Banks' Contribution to Government Debts

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Summary. The paper argues that an important contribution of private banks to the expansion of government debts, and thereby to the increase in the money supply, is based on their being mediators of government expenditures. In order to develop the argument the paper distinguishes between two money circuits: one, which includes the government, starts from the central bank, and another one, which includes the final recipients of government expenditures, starts from private banks and is based on their deposit money. Presupposing then an institutional setting in which only private banks are permitted to initially purchase government bonds on the primary market, the paper shows that private banks can finance these purchases with their own deposit money.

Keywords: Government debts, taxes, banks, money circuits

1 Introduction

Government debts dramatically increased in recent decades. Fig. 1 illustrate this with data from the Euro area. In this paper we discuss the contribution of banks which, as we argue, is founded in the role they play in the mediation of payments between the government and nonbanks (households and firms other than banks). The paper is organized as follows.

- We begin with considering the mediation of government expenditures by banks (that is, private banks). We argue that a proper understanding requires to distinguish between two money circuits: one, which includes the government, starts from the central bank, and another one, which includes the final recipients of government expenditures, starts from banks and is based on their deposit money.
- We then distinguish between two problems concerning the financing of government expenditures: a short-term problem which concerns the daily settlement, and a long-term problem concerning the financing of expenditures which exceed taxes over a longer period.
- In order to discuss the long-term problem, we presuppose an institutional setting in which government debts are financed with bonds and only banks are permitted to initially purchase these bonds on the primary market. We show that banks, due to their mediation of government expenditures, can finance these purchases with their own deposit money.
- We finally consider two aspects of the accumulation of government debts. One concerns the payment of interest. This is illustrated in the appendix with German data. The other one concerns the expansion of the money supply.

2 Mediation of expenditures and taxes

We presuppose an institutional setting characterized by three conditions.

- Accounts of the government are located at the central bank. This entails that transactions involving the government require central bank money.
- Private units consist of banks which also have accounts at the central bank, and nonbanks (households and firms other than banks) having accounts at banks.
- Payments between the government and nonbanks are mediated by banks.

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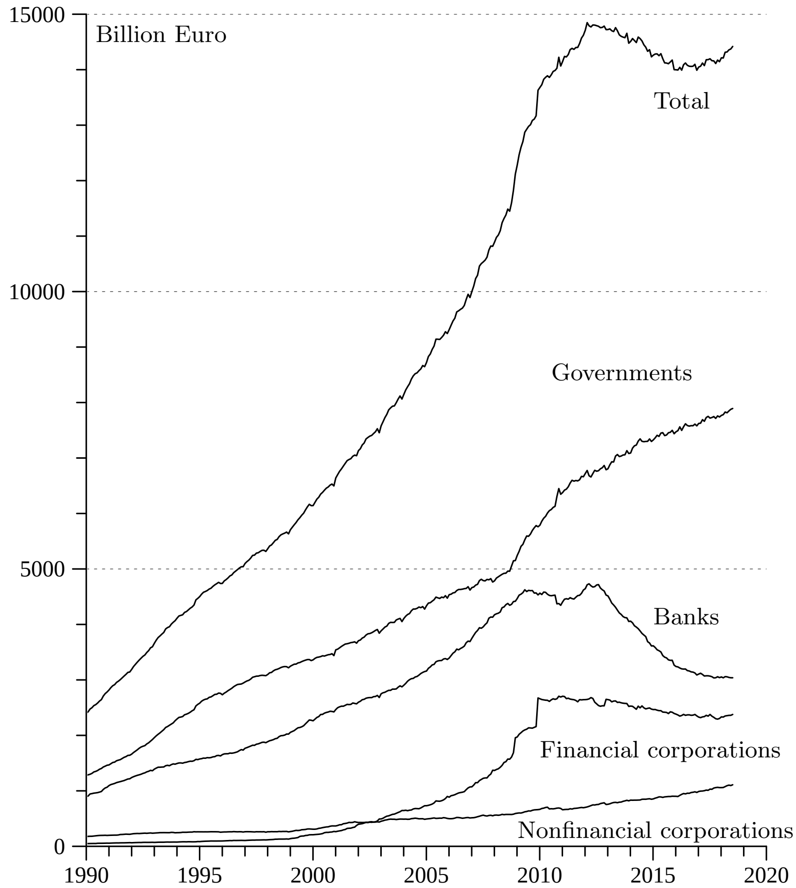


Fig. 1 Outstanding bonds in the Euro area (historical composition) emitted by different kinds of institutions. The values are stocks at the end of a month in billion Euro. Source: European Central Bank, Statistical Data Warehouse.

The framework requires to distinguish between two money circuits as shown in Fig. 2. One circuit starts from the central bank and uses central bank money (denoted by M^*, consisting of both cash and deposits at the central bank); the other one starts from banks and uses deposit money (denoted by M) which can be created by banks.[1] In the figure, for simplification, we have omitted the circulation of cash between banks and nonbanks. The dotted lines indicate backflows which do not provide funds but allow to extinguish liabilities. Note that there is no flow of money between the two circuits.

In each circuit there is a single stock of money which can grow and shrink as follows from the creation and destruction of money. For the first money circuit we use the notation

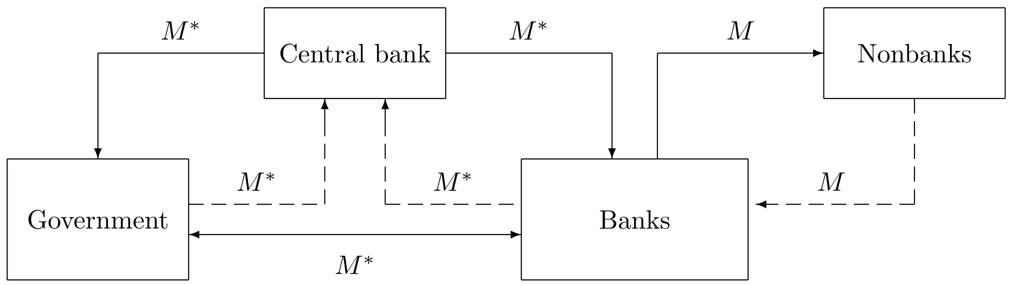
$$M^* = M_g^* + M_b^* \tag{1}$$

where the two summands denote, respectively, the money in the accounts of the government and the banks. For the second money circuit it suffices to use the notation M for denoting the stock of money held by nonbanks. Note that there is no stock of money for the central bank and for the private banks. Instead, M^* and M contribute, respectively, to their liabilities.

We now consider transactions between the government and nonbank units. We begin with government expenditures and then consider taxes.

[1] For understanding banks' ability to create deposit money see, e.g., McLeay, Radia and Thomas (2014), Werner (2014), Jakab and Kumhof (2019).

Fig. 2 Two money circuits



(1) We assume that the government intends to pay an amount X to a nonbank unit U. The transaction is mediated by a bank where U has an M-account. So eventually the bank must increase the account by X which entails:[2] $M \mathrel{+}= X$. The bank can do this with self-generated deposit money, but will require an equal amount from the government. So the government must ask the central bank to organize an exchange:

$$M^*_g \mathrel{-}= X \quad \text{and} \quad M^*_b \mathrel{+}= X \tag{2}$$

There are, of course, a huge number of such transactions on every day. If at the end of a day the government's M^*_g-account or the consolidated M^*_b-account of the banks is negative, the final settlement requires that the institution with a negative account must borrow money from other institutions including the central bank. In any case, the bank which organized the transaction eventually has a claim against the government which equals its liability created by increasing U's account.

(2) We now consider the payment of taxes by a nonbank unit U. The process starts with U's asking the bank, where U has an M-account, to pay an amount X to the government: $M \mathrel{-}= X$. In addition an exchange

$$M^*_b \mathrel{-}= X \quad \text{and} \quad M^*_g \mathrel{+}= X \tag{3}$$

must take place. We note that this is possible even if the bank has not sufficient reserves at the point in time when the exchange takes place. Only at the end of the day the clearing and settlement process described above must take place. Eventually, there is a reduction in the bank's balance sheet: both its liability against U and its M^*-account reduce by X.

Further questions concern the financing of the settlement process. However, the above consideration already allows three conclusions:

a) Government expenditures do not require previous receipts of taxes.

b) Payments of taxes do not require previous government expenditures.

c) Payments of taxes increase the government's M^*-account and in this sense provide funds for expenditures.[3]

3 Debt-based government expenditures

There are two financing problems for the government. A short-term problem concerns the daily settlement. This problem occurs when, at the end of a day, M^*_g is negative and the government must borrow money for the settlement. We will assume that this problem can be solved with

[2] We use '$+=$' and '$-=$' to mean, respectively, 'increased by' and 'decreased by'.

[3] The conclusions (b) and (c) contradict the view of taxes by the Modern Money Theory as it is, for example, explained by Tymoigne and Wray (2013). An explicit critique is, however, outside the scope of the present paper.

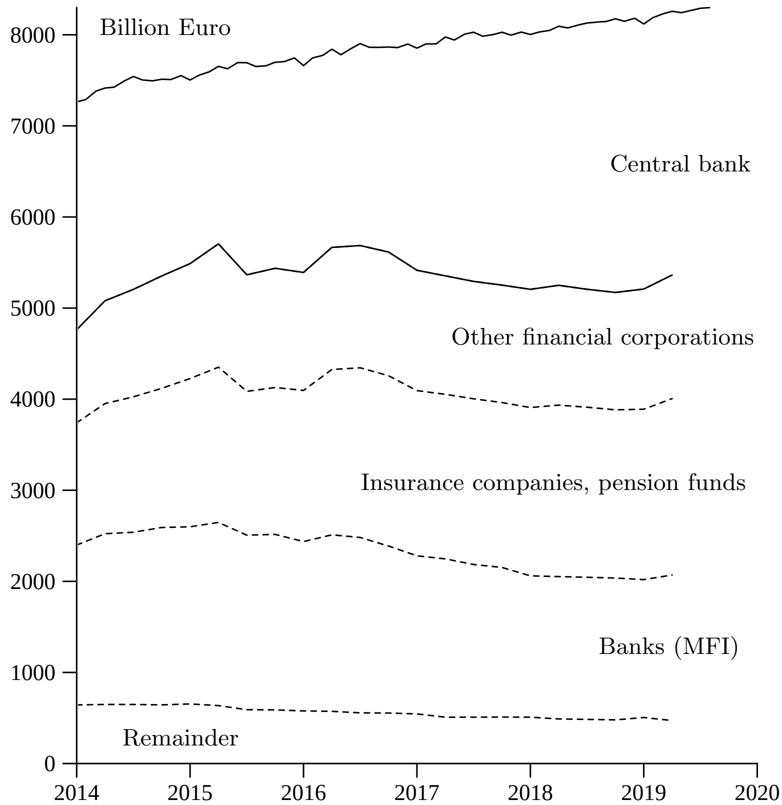


Fig. 3 Shares of outstanding government bonds in the Euro area hold by the specified institutions. The remainder at the bottom includes: non-financial firms, private households, not-for-profit organizations, state institutions and a very small number of not sectorised institutions. Source: Time series from the Security Holding Statistics of the European Central Bank.

short-term loans which, depending on the institutional setting, are available from the central bank and/or private banks.

Another problem concerns the financing over a longer period. We refer to years indexed by t. X_t denotes the expenditures made by the government in the year t. Financing requires an inflow to M_g^* which suffices for these expenditures. There are two sources. First the taxes which the government receives in the year t, which will be denoted by Y_t^{tx}. The second source is debt. So we may write

$$X_t = Y_t^{tx} + Y_t^{debt} \tag{4}$$

where Y_t^{debt} denotes the required money for debt-based expenditures.

In order to discuss the financing of Y_t^{debt} we presuppose an institutional setting characterized by two conditions:

- Y_t^{debt} is financed by the emission of bonds (tradable financial capital), and
- at the primary market only banks, not the central bank, are permitted to purchase government bonds.

These conditions characterize, for example, the situation in the Euro area. Of course, after being initially purchased by banks, government bonds can be sold to other institutions. Fig. 3 provides information about the Euro area.

We assume that the quantity of the emitted bonds is calculated in such a way that it suffices for financing net expenditures Y_t^{nexp}. Then, if bonds have a duration of m periods, one can use the formula

$$Y_t^{debt} = Y_t^{nexp} + r \sum_{l=1}^{m} Y_{t-l}^{debt} + Y_{t-m}^{debt} \tag{5}$$

where r is the rate of interest (which, for simplicity, is assumed constant) and Y_{t-m}^{debt} is the repayment of previously emitted bonds. The net borrowing (new debt) is

$$Y_t^{debt} - Y_{t-m}^{debt} = Y_t^{nexp} + X_t^{int} \tag{6}$$

where the second summand on the right-hand side, X_t^{int}, denotes the interest which must be paid.

4 Banks' financing of government bonds

We now show that banks can finance the government bonds which they eventually own with their own deposit money. For developing the argument we assume that the financing begins with banks' borrowing the required money from the central bank: $M_b^* \mathrel{+}= Y_t^{debt}$. This money is then used to buy the bonds from the government:

$$M_b^* \mathrel{-}= Y_t^{debt} \quad \text{and} \quad M_g^* \mathrel{+}= Y_t^{debt} \tag{7}$$

The banks now own the bonds, and we assume that fractions α and β are sold, respectively, to the central bank and to nonbank units. This entails:

$$\text{Debts of the banks } = (1-\alpha)\, Y_t^{debt} \quad \text{and} \quad M \mathrel{-}= \beta\, Y_t^{debt} \tag{8}$$

The government then spends the money it has received from selling the bonds. For simplicity, we assume that the complete amount is spent in the current period t and the fractions α and β remain constant across time. So the central bank receives $\alpha\,(Y_{t-m}^{debt} + X_t^{int})$. The remainder is mediated by banks:

$$M_b^* \mathrel{+}= Y_t^{debt} - \alpha\,(Y_{t-m}^{debt} + X_t^{int}) = (1-\alpha)\, Y_t^{debt} + \alpha\, Y_t^{nexp} \tag{9}$$

After the repayment of the remaining debts the increase in banks' reserves is $\Delta M_b^* = \alpha\, Y_t^{nexp}$. Since payments of the government include repayments of bonds, the assets of the banks have increased by

$$\text{Bonds } = (1-\alpha-\beta)\,(Y_t^{debt} - Y_{t-m}^{debt}) \tag{10}$$

$$\text{Reserves } = \alpha\, Y_t^{nexp} \tag{11}$$

On the other hand, banks must create deposits which equal the receipts of nonbanks:

$$M \mathrel{+}= Y_t^{nexp} + \beta\,(Y_{t-m}^{debt} + X_t^{int}) \tag{12}$$

Taking into account the previous reduction of M (see (8)), the final increase in banks' liabilities against nonbanks is

$$\Delta M = (1-\beta)\, Y_t^{nexp} \tag{13}$$

which is less than the increase on the banks' asset side. The difference equals $(1-\alpha-\beta)\, X_t^{int}$, that is, the interest received by the banks.

Example. To illustrate we use a numerical example:

$$Y_t^{debt}\,(100) = Y_t^{nexp}\,(60) + Y_{t-m}^{debt}\,(30) + X_t^{int}\,(10) \tag{14}$$

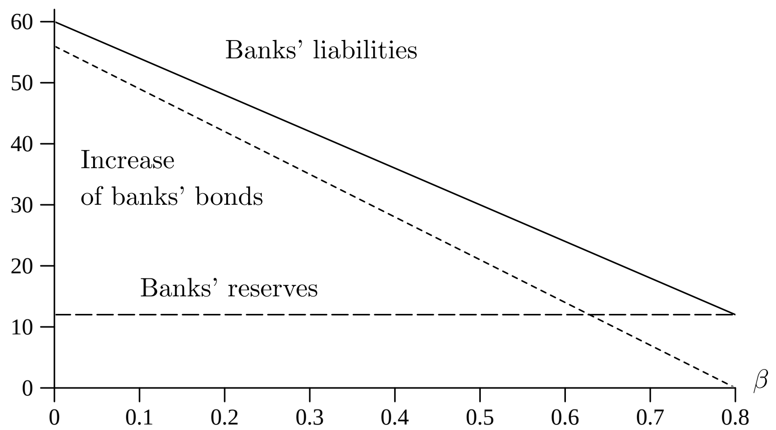


Fig. 4 Illustration based on (14) with $\alpha = 0.2$.

If $\alpha = 0.2$ and $\beta = 0.5$, the asset side of the banks has increased by 21 (bonds) + 12 (reserves). On the other hand, their liabilities have increased by $0.5 \cdot 60 = 30$. The difference equals the interest received by the banks. The following table depicts the outcome as a balance sheet:

Assets			Liabilities		
$\alpha\, Y_t^{nexp}$	$=$	$0.2 \cdot 60 = 12$	$(1-\beta)\, Y_t^{nexp}$	$=$	$(1-0.5)\, 60 = 30$
$(1-\alpha-\beta)\, Y_t^{debt}$	$=$	$(1-0.2-0.5)\, 100 = 30$	$(1-\alpha-\beta)\, X_t^{int}$	$=$	$(1-0.2-0.5)\, 10 = 3$
$-(1-\alpha-\beta)\, Y_{t-m}^{debt}$	$=$	$-(1-0.2-0.5)\, 30 = -9$			

Fig. 4 illustrates how the outcome depends on β.

Conclusion. Using 'financing' to mean 'providing money', in the presupposed framework only banks finance government debts. Neither the central bank nor the nonbank units contribute by purchasing bonds on secondary markets. One may say that the central bank finances the banks' purchasing government bonds. At the end of the period, however, the borrowed money has been paid back; and there is no longer an increase in M^* that can be attributed to financing government debts. A lasting increase in M^* only results from the central bank's purchase of bonds from the banks and serves to supply banks with reserves.[4] If $\alpha = 0$, the debt-based government expenditures simply have two effects: an increase in government bonds owned by banks and nonbanks; and an increase of the M-circuit according to $(1-\beta)\, Y_t^{nexp}$.

5 Accumulation of government debts

As illustrated by Fig. 1, debt-based financing of government expenditures is accumulating from year to year. An illustration based on Eq. (5) can help to better understand some implications. We consider a sequence of years, $t = 0, 1, 2, \ldots$, start from $Y_0^{tx} = 500$ and $Y_0^{nexp} = 100$, and assume that both components grow with the rate $\rho = 1\,\%$, the interest rate equals the growth rate and the duration of bonds is $m = 8$ periods. Fig. 5 shows the development.

[4] This statement assumes that the interest which the central bank receives does not flow back to the government. If it does, the backflow formally increases M^*. However, instead of viewing this backflow as contributing to financing the government, it seems preferable to think of a waiving of interest which allows the government, in order to calculate the emission of bonds, to use instead of Eq. (5) a modified formula:

$$Y_t^{debt} = Y_t^{nexp} + r \sum_{l=1}^{m} (1 - \lambda_{t-l}\, Y_{t-l}^{debt} + Y_{t-m}^{debt} \tag{15}$$

where λ_{t-l} denotes the fraction of bonds, emitted in the period $t - l$, which are currently owned by the central bank. The financing of the receipts from the actually emitted bonds is not affected by using this modified formula.

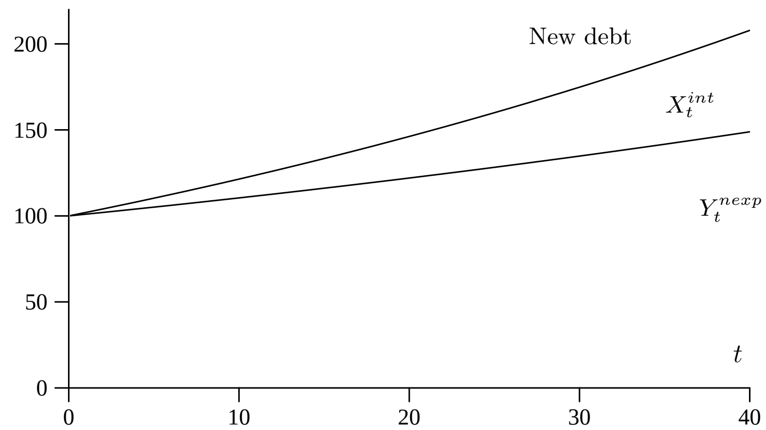


Fig. 5 Development of the quantities defined by (5) starting from $Y_0^{nexp} = 100$ ($\rho = r = 0.01$, $m = 8$).

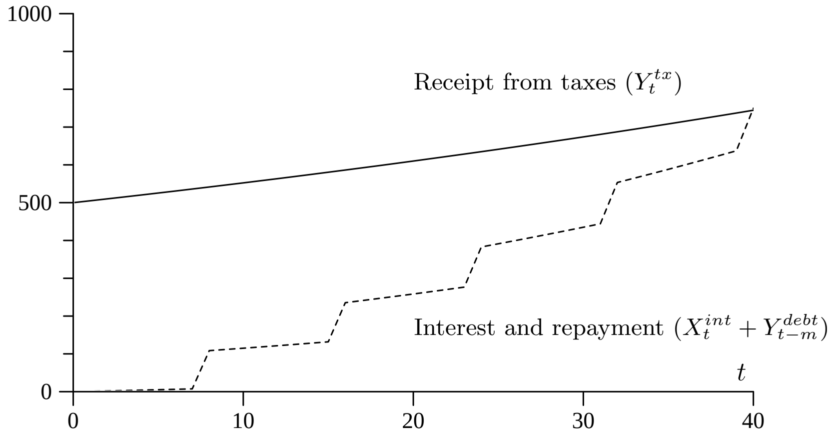


Fig. 6 Payment of interest and repayment of government debts compared with the development of receipts from taxes, starting from $Y_0^{tx} = 500$ and $Y_0^{nexp} = 100$ ($\rho = r = 0.01$, $m = 8$).

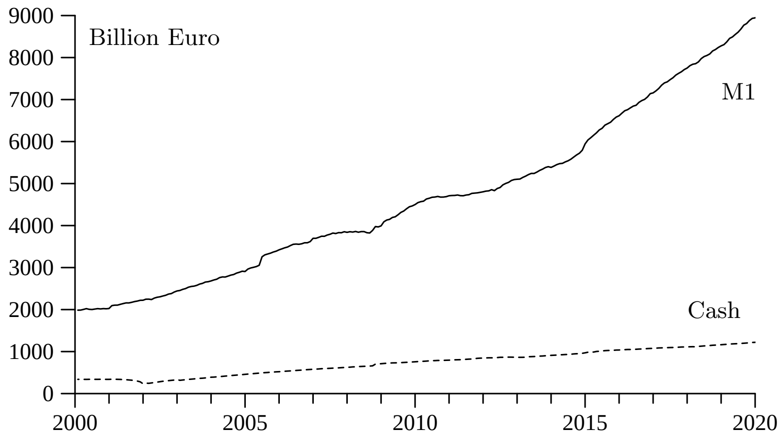


Fig. 7 Development of the money supply M1 in the Euro area (changing composition). Source: European Central Bank, Statistical Data Warehouse.

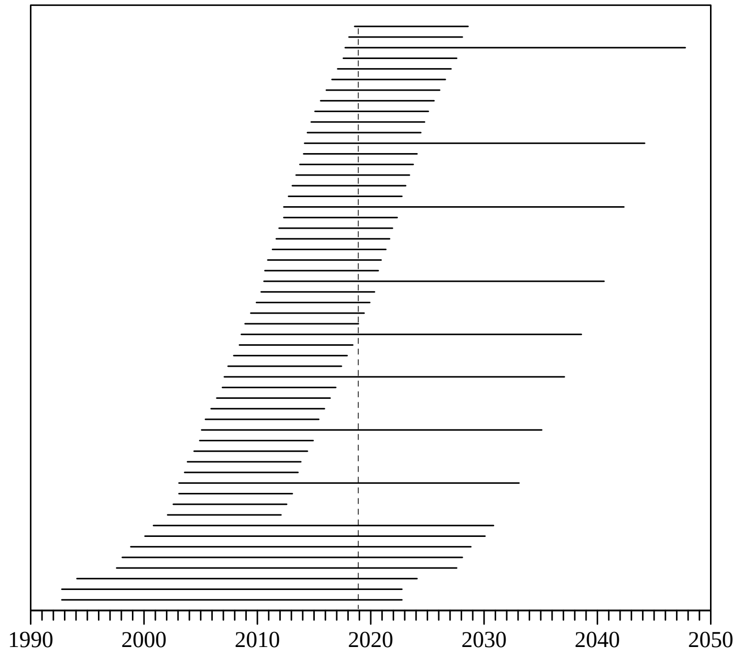


Fig. 8 Temporal placement of 55 German government bonds.

(1) The interest is paid by the government which emitted the bonds. However, it is financed by new bonds so that the interest which owners of government bonds receive in period t actually originates from the money spent in that period for buying new bonds. Of course, one could add the receipts from taxes on both sides of Eq. (6) and then argue that the origin of the money used for the payment of interest is indeterminate. However, as long as Y_t^{nexp} is not negative, the interest can well be considered as being financed out of the net borrowing.

In fact, the assumption that interest and repayment of government debts can be financed out of taxes is not sustainable in the long run. To illustrate we use our example in which we assumed $Y_t^{tx} = 5\,Y_t^{nexp}$. As shown in Fig. 6, the proportion of tax receipts to be used for paying interest and repayment of debts would continuously grow. For an illustration with German data see the appendix.

(2) A second implication of the accumulation of government debts concerns the money supply. Debt-based, in contrast to tax-based government expenditures directly increase the money supply in the M-circuit. As shown by Formula (13), the increase is only reduced by the government bonds which nonbank units buy from banks. Purchases of the central bank do not reduce the expansion of the money supply.

In the Euro area about half of the outstanding government bonds is hold by nonbanks (see Fig. 3). So one can conclude that roughly half of the government's debt-based expenditures contribute to the increase in the money supply *in each year*. As can be seen from a comparison of Fig. 1 and Fig. 7, this is a large part of the total increase in the money supply.

Appendix: Illustration with German data

To illustrate some aspects of the foregoing discussion we refer to 55 bonds which have been emitted by the German government since the beginning of 1992 and for which there is information on the statistics portal of the German Bundesbank (retrieved at the end of November, 2018). In addition, we have used information from the German Finanzagentur which organizes the emissions. The bonds have durations of 10 or 30 years, the total emission volume amounts to about 1029 billion Euro. Fig. 8 shows the temporal placement of the bonds.

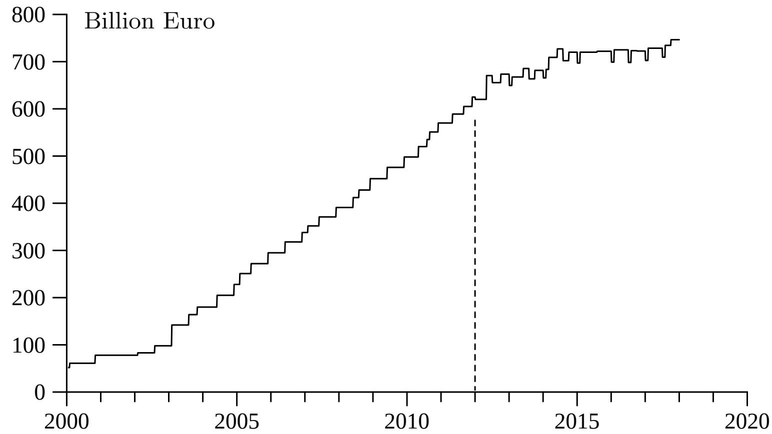


Fig. 9 Development of the level of indebtedness.

Table 1 German government bonds: interest and repayments in the period 2012 – 2018 (in billion Euro).

Year	Emission	Repayment	Net borrowing	Increase of debt	Interest actual	Interest 5 %-coupon
2012	68, 5	39.0	29.5	29.5	24.5	31.0
2013	54, 0	38.0	16.0	45.5	24.0	32.5
2014	79, 5	48.0	31.5	77.0	23.4	33.3
2015	46, 0	44.0	2.0	79.0	22.9	34.9
2016	51, 0	47.5	3.5	82.5	21.7	35.0
2017	63, 0	39.0	24.0	106.5	19.9	35.1
2018	42, 0	21.0	21.0	127.5	18.6	36.3
Total	404.0	276.5	127.5	127.5	155.0	238.1

In order to describe our calculations, we use the following notations. V_i denotes the emission volume, A_i the coupon rate, τ_i the starting and τ_i' the ending time (day) of the ith bond ($i = 1, \ldots, 55$). For each point in time τ, the level of indebtedness can be calculated by

$$\sum_{\tau_i \leq \tau \leq \tau_i'} V_i \tag{16}$$

where the summation covers all bonds which did not start later and ended not earlier than τ. Fig. 9 shows the development. The first repayment took place in December 2012. Subsequently we use years. In the year t, the emission volume is $\sum_{\tau_i \in t} V_i$, and the sum of repayments is $\sum_{\tau_i' \in t} V_i$. The difference is the net borrowing in that year. In order to calculate the interest we assume that coupons are paid at annual intervals and use, for the year t, the formula

$$\sum_{\tau_i \leq t-1 \leq \tau_i'} V_i\, A_i/100 \tag{17}$$

where $t-1$ denotes the last day in the year $t-1$.

Table 1 shows these quantities for the years 2012 – 2018. The column ‘Increase of debt’ contains the cumulated net borrowing. The last column shows hypothetical payments of interest based on the assumption of a constant 5 % coupon rate. Summarizing the figures, the table shows: During the seven years the government has emitted a volume of 404 billion Euro. In the same period, repayments and interest amounted to 276.5 + 155 = 431.4 billion Euro. This is 27.5 billion larger than the emission volume.

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