

4 About Domar condition

From the above discussion, the interest rate can be changed by monetary policy so that the so-called Domar condition ([1], [18]), that the interest rate must be less than the economic growth rate to prevent the ratio of government debt to GDP from becoming infinitely large (in particular, if a balanced budget can be achieved excluding interest payments on government bonds), can be satisfied, but even if this condition is not satisfied, the ratio of government debt to GDP will not become infinitely large. When savings are made in both government bonds and money, the issue is not the interest rate on government bonds itself, but the product of the share of savings held in government bonds and the interest rate on government bonds $b(r)r$ and the proportion of the savings consumed δ. We call
$$\delta(1 + b(r)r) - 1 \quad (21)$$

the *adjusted interest rate*. Since $\delta \leqq 1$ and $b(r) \leqq 1$, It is not larger than r.

Let us assume balanced budget excluding interest payments on the government bonds in Period 1 as follows.

$$G_1 - T_1 = 0.$$

Then, (2) means that the following equation must hold.

$$(1+g)(1+p) = \delta(1 + b(r_0)r_0).$$

If

$$1 + g < \delta(1 + b(r_0)r_0),$$

there is excess demand for goods. Then, the prices rise and the nominal growth rate $g + p + gp$ equals

$$\delta(1 + b(r_0)r_0) - 1.$$

For the periods after Period 1 we obtain similar results.

Then, under the assumption that $\delta > \frac{1}{2}$, (19) and

$$\frac{1-\delta}{\delta} < 1$$

mean

$$\frac{S_n}{Y_n} - \frac{S_{n-1}}{Y_{n-1}} < \frac{S_0}{Y_0},$$

and

$$\text{when } n \to \infty, \frac{S_n}{Y_n} - \frac{S_{n-1}}{Y_{n-1}} \to 0.$$

Therefore, the debt to GDP ratio can not diverge to infinity even if

$$1 + g < \delta(1 + b(r_0)r_0),$$

or

$$g < \delta(1 + b(r_0)r_0) - 1,$$

Summarizing the result,

Proposition 5. *Even if the adjusted interest rate (21) is larger than the real growth rate, the debt to GDP ratio can not diverge to infinity.*

5 Conclusion

We have argued that fiscal collapse is impossible because the ratio of the government debt to GDP can not diverge to infinity. Using a simple macroeconomic model including peoples' money holding we have shown the following results.

1. The budget deficit including interest payments on the government bonds equals an increase in the savings from a period to the next period.
2. If the savings in the first period (Period 0) is positive (unless the savings are made solely through stocks), we need budget deficit to maintain full employment under constant prices or inflation in the later periods.
3. Excess budget deficit induces inflation under full employment.
4. Under an appropriate assumption about the proportion of the savings consumed, the debt to GDP ratio converges to a finite value. It does not diverge to infinity.

References:

[1] Domar, E. D., The Burden of Debt and the National Income. *American Economic Review*, Vol.34, 1944, pp. 798-827.

[2] Kelton, S., *The Deficit Myth: Modern Monetary Theory and the Birth of the People's Economy*. Public Affairs, 2020.

[3] Lerner, A. P., Functional Finance and the Federal Debt. *Social Research*, Vol.10, 1943, pp. 38-51.

[4] Lerner, A. P., *The Economics of Control: Principles of Welfare Economics*. Macmillan, 1944.

[5] Mochizuki, S., *A book understanding MMT (in Japanese, MMT ga yokuwakaru hon)*. Shuwa System, 2020.

[6] Morinaga, K., *MMT will save Japan (in Japanese, MMT ga nihon wo sukuu)*. Takarajimasha, 2020.

[7] Nakano, A., *A book to understand the key points of MMT (in Japanese, MMT no pointo ga yokuwakaru hon)*, Shuwa System, 2020.

[8] M. Otaki. The dynamically extended Keynesian cross and the welfare-improving fiscal policy. *Economics Letters*, Vol. 96:pp. 23–29, 2007.

[9] M. Otaki. A welfare economics foundation for the full-employment policy. *Economics Letters*, Vol. 102:pp. 1–3, 2009.

[10] M. Otaki. *Keynsian Economics and Price Theory: Re-orientation of a Theory of Monetary Economy*. Springer, 2015.

[11] Park, S., *The fallacy of fiscal collapse* (in Japanese, *Zaisei hatanron no ayamari*). Seitosha, 2020.

[12] Shimakura, G., *What is MMT?* (in Japanese, MMT towa nanika), Kadokawa Shinsho, 2019.

[13] Mitchell, W., Wray, L. R., & Watts, M., *Macroeconomics*. Red Globe Press, 2019.

[14] Tanaka, Y., An Elementary Mathematical Model for MMT (Modern Monetary Theory). *Research in Applied Economics*, Vol. 13, 2021, pp. 1-20. https://doi.org/10.5296/rae.v13i3.18989

[15] Tanaka, Y., Very Simple Mathematical Model of MMT (Modern Monetary Theory). *Business and Economic Research*, Vol. 11, 2021, pp. 78-87. https://www.macrothink.org/journal/index.php/ber/article/viewFile/18983/14773

[16] Tanaka, Y., On Budget Deficit under Economic Growth: Towards a Mathematical Model of MMT. *International Journal of Social Science Research*, Vol. 10, 2022, pp. 36-58. https://doi.org/10.5296/ijssr.v10i1.19130

[17] Wray, L. R., *Modern Money Theory: A Primer on Macroeconomics for Sovereign Monetary Systems* (2nd ed.). Palgrave Macmillan, 2015.

[18] Yoshino, N., & Miyamoto, H., Revisiting the public debt stability condition: rethinking the Domar condition. *ADBI Working Paper Series*, No. 141, Asian Development Bank Institute, 2020. Retrieved from https://www.adb.org/sites/default/files/publication/606556/adbi-wp1141.pdf