

**Monopoly Money:  
The State as a Price Setter\***

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Today's currencies exist within the context of State powers. These powers endow the State with the ability to move desired resources from the private to public sector using economic policies targeting full employment and price stability. This paper explores the basis for understanding modern monetary systems as rooted in the monopoly powers of the State. In the first section, the case of colonial Africa will be used to demonstrate how State powers are used to give value to the currency. The second section further explores historical issues in the development of these powers and their institutional basis. The present-day monetary system and the role played by the government are then examined. In particular, the way in which certain powers of the State turn bank money into State money is explored in this section. This third part is intended to alleviate any doubts with regard to the government's monopoly powers in the presence of bank credit creation. In the fourth part, a mathematical framework is employed to demonstrate the exogenous pricing power of the State. Finally, a conclusion is offered in which the employer of last resort approach is identified as an appropriate policy framework for full employment and price stability.

**Colonial Africa: An Illustration of a Tax-Driven Currency**

Historians of the African colonial experience have often remarked on the manner in which the European colonizers were able to establish new currencies, to give those currencies value, and to compel Africans to provide goods and services in exchange for those currencies.

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[In Malawi there was an] imposition of a Sh.3 annual hut tax over the whole colony in 1896. This was a high figure for the northern areas. And undoubtedly stimulated further labor migration [to find work paying shillings]. In the south of Malawi, however, Africans preferred to meet the tax by [selling products]. Southern [European] planters therefore were short of labor and pressed for an even higher tax. As a result the tax was raised in 1901 to Sh.6, with a Sh.3 remission for those who could prove they had worked for a European for at least one month. This 'labor tax' had an immediate effect. The labor market in the south became flooded... Taxation, then, if it were high enough...could force men into wage earning [Stichter 1985, 26-28].

African economies were monetised by imposing taxes and insisting on payments of taxes with European currency. The experience with paying taxes was not new to Africa. What was new was the requirement that the taxes be paid in European currency. Compulsory payment of taxes in European currency was a critical measure in the monetization of African economies as well as the spread of wage labor [Ake 1981, 33-34].

In those parts of Africa where land was still in African hands, colonial governments forced Africans to produce cash-crops no matter how low the prices were. The favourite technique was taxation. *Money* taxes were introduced on numerous items-cattle, land, houses, and the people themselves. Money to pay taxes was got by growing cash crops or working on European farms or in their mines [Rodney 1972, 165; original emphasis].

Taxation as a method of forcing out laborers but it did not distinguish between the various sources of the cash. Most Africans who could simply sold produce or livestock [to Europeans at administered prices] in order to pay the tax. But where Africans were poor in items to sell, or were distant from markets, taxation could produce laborers [Stichter 1985, 26].

The case of Colonial Africa illustrates how taxation can serve as a launching vehicle for a new currency. Prior to colonization, African communities were engaged in subsistence production and internal trade and, therefore, had little need for European currency. After colonizing Africa, the Europeans employed a system based on taxation that endowed the new currencies with value. The colonial government, in need of real goods and services such as cash crops and wage labor, imposed a tax liability on the population, denominated in European currency. Taxation compelled the members of the community to sell their goods and/or labor to the colonizers in return for the currency that would discharge their tax obligation. Taxation turned out to be a highly effective means of compelling Africans to enter cash crop production and to offer their labor for sale.

In any system—democratic or authoritarian—the government can ensure the value of any currency through these three basic powers: the power to levy taxes, the power to declare how tax obligations must be satisfied, and the power to issue currency. These powers are the basis for securing the purchasing power of State money. Contrary to the conventional idea that taxation “finances government expenditures,” here the

primary function of taxation is guaranteeing that a particular monetary unit—the one issued by the government— will be demanded in exchange for any and all other real goods and services and will, thereby, dominate a country’s monetary system.

The government becomes the “money monopolist”<sup>1</sup> through exercising these powers. Just like colonial governments, modern States need to obtain goods and services from the private sector. In order to induce the private sector to sell to the government, the State imposes a tax obligation on the population in currency, which the private sector can obtain only from the government. The population, pressed by the necessity to pay its legal requirements, sells to the government in exchange for currency. Currency may therefore be viewed as a tax credit to the population that drives the transfer of real goods and services from the private to the public sector. Of course, over time, secondary markets will develop so that State money becomes the general means of payment, unit of account and medium of exchange. In addition, and as it will be discussed below, governments can turn other money—such as bank money—into State money by declaring it acceptable for payments at public offices with appropriate restrictions. But these developments do not change the underlying causal forces at work in determining the value of the currency.

The government is the only institution that has the power to impose a tax liability on the entire population. Thus it can choose at will what it will accept for settlement of tax obligations. It must be noted, however, that the government must ensure that the tax liability is denominated in either something unobtainable, or taxed in sufficient quantities to induce scarcity. Suppose the government decides to accept anything else at its pay offices—wheat, for example. The private sector can easily obtain the wheat by engaging in wheat production. As the private sector has control over the means of settling the tax liability, there is no guarantee that the government will be able to purchase any goods and services from the private sector. Should the government, however, decide to tax more wheat than the crops can yield in a given year, then the private sector will automatically price its goods and services in the scarce wheat and will sell them to the government in order to obtain it. Legal tender laws by themselves do not give the government monopoly powers. It is the government’s power to determine what it will accept in payment of taxes that gives it its “monopoly” position.

## **Further Historical Examination of State Currency**

This section briefly discusses some aspects of monetary evolution, in particular how money became State currency and how the State became the “money monopolist.” We are concerned mainly with the historical developments after the establishment of private property. In the beginning there was debt.

As L. Randall Wray notes, with the introduction of private property, the task of providing the means of subsistence becomes increasingly uncertain [Wray 1993, 11-12]. He coins the term "existential uncertainty" and argues that it is the primary reason why borrowing becomes the fundamental form of market exchange:

The role of existential uncertainty can be seen in the behavior of individual landowners who are unable to meet their needs from their own personal productive efforts. Their existence thus depends on being able to borrow means of subsistence from other individuals. This is the basis of the first

economic exchange and it takes the form of a loan in which one private producer extends physical product which he has accumulated as his margin of security to a borrower who in exchange promises to furnish his labor whenever the lender should require it in order to ensure his won survival [Wray 1993, 11-12].

This quote illuminates the process by which credit money emerged. Wray echoes Heinsohn and Steiger's claim about the purpose of markets: "The market, then, 'is not a place of barter... but a place for earning the means of settling debt' [Heinsohn and Steiger 1989, 193]" [Wray 1993, 16]. In other words, markets emerged to provide individuals with the opportunity to obtain and settle debts. It is not our purpose to study how markets emerged. The focus of this paper is to why people use a particular means to settle debts and how they obtain it.

As markets emerged, a variety of institutional arrangements sprang up. These institutions insured that the credit extended to a party will be converted into some kind of commodity (initially wheat and later gold). Convertibility was desirable as it partially reduced the risk of default on the part of the debtor.

...loans and credit money generate the desire to hold small reserves of commodity money in order to ensure convertibility... [Wray 1993, 25].

Commodity-backed credit money, however, did not eliminate financial crises—periodically there were runs on banks in the particular commodity. The development of commodity money was mainly due to institutional arrangements. More importantly, though, those institutional arrangements constituted a pyramidal structure. On each level of the pyramid agents issued liabilities, where the most accepted liabilities were the ones issued by the agents at the top of the pyramid.

In the case of England, for a brief period, London banks were at the top of the hierarchy.

Each economic agent would issue liabilities made convertible into liabilities of a higher agent in the pyramid. Thus, a firm would make its liabilities convertible into country bank notes... The country banks, in turn made their notes convertible into notes issued by London banks. These London Banks would hold the "reserves" of a country bank... If a run began on a country bank, the London bank would lend its notes against the reserves of the country bank [Wray 1993, 28].

Since the London banks were private lenders they still didn't manage to ensure convertibility at all times. A lender of last resort was needed that was not constrained in its ability to issue liabilities. In England, that institution was the Bank of England. It must be noted, however, that the Bank of England acquired its special status because its notes could be used for tax payments, regardless of the available gold. As any central bank, it was an agent of the government that was granted exclusive rights to issue notes. *De facto*, the English government stood at the top of the pyramid. The reason why bank notes were accepted is because they have been declared by the State as acceptable for payment of taxes. In the words of Kna):

Bank-notes are not automatically money of the State, but they become so as soon as the State announces that it will receive them as epicentric payments [payments to the State]. By virtue of this "acceptation", bank notes become State currency... [Knapp 1924, 135].

The government took steps toward securing its purchasing power by giving the Bank of England monopoly rights to issue government liabilities. Most importantly, however, the government secured its purchasing power by declaring that it would accept Bank of England liabilities for tax payments and/or for any other debt settlement between the private sector and the government. Thus, Bank of England notes became State currency.

In sum, markets are the place where agents try to obtain the means of settling debt. The highest form of debt is the one owed to the government—the tax liability. The most accepted notes are the ones issued at the top of the pyramid—namely the government notes. As a result market activity is dominated by government notes and all other types of liabilities become extinct.

The government's currency was accepted, because (1) all tax obligations had to be paid in government notes and (2) because the government (or the Bank of England as its agent) had the monopoly power to issue these notes, which the State then exchanged for desired real goods and services. The government was at the top of the financial pyramid because it had a set of powers, which no other institution had, all at the same time. It has the power (1) to tax, (2) to determine what it will accept for settlement of tax obligations, and (3) as every monopoly, to determine prices.

Regardless of the type of currency, as long as it is scarce and accepted by the government for payment, it automatically becomes government money. It is the government that will have exclusive single supplier monopoly powers in providing that currency to the population.

## **Modern System: The Integration of the Banking System and the State**

Today we settle tax liabilities by writing a check on our account at the bank. That check is bank money. Thus, implications of a banking system that can provide money to the private sector through credit creation must be addressed head on. It will be shown that regardless of the process of credit expansion the government remains the “money monopolist.”

We will first describe how the Fed and the Treasury supply currency to the population by “financing” government expenditures. Secondly, we will incorporate the banking sector to show that it cannot provide currency independently from the government. Credit creation in conjunction with taxation imposed by the government does not alter the fundamental role of the State as described thus far.

The ability of the government to spend is unlimited. The Treasury can have all the expenditures it desires without any constraints from the private sector. That is a reflection of its single supplier monopoly status. Government expenditure is an income to the private sector. To incorporate the banking sector let the government engage in capital asset acquisition. Suppose it wants to upgrade the computer network of the Federal Reserve and purchases computers and software from IBM for the amount of \$100

million. We will discuss what happens if 1) the \$100 million expenditure is less than the population's tax obligations and 2) it is in excess of the tax obligation.

The money involved in the transaction is deposited in the banking system. The bank account of IBM is credited with reserves. The government has provided for the creation of deposits. Since loans create deposits, banks can increase the amount of money circulating in the system by making loans. Banks use a portion of these deposits to lend to other agents in the private sector. They also maintain a reserve requirement for each deposit. If IBM leaves the \$100 million in its bank account, that bank has excess reserves, which it will attempt to lend to other banks in the interbank market. If the bank merely makes a loan to another customer and the money stays in the bank but this time in the other customer's account, the bank will still be looking to hit a bid in the interbank market.

Any expenditure made by the government creates deposits. Any payment of taxes reduces them. Suppose the government taxes more than \$100 million. The population has to draw more money than they have initially deposited (from the sale of goods and services to the government). The banking sector as a whole will not be able to meet its required reserve ratio, as required reserves are determined after the deposits are recorded.

In this case, two things can happen—either banks will fail or, more likely, will turn to the Central Bank (the lender of last resort) for the funds. As the population pays its taxes by writing checks to the Treasury, it draws more money from the banking sector than the available bank reserves. How can this happen? The Central Bank clears interbank checks even if a bank does not have sufficient clearing reserve balances. A shortage of reserves in the system can be alleviated only by the Central Bank through the purchase of securities, for example. This purchase of securities is needed to keep the system in balance. The Central Bank is the monopoly supplier of reserves in a system where the government is the monopoly supplier of securities. Therefore, should the State impose a higher tax liability than the deposits it has initially created, the government will quickly find itself in the position of providing the funds before they are taxed out of the public. In effect, even if bank money is accepted for settling of tax obligation, it is ultimately the government (The Federal Reserve and the Treasury as its agents) that provides the currency (dollars).

By accepting bank money the State is *de facto* agreeing to advance credit (currency needed to discharge tax liability) to banks. In order to insure that it will get value for this credit, the State demands collateral for loans in the form of bank capital or net worth. If there is a shortage, even though the central bank must add reserves through lending, the central bank still sets the terms of that loan. One of the terms is the interest rate. In addition, the Fed demands collateral for the loan in the form of actual securities or the bank's net capital. Thus, the Federal Reserve maintains strict capital surveillance of member banks. Otherwise, if the Fed had no capital or collateral requirements and made unlimited unsecured loans, the State would indeed lose its supplier monopoly status and the value of the currency would be at risk of immediate hyperinflation.

In sum, the State purchases goods and services by paying with its own currency. Thus, the government has provided for the creation of deposits. Any tax receipt results in depletion of reserves. Only the State has the power to determine the tax level. It is the only institution that can create and/or destroy reserves. Regardless of the multiplier process, the State is the "money monopolist" of what it demands for payment of taxes.

We now consider the second scenario. Assume that from the inception of the currency the system is in balance. In this case, however, the government decides to run a deficit, i.e. expenditures are greater than taxation. Using our previous example, suppose that the transfer of money from the Treasury account at the Fed to IBM's account at Nations Bank, for example, is in excess of taxation. The system is flooded with excess reserves. In an attempt to earn interest on those excess reserves, Nations Bank lends to other banks. Since all banks have an account at the Fed, the reserves only get passed from bank to bank as the Fed transfers funds from one account to another. The aggregate level of reserves, however, does not change. If there is no counter action that drains reserves from the system as a whole, the overnight interest rate will naturally fall down to zero. Let banks extend loans to firms or households, in an attempt to get around the falling interest rate. These loans are deposited at other banks and the banking system is in check as the new deposits account for the new loans. That however, still does not change the amount of money banks have in reserve on deposits with the Fed. The banking system is still flooded with reserves and the interest rate keeps falling down to zero. It is the interest rate, *not* reserves, that is the only factor under the direct control of the Federal Reserve. To support the overnight rate the Fed steps in and drains those excess reserves through the sale of government securities. As Warren Mosler points out:

If [the Fed] wire-transfer[s] extra money to the banks because the Treasury wants to spend it, all else equal, the banks don't need it. So [the Fed] sell[s] securities so there is someplace to earn interest on that money [Mosler 1994]

The same applies to the Treasury. When it sells Treasury securities it also drains reserves. If, however, the Treasury sells securities to the private sector and does not spend, shortage of reserves results and the Fed *has* to offset again. The Central Bank buys securities from the private sector and supplies enough excess reserves. Similarly, if the Treasury taxes the population and does not spend the dollars first, the Federal Reserve buys securities first and then provides the dollars to the public for tax payment.

To recapitulate,

1. From inception, the government cannot collect more money in taxes than it spent. Expenditure comes *first*.
2. Any sale or purchase of securities is done only to provide an interest-bearing alternative to non-interest bearing reserve accounts. These are transactions that support the overnight interest rate and do not finance government spending. The government, consolidating the Treasury and Federal Reserve, has unlimited dollars at its disposal.

### **Mathematical Framework: Analyzing the Implications of the State as a Single Supplier of that which it Demands for Payment of Taxes**

This section presents a basic mathematical framework that relates the level of taxation, the prices paid by the government for goods and services, and other factors to overall government expenditures. The model provides understanding of the government's status of single monopoly supplier and illuminates its option to act as an employer of last resort.

### **Conceptual Framework**

We will begin by showing the basic relationship between prices paid by the government and the quantity received by the government from the private sector,<sup>2</sup> based on the following cause and effect, as outlined in Mosler's analysis "*Soft Currency Economics*":

1. The government needs real goods and services (g&s).
2. The government imposes taxes, in dollars, in order to create sellers who offer real g&s in return for the needed dollars.
3. The government purchases the desired g&s.
4. The government is the monopoly issuer of its currency. Therefore, it has the ultimate power to determine the price it pays for g&s; i.e. prices are exogenous.

### **The Model**

The terms and conditions are defined as follows:

**Population (M):** 10 people.

**T:** tax liability of the economy.

**PL:** wage paid by the government for one fire fighter.

**QL:** quantity of labor that works for the government as fire fighters.

$0 < QL < M$ , where  $QLM$  is the maximum capacity of the economy ( $M=10$  people).

**G:** government spending.

**Gd:** government deficit.

**I:** aggregate investment.

**S:** aggregate savings.

**H(nfa):** net nominal savings denominated in the currency demanded for payment of taxes in the economy.

### **Assumptions**

1. T is fixed (a fixed property tax is a good example).
2. There is only one tax period.

The model will start with the accounting identity:

$$G + I = T + S$$

The equation above can be restated:  $G = T + (S - I)$ , where  $(S - I) = H(nfa) = Gd$ .

### **Case 1**

#### **Supplementary Assumptions**

1. The economy produces one service only, fighting fires.
2. The only expenditure of the government is paying wages to the fire fighters.
3.  $H(nfa)=0$  (assume that in our model there is no provision for a government deficit; in other words, the private sector has no desire to net save).
4.  $T = \$10$ —total tax bill for the entire community.
5. Labor is not divisible (only 1, 2, 3 fire fighters can be hired).
6. Labor hours are not divisible. Every worker is hired on full-time basis for the entire tax period.
7. The lowest unit of account is \$1.00.
8.  $PL$ —the price of labor is set by the government.

The following is a general formula for the level of government spending for a given tax period:

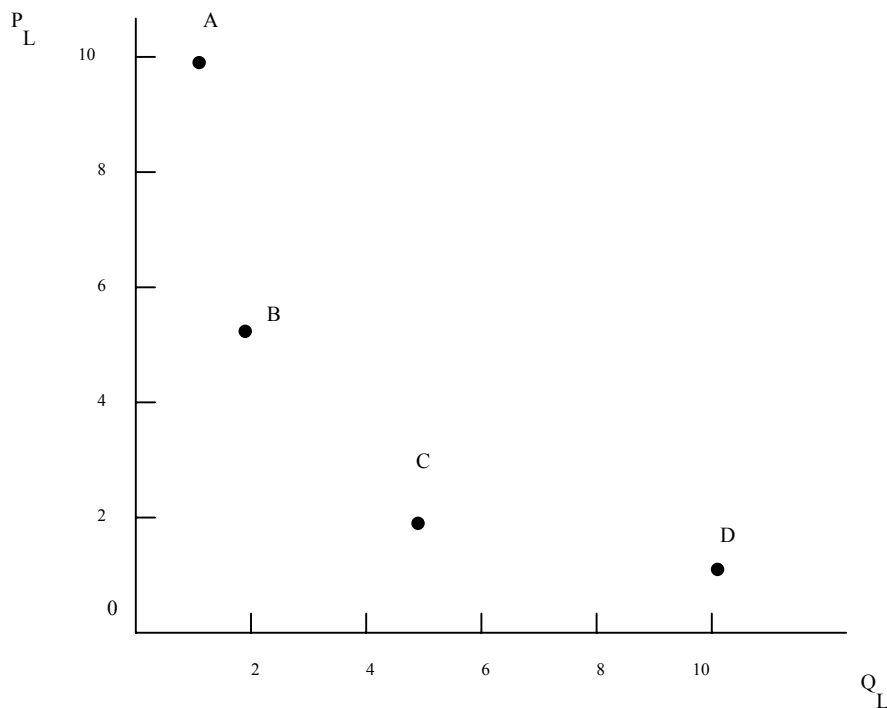


$$\sum_{i=1}^n (Q_i \times P_i) = T$$

The expression indicates that, the amount of dollars necessary to pay taxes, are equal to the sum of the revenue of the sale of quantity Q real goods and services offered by the private sector, where each good  $Q_i$  is sold for some corresponding price  $P_i$ . Since in this model the private sector offers only one service—working as fire fighters—and government's only expense is paying wages, the expression is simplified to the following:

$$P_L \times Q_L = T,$$

From this equation we can extrapolate that, in order to obtain T dollars for taxes, the private sector must sell  $Q_L = T/P_L$  services to the government. In Figure 1, points A, B, C, and D indicate the quantity of labor ( $Q_L$ ) that is transferred from the private sector to the government at a corresponding wage level ( $P_L$ ); i.e. how many people sell their labor as fire fighters, at different wages, given the aggregate tax obligation (T) of \$10.00.



**Figure 1**

Since labor and wages are not divisible, the graph in Figure 1 consists of specific points as opposed to a continuous curve. For example, the government cannot hire 1.5 fire fighters and, under the initial assumption, it cannot offer 2.5 dollars as a price for labor.

Point A indicates that if the government offers \$10 per fire fighter, only one will be hired. Points B, C, and D show that a wage of \$5, \$2, and \$1 will result in 2, 5, and 10 fire fighters, respectively. No other point exists, since  $H(nfa)=0$ .

The example illustrated in Case 1 establishes the following inverse relationship: **An increase in prices paid by the government corresponds to a decrease in the quantity of goods and services it receives.** Conversely, higher prices result in fewer goods and services purchased.

**Case 2**

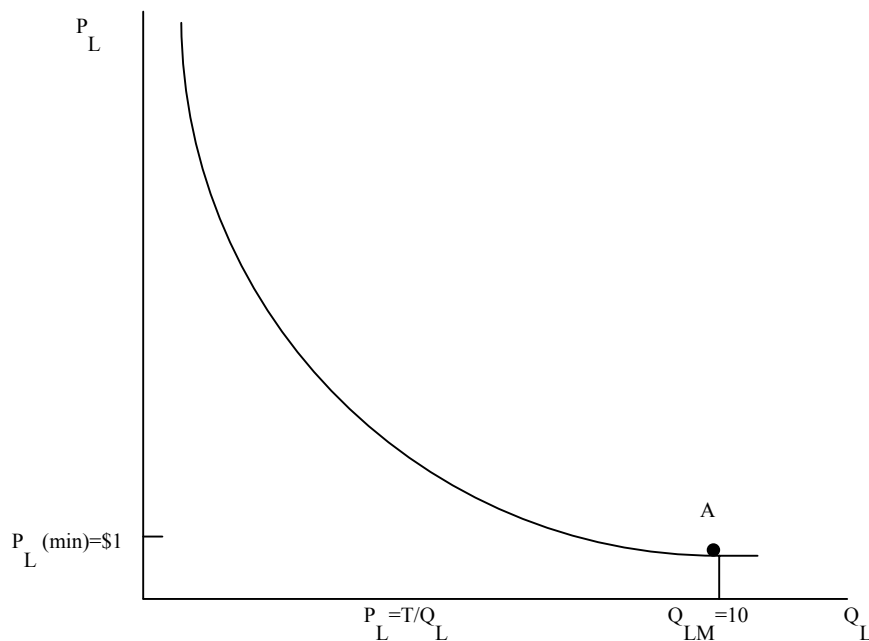
Supplementary Assumptions

1.  $H(nfa) = 0$ .
2.  $T = \$10$ .

This case removes supplementary assumptions 4 and 5 from Case 1, allowing labor-hours and wages to be divisible; i.e. labor can work less than full time for a given tax period and the smallest unit of account is no longer \$1.00. The inverse relationship between the price the government pays for labor and the amount it receives from the private sector continues, and is now represented by a function, instead of discrete points:

$$P_L = T/Q_L$$

$$P_L(\text{min}) = \$1(\text{minimum wage})$$



**Figure 2**

Figure 2 demonstrates the following:

1. With  $H(nfa)=0$ , there is only one unique curve.
2. Since  $Q_{LM}=10$  defines the limit of the capacity of the economy, it also defines the minimum wage  $P_L(\text{min})$  the government can offer. In Case 2 this wage is denoted by point A.
3. The curve is asymptotic to the y-axis. It never crosses it because the existence of any tax means that some labor will always be attracted.

**Case 2a**

Supplementary Assumptions

1.  $H(nfa)=0$ .
2.  $T=\$10$ .
3. The government chooses to set the price of labor ( $P_L$  is exogenously determined).

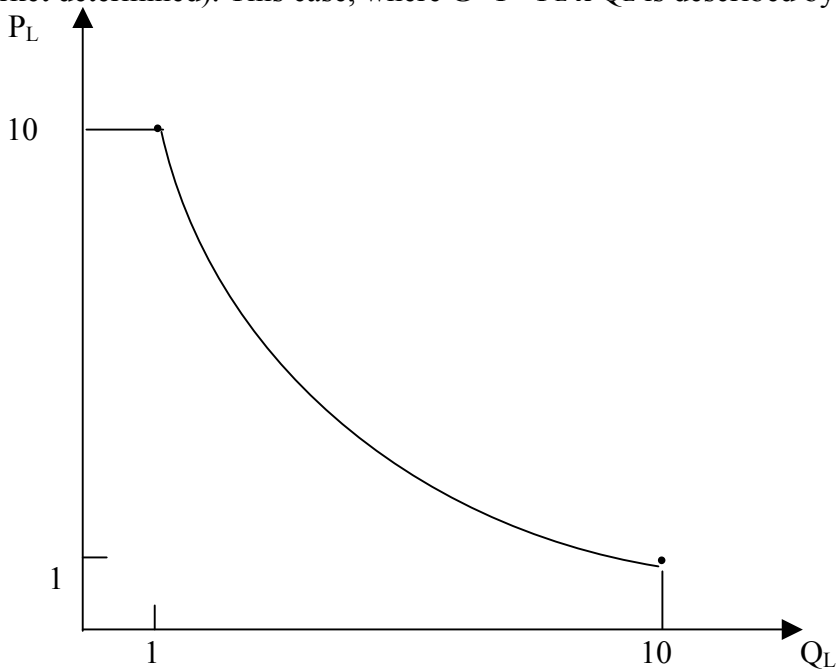
This case will be described by the same continuous graph as in Figure 2. The graph demonstrates that at any given  $P_L$  the government knows the amount of  $Q_L$  it will receive.  $P_L$  does not change via market forces.

**Case 2b**

Supplementary Assumptions

1.  $H(nfa)=0$ .
2.  $T=\$10$ .

The government forfeits its option to set  $P_L$  by choosing to pay a market price for labor ( $P_L$  is market determined). This case, where  $G=T= P_L \times Q_L$  is described by Figure 3.



**Figure 3**

Without the government setting  $P_L$ , as in Case 2a, this model shows that the possible outcomes for the time period include *all* points on the line.

In Figure 3, the market price of labor will not fall below \$1, because then there will be no solutions for  $P_L \times Q_L = T$ . The market price also can never exceed \$10, because the government is spending \$10 only (since the desire to net save is zero in this case). In order to fulfill its tax obligation, the private sector will have to “sell” only one unit of labor. Therefore, in this case the market price of labor has boundaries:

$$G/Q_L (\min) > P_L > G/Q_L (\max) \quad \text{or} \quad 10/1 > P_L > 10/10 \quad \text{or} \quad \$10 > P_L > \$1.$$

In Case 2a, the government sets the price of labor, making it an exogenous variable. In Case 2b the government pays a market determined (endogenous) price of labor and thus it does not know the price it will pay and the corresponding number of fire fighters it will receive. By allowing the taxpayer to set prices, the government also gives him the power to determine quantity. This could pose an interesting dilemma. For example, an organized labor pool could see to it that  $P_L$  would be 10 at all times, and that any tax increase would be answered with a corresponding price increase. Therefore, any attempt by the government to get more than the minimum  $Q_L$  would fail. Please note that it is the government's (exogenous) choice whether to implement policy 2a or 2b. Note that Case 2a is the African example and Case 2b illustrates the current practice in most of the world.

### Case 3

Case 3 incorporates additional government expenditure—the purchase of park benches from the private sector. In Case 3a, the government chooses to set the wage of the fire fighters, and to pay market determined prices for a bench. In Case 3b, the government decides to determine both the wage it offers for a fire fighter and the price it pays for a bench. And in Case 3c, it does not set any prices. (Case 3a is a basic outline for the full employment model discussed later in this paper).

#### Case 3a

##### Supplementary Assumptions

1. The government sets the price of labor ( $P_L$ ), and purchases benches at a market determined price ( $P_B$ ).
2.  $H(nfa)=0$ .

Case 3a illustrates how a change in the price of benches affects the number of people who will work for the government as fire fighters. The graphs below show that, as the government increases the number of benches it purchases from the private sector, the number of fire fighters it gets will decrease. The general relationship between the two variables is given by the formula:

$$P_B \times Q_B + P_L \times Q_L = T$$

$$P_B = T/Q_B - P_L/Q_B \times Q_L,$$

where  $T$ ,  $P_L$ , and  $P_B$  are given.

As the graphs bellow demonstrate, when  $Q_B$  increases,  $Q_L$  decreases.

$$T=\$10$$

$$P_B=\$3$$

$$P_L=\$1$$

$$T=P_B \times Q_B + P_L \times Q_L$$

#### Graph A:

$$Q_B=1 \text{ bench}$$

$$10=3 \times 1 + 1 \times Q_L$$

$$Q_L=7$$

$$P_B=10-Q_L$$

#### Graph B:

$$Q_B=2 \text{ benches}$$

$$10=3 \times 2 + 1 \times Q_L$$

$$Q_L=4$$

$$P_B=10/2 - 1/2 \times Q_L$$

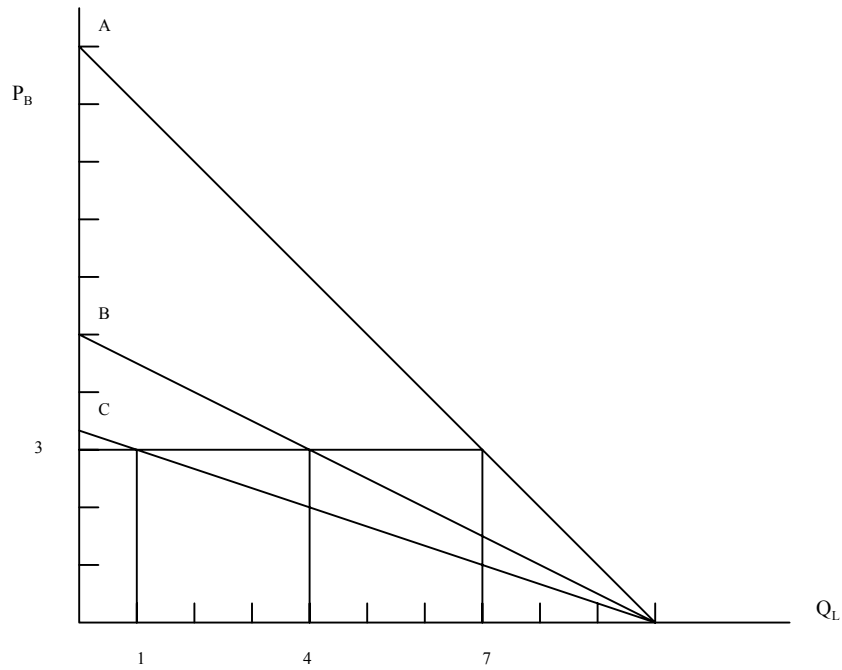
#### Graph C

$$Q_B=3 \text{ benches}$$

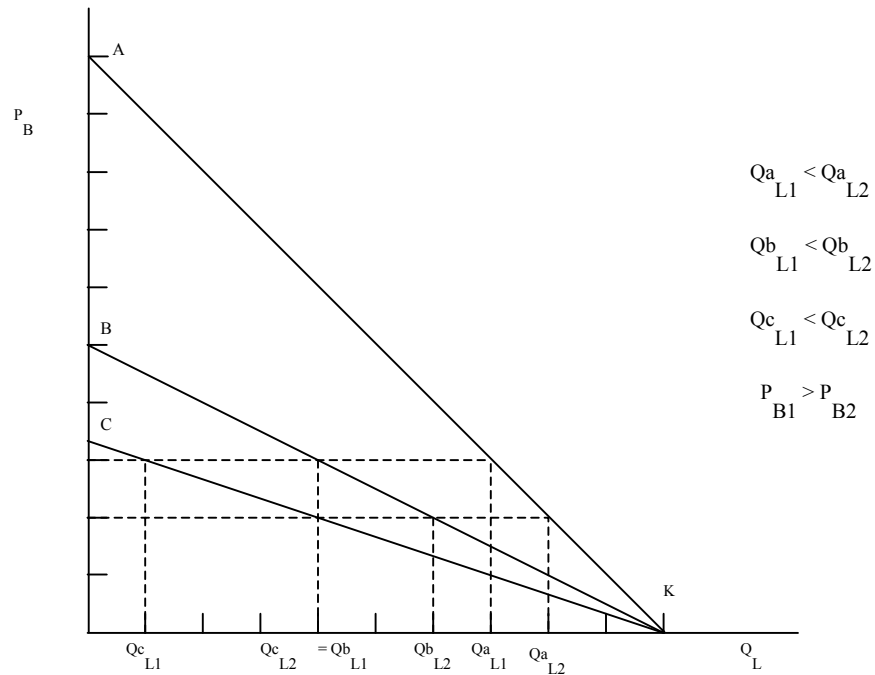
$$10=3 \times 3 + 1 \times Q_L$$

$$Q_L=1$$

$$P_B=10/3 - 1/3 \times Q_L$$



**Figure 4**



**Figure 5**

Consider prices  $P_{B1}$  and  $P_{B2}$  at every given level of purchase of benches by the government in Figure 5, which is identical to Figure 4. Notice that the government will attract fewer fire fighters with a high market price of benches than with a low market price. In other words, when market prices are high, the number of people working for the

government is low. When market prices fall, more public service jobs are taken to obtain the needed dollars.

In Figure 5, point K is defined by the ratio  $T/PL$ . If  $H(nfa) > 0$  then point K will shift to the right and will be given by  $G/PL$ .

**Case 3b**

Supplementary Assumptions

1. Government spending includes the purchase of labor and park benches.
2. Government sets both the wage of a fire fighter and the price of a bench.

Conditions

1.  $P_B$ —government determined price of a bench.
2.  $Q_B$ —the number of benches sold to the government.
3.  $H(nfa) = 0$ .

The amount of goods and services the government will be able to purchase is given by the following budget constraint:

$$G = P_B \times Q_B + P_L \times Q_L,$$

restated:

$$Q_B = (G / P_B) - (P_L / P_B) Q_L.$$

Changing  $P_B$  alters the slope of the graph but not the x-intercept:

Graph A:

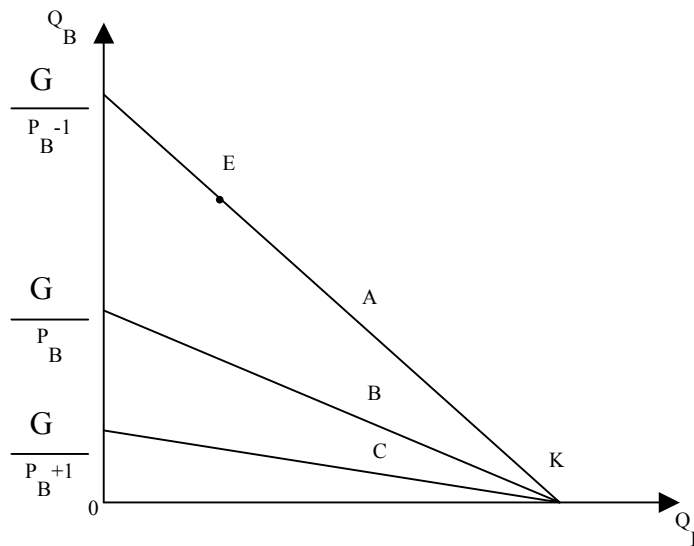
Graph B:

Graph C:

government price= $P_B$

government price= $P_B+1$

government price= $P_B-1$



**Figure 6**

We have incorporated the purchase of another good by the government. The relationship between how much it pays and how much it gets continues to be inverse. If the price of benches ( $P_B$ ) is raised, all else equal, the quantity sold to the government ( $Q_B$ ) declines.

Each point on the line represents a different basket of goods and services. The y-intercepts on all three graphs indicate the point at which the government gets only park benches and no fire fighters. The x-intercept is the point where the government only employs fire fighters and does not purchase any benches. Of course, the private sector may want to sell some combination of the two; point E is an example. The function does not give any specific equilibrium level of goods and services transferred from the private to the public sector, resulting in an uncertain quantity of labor and/or benches.

### Case 3c

#### Supplementary Assumptions

1. Government spending includes the purchase of labor and park benches.
2. Government accepts market-determined prices for both the wage of a fire fighter and the price of a bench.

On Figure 6, the price and quantity of benches change but the x-intercept (point K) remained constant, since it is defined as  $G/PL$ . In this case, however,  $PL$  also fluctuates due to changing market conditions. Hence, Case 3c is similar to Case 2b, where there were infinite possible outcomes. Both Case 3c and 2b are characterized by the absence of exogenous price control by the government, with price and, therefore, quantity determined by the taxpayer.

### Case 4

All cases so far have assumed that  $G_d = H(nfa) = 0$ . Case 4 introduces different levels of  $H(nfa)$  to Case 2a.

#### Supplementary Assumptions

1.  $T = \$10$ .
2.  $Q_{LM} = 10$ .
3. The government sets the price of labor.
4. The government purchases fire fighters only.

This case graphs 3 conditions:

1.  $H(nfa) = \$0$
2.  $H(nfa) = \$2$
3.  $H(nfa) = \$-2$ , where

$H(nfa) = \$-2$  means that the private sector dis-saves as it borrows from the government. Here is the data for the three cases and the graphs that describe the number of fire fighters that will work for the government at different wage-levels.

#### Case 4a:

$H(nfa) = G_d = \$0$   
 $G = 10 + 0 = \$10$   
 $PL = G/QL = 10/QL$

#### Case 4b:

$H(nfa) = G_d = \$2$   
 $G = 10 + 2 = \$12$   
 $PL = 12/QL$

#### Case 4c:

$H(nfa) = G_d = -\$2$   
 $G = \$8$   
 $PL = 8/QL$

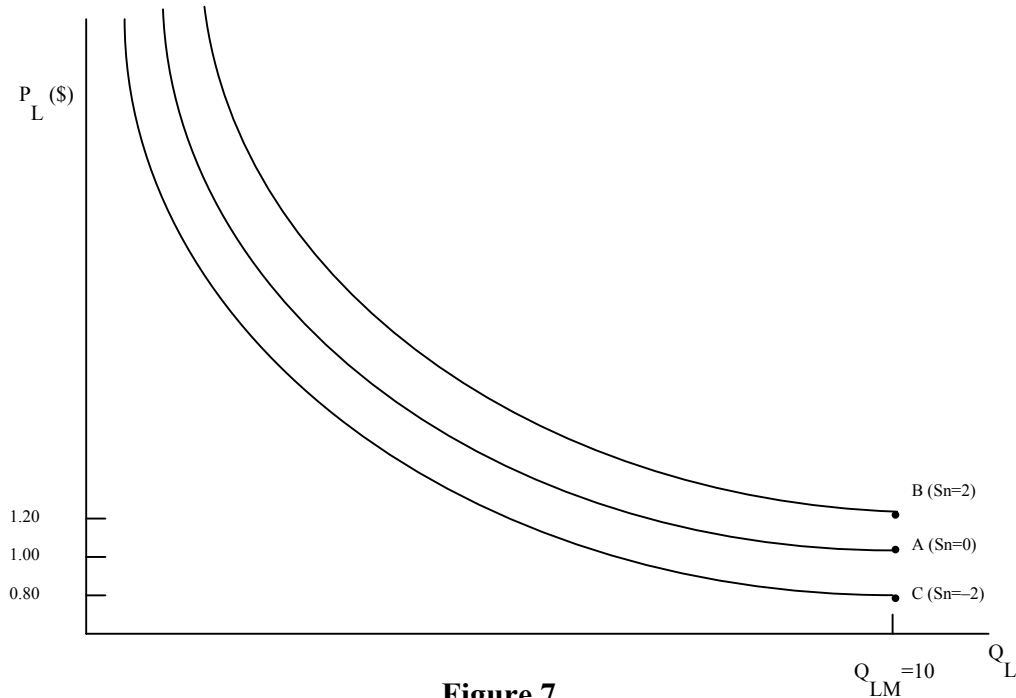


Figure 7

All three curves in Figure 7 are downward sloping: the more the government pays, the less it receives from the private sector (at a given tax level).

The three situations are characterized by different minimum wages that the government can offer. With full capacity confined to 10 people, in the first situation (curve  $P_L=10/Q_L$ ), the government is not running a deficit ( $H(nfa)=0$ ); hence \$1 is the minimum that the government can pay for a fire fighter. At that point (point A) it will attract 100 percent of the capacity and everyone will be working in the public sector, fighting fires. In the second situation (curve  $P_L=12/Q_L$ ) when the private sector net saves \$2, the minimum wage is given by point B, \$1.20. Similarly for the third curve that wage is \$0.80.

Changing  $H(nfa)$  does not change the basic relationship, **it only shifts the curve**. This shift can be expressed mathematically in general terms as opposed to using particular values for our variables.

### Proof

$$\text{Let } G = P_L \times Q_L = T + H(nfa)$$

$$P_L = (T + H(nfa)) / Q_L = T / Q_L + H(nfa) / Q_L$$

Let net savings increase from  $H(nfa)$  to  $H(nfa)^*$ , by a change of  $\Delta H(nfa) = H(nfa)^* - H(nfa)$

$$G^* = P_L^* \times Q_L = T + H(nfa)^*$$

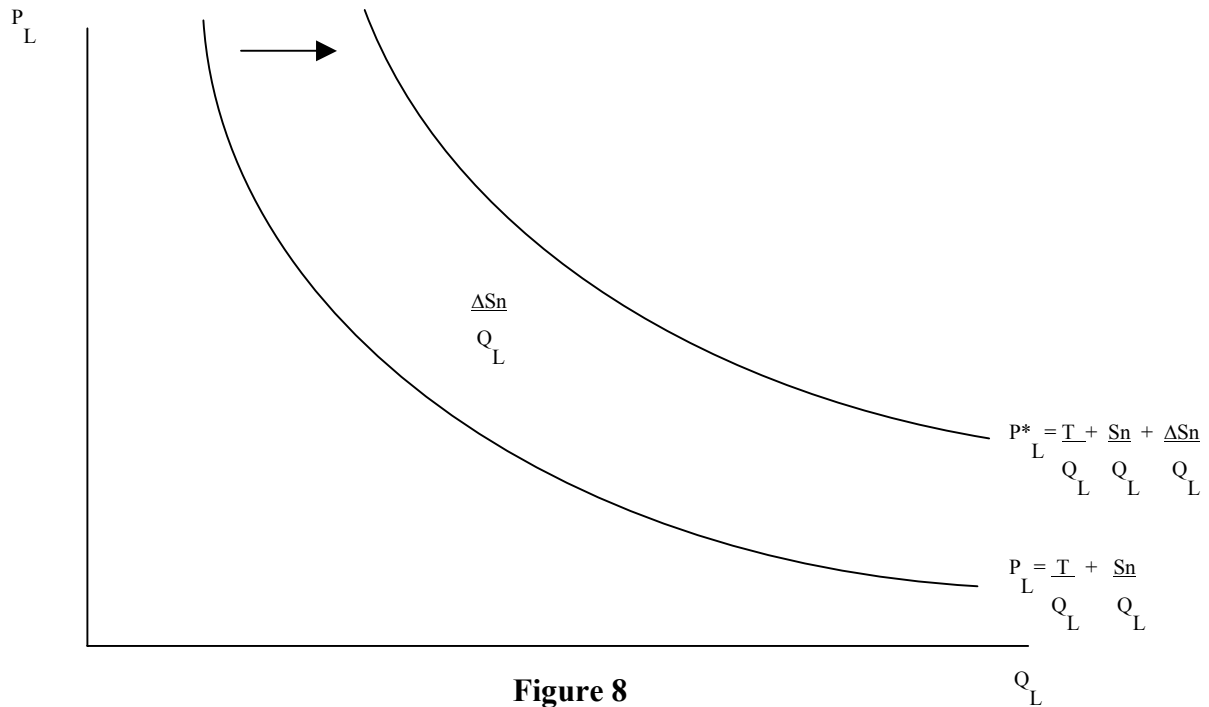
$$P_L^* = (T + H(nfa)^*) / Q_L = T / Q_L + H(nfa)^* / Q_L$$

$$\Rightarrow P_L^* = T / Q_L + (H(nfa) + \Delta H(nfa)) / Q_L = T / Q_L + H(nfa) / Q_L + \Delta H(nfa) / Q_L$$

$$\Rightarrow P_L^* = P_L + \Delta H(nfa) / Q_L$$

Therefore, the curve has shifted by  $\Delta H(nfa) / Q_L$ . We have found a general expression for the shift of the curve.





**Case 5**

This case significantly modifies the setup of the model, however, the basic relationships are maintained. A couple of terms are added:

**U:** number of people seeking unemployment compensation

**Uc:** dollar amount of unemployment compensations one receives

**Modified Assumptions**

1.  $H(nfa)=0$ .
2.  $T=\$100$ .
3. The government decides to spend a fixed amount on benches at market prices (\$90) and offers to pay \$2 to each unemployed individual in the form of unemployment compensation.

In this case total government expenditure will include the purchase of benches and the aggregate unemployment compensation it pays to the unemployed people that seek it. The equation for government spending is modified to:

$$G = P_B \times Q_B + U \times U_c,$$

where  $P_B \times Q_B=90$  and  $U_c=2$ . When the values are substituted, the formula yields  $U = 5$ .

$$100 = 90 + U \times 2 \quad \Rightarrow \quad U = 5$$

Thus, we can conclude that when the government spends only \$90 on goods from the private sector and offers \$2 for unemployment compensation, at least five people will file an unemployment claim if the population is to meet its tax requirement of \$100. Note that if the private sector decides to charge the government very high prices for a bench, it can easily lay off more than five people. Since the desire to net save is zero only five of those unemployed workers will show up for compensation, enough to obtain the means that settle the aggregate tax liability.

**Case 6**

The conditions of Case 6 are exactly the same as the ones in Case 5, with the exception of the level of net saving. We will study how many people will file unemployment claim with the government at different levels of H(nfa).

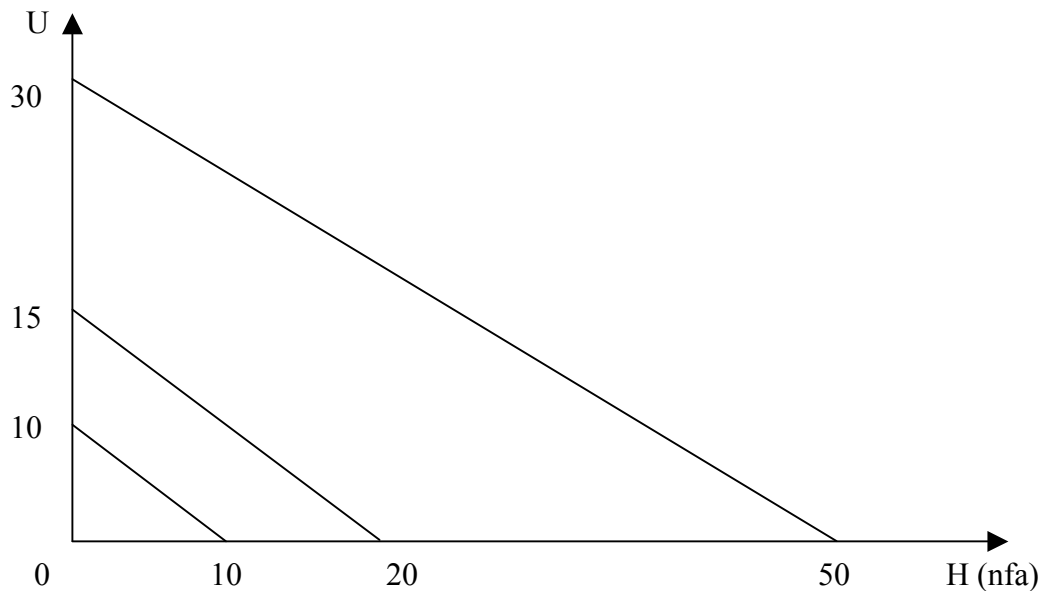
Figure 9 graphs three conditions:

1. H(nfa) = \$10
2. H(nfa) = \$20
3. H(nfa) = \$50

The formula describing these three scenarios is:

$$G = T + H(nfa) = PB \times QB + U \times U_c \quad \text{or} \quad 100 + H(nfa) = 90 + U \times 2$$

$$U = (100 + H(nfa) - 90) / 2$$



**Figure 9**

Figure 9 shows that the higher the desire to net save, the more people with claim unemployment compensation, given a fixed level of government expenditure on good from the private sector.

## **Conclusion: The Employer of Last Resort Option**

In sum, price is an exogenous function in the case of a single supplier monopolist. The State has several available options when choosing a method of price determination. The current method of paying market prices for all purchases has been shown to have exactly the outcomes observed in the world today. Likewise, historical examples of other options are also consistent with this model. The case for employer of last resort (ELR) made by Wray [1998], Mitchell [1998], and Mosler [1995] uses the option outlined in Case 3a above. The currency is set exogenously for one purchase, ELR labor, and other prices are allowed to be determined by existing market conditions.

We have considered the driving force behind currency as well as the role of the government as a single supplier of currency both in the past and in the present. Finally, the mathematical framework presented in this paper outlines the inverse relationship between the price the government pays for goods and services and the minimum quantity of real goods and services it receives for a given level of taxation, considering that:

1. The government is the monopoly supplier of its fiat currency.
2. The government exogenously sets taxes and creates sellers of real goods and services.
3. The government has the ultimate power to exogenously set the prices it pays for real goods and services.

The inverse relationship is maintained regardless of the fact that the private sector may or may not have a desire to net save. Net saving equals the government deficit by definition, which can be incorporated into a fiscal policy that lets market conditions cause the deficit to float with the net desire of the private sector to save the currency, as outlined by Wray, Mitchell, and Case 3a in this paper.

To recapitulate, this mathematical framework outlines some basic relationships that can be considered in the selection of fiscal policy options. Taxation is the driving force behind the currency, the government is the single monopoly supplier of currency, and as such it has the power to set taxes and prices exogenously. Furthermore, there is an option open to the State that can eliminate the problems of unemployment and provide meaningful price stability as well.

### *Notes*

1. “Monopoly” is used here in a general sense to indicate the exclusive powers and privileges of the State to create that which it demands for payment for taxes. It is not meant to imply the usual profit maximizing motives of private sector monopolists.
2. The private sector includes all participants holding dollars, domestically or abroad; i.e. everyone except the monopoly issuer of the currency.

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