

# Why do central banks (and money) rule the roost?

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## 1. Introduction

Recently, many economists have been involved in a debate on the future of money and central banking. The interest in this issue has been spurred by the impressive progress of financial innovation that has characterized all advanced economies during the last part of the 20<sup>th</sup> century. Particular attention is given to the effects of innovations related to information and communication technology (ICT). This paper looks at some aspects of the current debate and puts them in relation to an older debate on money, which took place in the 1930’s. More precisely, the paper concentrates on the implications of financial innovations for the central banks’ ability to implement effective monetary policies.

Several authors regard recent financial innovations as a threat to the central banks’ ability to affect the behavior of the economy through their policies. Financial innovations determine a declining demand for conventional money and, in particular, for base money, in the form of demand for bank’s reserves at central banks. As a consequence, it is argued, central banks could meet increasing difficulties in attempts to affect the economy’s behavior through changes in interest rates.

Alternatively, others argue that, even in an extreme and unrealistic situation in which the demand for reserves vanishes altogether, central banks would still be able to implement monetary policy by influencing the economy’s interest rates. The possibility for central banks to always affect market interest rates derives from the fact that they do not necessarily have to control interest rates through variations in their supply of reserves. Central banks, instead, can directly fix an interest rate on their liability and affect all the other rates without having to change the supply of reserves. The fundamental ultimate reason why central banks can operate in such a way is that their liability is the economy’s standard of value, or unit of account.

The emphasis laid on the essential importance of money being the standard of value recalls an older debate on the nature and properties of money and why money “rules the roost”, that is to say why money is relevant for the working of market capitalist economies. More in particular, in that debate, which took place in the 1930’s, Kaldor argued that money “rules the roost” because it is the standard of value, not for other special properties.

If the crucial role of money ultimately derives from its role as the economy’s standard, the displacement of money, and central banks that issue and administer it, by another new instrument requires that it replace money also in its function of unit of account and that it is not issued and administered by central banks. Contemplating this possibility raises important analytical and theoretical problems.

Although the adoption of a particular medium of exchange or the displacement of a medium by a new more efficient instrument can be conceived of as an outcome of “spontaneous” market innovative processes, the emerging of a new standard of value

is the result of a much more complex social, institutional and economic process. Therefore, the displacement of money and central banks presupposes an equally complex process, which involves other aspects than mere technological advances.

The paper is organized as follows. Section 2 deals with the contemporary debate on central banks and monetary policy in a “world without money”. The following section 3 relates the current debate to the 1930’s debate on money and its essential properties. Section 4, presents some considerations on the social nature of money and its implications for the future of central banking. Section 5 draws some conclusions.

## **2. Monetary policy in a “world without money”**

In traditional “textbook models”, the central bank determines the economy’s interest rate by varying the supply of money, the demand for which is assumed to be a sufficiently stable function. By varying the supply of money, the central bank creates a gap between the amount of money that the public wishes to hold and the amount of it that is available in the economy. Equilibrium in the money market is restored by changes in the interest rate. The IS-LM model is the most popular representation of this idea of how central banks operate (White 2001: 5-13).

The description outlined above of how central banks realize their target rate faces a difficulty. Although there is a large consensus on the actual ability of central banks to affect interest rates—in particular, short-term rates—many observe that the value of transactions in which they are engaged in advanced economies is too small a percentage of total transactions to be able to have significant effects on interest rates. Benjamin Friedman (1999) underlines this difficulty and proposes his own explanation of why central banks can affect the economy’s interest rates even though they engage in a relatively small volume of transactions. Central banks can implement effective monetary policies because of the special nature of their transactions. Any transaction in securities made by a central bank implies a variation in the commercial banks’ reserves, which is not true for all the other participants in the market. The central bank is a monopoly supplier of reserves.

For Friedman, the monopolistic nature of central banks and its effects on interest rates are compatible with any conception of monetary policy.<sup>1</sup> In particular, the central bank’s monopolistic position is crucial also when it operates through “moral suasion”, i.e. by signaling to the market its intention to vary interest rates at some date in the future. In this context, the market responds to the central bank’s signal by changing its expectations about future rates, so that it is the market itself that produces the variation in interest rates, without any engagement of the central bank in actual transactions. But in order that this mechanism work, the central bank’s signal must be credible, which is true only if the bank can actually vary short-term rates (by varying the supply of reserves) when the announced time to do so comes and the market has not yet responded in expected way. Thus, whatever is the adopted view of monetary

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<sup>1</sup> In the “monetary view” of monetary policy, the public demands bank-issued money, against which commercial banks must have reserves at the central bank. When the central bank changes the supply of reserves, banks must change their supply of money to the public and changes in the interest rate follow. In the “credit view”, the public demands loans from banks, which create money by lending. The banks’ demand for reserves is positively related to the volume of their lending. If changes in the demand for reserves are not matched by changes in their supply by the central bank, there must be changes in the amount of bank loans, with consequent variations in interest rates.

policy, the central bank's effectiveness depends on it being the monopoly supplier of reserves.

On the grounds of his explanation of why central banks affect interest rates in the current situation, Friedman examines the processes that can represent a threat for the central banks' effectiveness. Advanced economies can evolve to a situation in which central banks become monopoly suppliers of something the demand for which has vanished or reduced to a very large extent. Due to financial innovations, both the demand for bank money and for bank credit are decreasing significantly (Friedman 1999), so that the demand for reserves is decreasing as well.

If the demand for reserves keeps on declining, at a certain point central banks would no longer be able to affect the economy's interest rates: changes in the supply of reserves would not produce any significant change in market interest rates. This is what Friedman calls "decoupling at the margin", i.e. changes in the variables controlled by central banks do not give rise to corresponding changes in the relevant variables for the economy as a whole (Friedman 2000).

In such a world, the monopolistic nature of central banks is no longer relevant: "being a monopolist is of little value if no one needs, or even wants, to have whatever the monopoly is of" (Friedman 1999: 327). In such a situation, central banks could not exert their influence through moral suasion: "with nothing to back up the central bank's expressions of intent (...), in time, the market would cease to do the central bank's work for it" (Friedman 2000: 271).

Friedman's description of how a central bank operates to determine its target interest rate basically reflects the way in which the US Federal Reserve (and other central banks) currently operates.<sup>2</sup> However, argues Woodford (2000; 2001; 2002; 2003), central banks can implement monetary policies also by operating in a different way. In a world characterized by financial innovations that make the demand for reserves at the central bank negligible, the central bank can influence the entire constellation of short-term interest rates by fixing its target rate directly. The Fed, for example, should fix its target funds rate and then supply the quantity of reserves demanded by banks at that rate (Woodford 2000).<sup>3</sup> With a zero interest rate on reserves, every time the central bank makes its target rate change, it produces a change in the spread between the two rates.

In the world depicted above, the demand for base money is small but *still positive*. In a situation in which the demand for money were nil, the policy outlined above would be inapplicable and central banks could not vary the spread (Woodford 2000: 241-2). However, even in such a highly unrealistic world, a central bank could control short-term rates by paying interest on commercial banks' reserves. Woodford considers the case of central banks that adopt a "channel" system of interest rate control<sup>4</sup> and the case in which commercial banks do not clear through the central bank's settlement balances but adopt a different system of clearing.

In the latter case, the banks' demand for balances with the central bank, which they regard as useful as any other equally riskless overnight investment, would be nil at

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<sup>2</sup> The Fed acts on its target rate (the federal funds rate) through open-market operations and does not pay interest on banks' reserves.

<sup>3</sup> In other words, the supply of base money becomes an endogenous variable and not an instrument used by the central bank to realize its target rate.

<sup>4</sup> For a detailed description of the "channel" system, see (Woodford 2000; 2001).

any interest rate higher than the settlement cash rate and horizontal at any rate equal to or lower than the settlement cash rate. In other words, banks hold balances at the central bank only if the overnight rate is not higher than the central bank's rate paid on settlement balances. In this framework, the central bank is still able to control interest rates by varying the rate it pays on its deposits. If the central bank changes its rate, the market rate has to change as well, because otherwise there would be an excess demand (supply) for market liquid assets, eliminated by arbitrage (Woodford 2001: 347).<sup>5</sup>

The crucial question is why the central bank is always able to fix the interest rate on its liability. For Woodford, the central bank can always fix the interest rate on its liabilities because there is no inherent equilibrium value for a fiat unit of account like the "dollar" (the central bank's liability), unless a particular value is determined through the monetary policy commitments of the central bank itself (Woodford 2000: 256-7). The unit of account in a purely fiat system is defined in terms of the central bank's liabilities. A contract promising to deliver a certain amount of dollars at a certain date implies a payment in terms of settlement balances at the central bank, or in terms of some kind of payment that the payee is willing to accept as a suitable equivalent. In any case, settlement balances at the central bank define the value of whatever is contractually accepted as payment: "Even in the technological utopia imagined by the enthusiasts of 'electronic money'—where financial market participants are willing to accept as final settlement transfers made over electronic networks in which the central bank is not involved—if debts are contracted in units of a national currency, then clearing balances at the central bank will still define the thing to which these other claims are accepted as equivalent" (Woodford 2001: 346). The value of a dollar deposit with the central bank cannot be anything other than a dollar. This is not true of instruments of private financial institutions.<sup>6</sup> In this framework, the central bank can affect short-term rates without engaging itself in large transactions.

Friedman is not convinced by Woodford's argument. For him, central banks of countries that adopt a system similar to that envisaged by Woodford can implement effective policies because "market participants know that, under current circumstances, the central bank *can* make the interest rate whatever it wants—if necessary, by engaging in very large transactions—and as a result those large transactions are *not* necessary." (Friedman 2000: 271).<sup>7</sup> Friedman, however, seems to

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<sup>5</sup> The central bank, however, would be unable to affect the spread between interest rates; in particular it could not vary the spread between base money and short-term rates.

<sup>6</sup> They can offer liabilities that promise to pay a certain amount of dollars in the future, but they must accept the market's present evaluation of such liabilities. Even if these liabilities were not perfect substitutes for other financial instruments, private financial institutions could not determine both the quantity issued of them and their nominal yield, whereas the central bank can determine both the quantity of settlement balances in existence and the nominal yield on those balances.

<sup>7</sup> Friedman also argues that there is an inconsistency in Woodford's analysis. Friedman carries out his reasoning in terms of the IS-LM model. Since, along the IS function, the equilibrium interest rate is undetermined, the central bank can fix it at whatever level by appropriately positioning the LM function. However, the IS-LM model is based on the hypothesis that the demand for money is defined for a zero (or fixed) interest rate on money itself, so that it is an inverse function of the interest rate on the alternative asset(s). If the rate on money changes in step with the rate on other assets (a constant spread), the demand for money is no longer a function of the interest rate and, therefore, the LM function becomes vertical. This does not mean that interest rates in the economy cannot be fixed by positioning the LM function, but a vertical LM function contradicts Woodford's argument, for which it should be horizontal, because the central bank should be ready to borrow and lend any amount at the rate it fixes (Friedman 2000: 270-1). For a similar criticism, see also (Lahdenperä 2001: 31).

underestimate that the possibility of arbitrage between reserves and other overnight investments makes the central bank's engagement in large transactions unnecessary: as soon as the rate on reserves is varied by the central bank, the market makes the other rates change in step. In other words, the market anticipates that the demand for borrowed reserves is going to change and adjusts the other rates rapidly, before the central bank is "forced" to engage in large transactions. In a sense, the possibility of arbitrage works in a similar way to the central banks' moral suasion. If anything, the arbitrage effect is stronger than moral suasion: markets do not have to believe in the central bank's announcement to change interest rates, it is sufficient that they respond by acting in a maximizing way.

Thus, in conclusion, in so far as their liability is the economy's standard of value, central banks "rule the roost": the rate that they can fix affects other market rates. Central banks can implement effective monetary policy also in a "world without money", i.e. a world in which the demand for base money has become negligible or even vanished.<sup>8</sup> This reasoning is contingent on the central bank's liability being the standard of value.

### 3. Why does money "rule the roost"?

Woodford's approach to the effectiveness of central banking recalls some aspects of an older debate on money. In fact, the use in the previous section of the term "rule the roost" to describe the effectiveness of central banks' policy was not casual. It was used to denote that in market economies money matters, in the sense that the money interest rate affects the behavior of the economy as a whole.

For Keynes (1936), money "rules the roost" in the sense that the interest on it sets a limit to the level of employment that the economy can realize. It is so because the interest rate on money is the most reluctant to decline as the stocks of all assets increase. If it is assumed that the yield of assets is a decreasing function of their quantity,<sup>9</sup> the equilibrium quantity of all assets is determined by the asset's yield that is fixed, or highly sticky: the production of all the other assets will not be pushed beyond the level at which their yield equates the "sticky yield". What is not obvious, however, is why money plays such a crucial role.

Keynes defines the following two notions of an asset's yield.

- i) The *own-rate of own-interest*, which is the asset's yield in terms of itself.
- ii) The *own-interest of money-interest*, which is the own-rate of own-interest corrected by the expected asset's appreciation/depreciation in terms of money.

The assets' rate of money-interest is

$$R_i = a_i + q_i - c_i + l_i \quad (i = 1, \dots, n)$$

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Friedman's arguments, however, seem to show the inadequacy of the IS-LM model to deal with such issues rather than a flaw in Woodford's line of analysis.

<sup>8</sup> The notion of policy effectiveness used here is limited. Monetary policy is said to be effective if it can influence short-term market rates. It is not an object of this paper to further investigate either the way in, and the extent to, which changes in short-term interest rates affect longer-term rates or the extent to which changes in interest rates in general produce significant changes in the real sector of the economy (output, employment, etc.).

<sup>9</sup> Keynes's hypothesis of a decreasing marginal efficiency of capital.

where  $a_i$  is the appreciation of the  $i$ -th asset in terms of money,  $q_i$  is the yield of the  $i$ -th asset in terms of itself (the own-rate of own-interest),  $c_i$  is the  $i$ -th asset's carrying cost and  $l_i$  is its liquidity premium, which is the amount of the asset itself that an agent is willing to pay for the potential convenience of the power of disposal of the asset.

Money (the  $m$ -th asset) is characterized by the following properties:  
 $a_m = 0; q_m = 0; c_m = 0; l_m = \bar{l}_m > 0$

Being the standard of value, money cannot appreciate or depreciate in terms of itself. Money is a non-producible asset (it has a zero elasticity of production) and the yield in terms of itself is nil. Money has also a nil carrying cost. Finally, money has a positive and constant liquidity premium (it has a zero elasticity of substitution). Therefore,

$$R_m = \bar{l}_m$$

In equilibrium, it must be

$$R_m = R_i \quad (i = 1, 2, \dots, n; i \neq m)$$

which means that money “rules the roost”: its interest rate determines the equilibrium quantities of all the other assets.

The notion of money used above corresponds to money “as we know it”, that is to say money as standard of value, medium of exchange and store of value (Keynes 1936). For Keynes, however, the role of money could be played by any other asset, which is not the standard of value but has all the other properties of money. Other assets, like land, may have played the same role as money in some historic situations (Keynes 1936: 241).

Although Keynes acknowledged the importance of the function of money as the standard of value,<sup>10</sup> this function was not a sufficient condition for it to “rule the roost”. Kaldor (1980a) criticized Keynes and argued that being the standard of value is a necessary condition for an asset to rule the roost. In Kaldor's notation,<sup>11</sup> the  $i$ -th asset's own-rate of money-interest is

$$R_i = a_i + q_i - c_i + r_i \quad (1)$$

If there are  $n$  assets, the general equilibrium condition is

$$\begin{aligned} a_i + q_i - c_i - r_i &= a_j + q_j - c_j - r_j \\ (i, j &= 1, 2, \dots, n; i \neq j) \end{aligned} \quad (2)$$

Money has  $a_m = 0$  and, consequently,  $r_m = 0$ ;<sup>12</sup> moreover, it has  $c_m = 0$ . Thus,

$$R_m = q_m \quad (3)$$

where  $q_m$  is what Kaldor calls the “convenience yield” of money, which derives from money being the medium of exchange.<sup>13</sup>

<sup>10</sup> See also (Keynes 1930).

<sup>11</sup> Kaldor used the notion of marginal risk premium instead of Keynes's notion of liquidity premium. See (Kaldor 1980a: 61), for the reasons why he preferred the marginal risk premium to the liquidity premium.

<sup>12</sup> There is no uncertainty about its future value.

The nearest substitute for money is short-term bills, which however cannot be used as a means of payment. They (the  $b$ -th asset) have a small risk premium,<sup>14</sup> a nil carrying cost and a nil expected appreciation. Therefore,

$$R_b = q_b - r_b \quad (4)$$

In equilibrium, it must be  $R_m = R_b$ , that is to say

$$q_m = q_b - r_b \quad (5)$$

$r_b$  sets the lower limit to the bill-rate of interest. When the amount of money in circulation is so large that its marginal convenience yield,  $q_m$ , falls to zero, the bill-own rate of interest ( $q_b$ ) reduces to  $r_b$ . For Kaldor,  $q_b$  is fixed by the central bank.<sup>15</sup> In turn, the current short-term rate, expectations on future short-term rates and risk premia determine the long-term interest rate.<sup>16</sup>

Kaldor then turns to the question of how this rate can actually set the standard for all the other rates. In the short period, equilibrium is realized through variations of current prices with respect to expected prices (i.e. through variations in the assets'  $a$ s). However, this adjustment process can work only if it is assumed that expected prices are invariant to changes in current prices, because otherwise the  $a$ s might not change at all. In other words, expectations must be assumed to be *perfectly inelastic*. If, like Keynes implicitly did, it is assumed that the expected price of reproducible assets is given by their long-period supply prices, an asset is produced only when its current price is higher than its supply price, i.e. when  $a$  is positive. When, for an asset,  $a = 0$ , its current price is equal to its expected price (its normal price) and, hence, the marginal efficiency of the asset,<sup>17</sup> its own-rate of own-interest and its own-rate of money-interest are all equal. In this framework, the general level of the own-rates of money-interest is set by the greatest of the own-rates of own-interest among those assets whose own-rate of money-interest ( $R_i$ ) cannot vary with respect to their own-rate of own-interest ( $q_i - a_i - r_i$ ). The only asset with such a characteristic is money because it is the standard of value and, hence,  $a_m = 0$ .<sup>18</sup>

The money-rate of money-interest rate can change only if the money's own-rate of own-interest changes, which for Kaldor can happen. The current yield of money ( $q_m$ )

<sup>13</sup> The convenience yield of money is similar to the "convenience yield of wheat to the miller or stocks of cotton to the yarn-maker". The convenience yield of money depends on the ratio of the money stock to the volume of money payments. It falls to zero when the ratio exceeds a certain critical value (Kaldor 1980a: 61-2).

<sup>14</sup> Which is fairly insensitive to their quantity.

<sup>15</sup> "In a modern community it is best to regard the short rate of interest (...) (rather than the quantity of money) as being fixed by the policy of the monetary authorities (...) and the quantity of currency in circulation as being determined by the demand for cash balances by the public, the latter being influenced also by the extent to which non-monetary liquid assets are available" (Kaldor 1980a: 64).

<sup>16</sup> Kaldor adopts Hicks's theory of long-term interest rates (Hicks 1946). Under the assumption that expected short-term rates are equal to the current rate, the long-term rate can be expressed as

$$q_l = q_b + \frac{\sum_{h=1}^l r_h}{l}, \text{ where } r_h \text{ denotes the risk premium relative to the forward short-term rate } i_h.$$

<sup>17</sup> The marginal efficiency of an asset is defined by Kaldor as the relationship of its future return to its present cost of production, i.e. its long-period supply price (1980a: 59).

<sup>18</sup> "... all assets other than money can adjust their own-rates of money-interest to that of money by a variation of their current price in terms of money; while the money-rate of money-interest can only be changed by varying money's own-rate of own-interest" (Kaldor 1980a: 70).

can change rapidly in response to changes in its stock but, with inelastic expectations, these changes have little impact on the long-term interest rate, which is an average of the current yield of money, its expected future yields and risk premia.<sup>19</sup>

From the analysis above, it follows that if there existed an asset other than money whose yield is sticky with respect to its level of production, it could not play the same role as money (the standard of value). The price in terms of money of such an asset, in fact, would increase and, consequently, its money-interest rate would fall. As a result, the standard yield for all the other assets would decrease and, hence, their production would not be constrained.

The picture is different if expectations are *elastic*. In this case, when the current price of an asset rises, its expected price rises as well, so that the asset's rate of money-interest does not decrease with respect to its own-rate of own-interest. However, the increase in the asset's money price would reduce its own-rate of own-interest: if the asset's yield is fixed in money terms, the increase in its price reduces its yield in terms of itself. This cannot happen with money (the standard of value) because there cannot be any increase in its "price". The exception is when there is an asset whose yield is fixed in terms of itself.<sup>20</sup>

If the hypotheses of elastic expectations and of the existence of an asset whose yield is fixed in terms of itself are removed, the roost is necessarily ruled by money because it is the economy's standard of value: "It appears, therefore, that contrary to Keynes's view, the kind of liquidity preference which is capable of setting a limit to the level of employment is inherently associated with the commodity which serves as the unit of account, and cannot reside in an asset other than money" (Kaldor 1980a: 73).

It is in this sense that Kaldor's position relates to the current discussion of why the central bank can always fix the interest rate on base money and influence other interest rates in the economy. The money rate of money-interest is dominant because "one dollar is always one dollar". Moreover, also in Kaldor's analysis, the dominant interest rate is ultimately determined by the central bank, which fixes the short-term rate.

There are, of course, differences between Kaldor's analytical framework and the framework to which the current debate refers. In particular, Kaldor assumes that money is demanded as a medium of exchange, i.e. it has a convenience yield that derives from its use in transactions. In the current debate attention is concentrated on the demand for base money in its function as commercial banks' reserves at the central bank, while it is accepted that the demand for money as a medium of exchange might vanish.<sup>21</sup> This difference, however, essentially depends on the fact that Kaldor carried out his analysis at a very abstract level, without considering the role of banks and their relationships with the central bank.

#### **4. Money (and central banks) as a social relation**

Both in Kaldor's more basic analysis of general equilibrium in a monetary economy and in Woodford's analysis of the working of modern payment systems, money and

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<sup>19</sup> On the stability of the long-term interest rate, see also (Kaldor 1980b: 37-9).

<sup>20</sup> But to assume that an asset's yield is fixed in terms of itself basically amounts to assuming that such asset is the standard of value.

<sup>21</sup> Under this latter hypothesis, Kaldor's notion of money's convenience yield cannot be used any longer:  $q_m$  would be permanently equal to zero.

central banks “rule the roost” because money (the central banks’ liability) is the economy’s standard of value. It is this function that defines the essential property of money. Money “matters” regardless of its actual use in transactions as a medium of exchange.

Being the economy’s standard also implies that money is the economy’s ultimate means of payment, i.e. the instrument by which final payments and settlements are made.<sup>22</sup> Contracts are expressed and enforced by law in the standard of value. They can be underwritten by using any type of instrument as a specific unit of account but, ultimately, the payee can claim the payment in money if the payer does not fulfill his/her contractual obligations. In this sense, the central banks’ liability is fully money, whereas any other instrument is “quasi-money” (Hicks 1989: 51-2).<sup>23</sup>

If money in its function of standard of value were displaced by another new standard, it would cease to “rule the roost”. If this new instrument were not issued and administered by the central bank, the latter would lose its power and ability to affect the behavior of the economic agents through monetary policy. The so-called electronic money, brought about by the “ICT revolution”, has been regarded as the new instrument that could displace conventional money.<sup>24</sup> Assume, for example, that factors of production are directly remunerated in e-money issued by firms that do not belong to the banking system and that third parties are willing to accept balances on the non-bank firm’s books in payment for the firm that issues e-money. Therefore, there is no need for the issuing firm(s) to have bank balances to back up in full its (their) corresponding liability.<sup>25</sup> In this situation, conventional money could be completely displaced by e-money, which can also become the new standard of value.

However, such a process of displacement meets significant obstacles, which essentially derive from the existence of externalities and network effects that characterize money both as a medium of exchange and as unit of account. The displacement of conventional money faces, first of all, a certain degree of “inertia”, which is due to a possibly high ‘switching cost’ (the cost implied by moving from one instrument to another) and a problem of coordination. The new instrument can actually be more efficient than the old only if it is adopted by a large number of agents in the economy, but no single agent knows when and if the others are going to switch to the new medium, so that the probability that nobody will adopt the new instrument is high.<sup>26</sup> The presence of inertia in the system means that, in many cases, the degree of competition among different “moneys” is low.

The obstacles to displacement exist both for conventional money as a medium of exchange and as the economy’s standard of value. They, however, are more relevant and stronger in the case of the passage from a standard of value to a new one, because

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<sup>22</sup> Goodhart (1989: 25-9) distinguishes between the notion of medium of exchange and of means of payment. The medium of exchange is not necessarily used for final payments.

<sup>23</sup> Goodhart takes a partially different position: the economy’s unit of account is *not necessarily* the means of payment, but it is *efficient*, to treat the means of payment as the economy’s unit of account (Goodhart 1989: 26).

<sup>24</sup> However, not every type of electronic money can be considered a potential substitute for conventional money. For more on this topic, see (Sardoni 2004).

<sup>25</sup> Kaldor (1970) had contemplated the possibility of a world where a number of large firms issue “chits”, in which employees are remunerated, and set up their own clearing system.

<sup>26</sup> See Dowd and Greenaway (1993). Their analysis is mostly concerned with switching from one currency to another, but it can be easily extended to the choice of competing means of payment.

externalities and network effects are more significant when one considers this function of money (Krueger 1999).<sup>27</sup>

The considerations above can be expressed also in more general terms. If one rejects the traditional Mengerian theory of money (Menger 1892), which is regarded as the result of a spontaneous evolution from barter driven by individual optimizing behavior, and money is regarded instead as the outcome of a complex social and economic process,<sup>28</sup> it is problematic to hold that it can be displaced merely by technological innovations or by agents' "spontaneous" choices. Although it is conceivable that innovations produce new media of exchange (like e-money and the like), which markets spontaneously adopt, it is more difficult, if not impossible, to hold that the displacement of money as the standard of value and ultimate means of payment can take place in the same spontaneous way. Such displacement would require some form of "exogenous" intervention to overcome the obstacles associated with the existence of the strong network effects, which derive directly from the social nature of money.<sup>29</sup>

Similar considerations can apply to central banks. Their existence and importance cannot be explained as results of spontaneous market processes, but as the result of complex historical and social processes.<sup>30</sup> Therefore, in the same way, their demise cannot be seen as the outcome of technological changes. In this respect, Freedman (2000) offers an interesting contribution. He argues that, regardless of the interest rate on reserves, commercial banks want to hold reserves with the central bank, even though there is no institutional reserve requirement. In other words, banks consider the central bank as the privileged locus of their settlements. This is so because the central bank is risk-free and can be lender of last resort.<sup>31</sup>

From a technological point of view, banks might become able to make settlements among themselves without involving the central bank. A private bank, for example, could act as settlement agent for all the others, but there are drawbacks to this type of arrangement: a private bank is not risk-free; the other banks would be uncomfortable about its competitive advantages. Another possibility could be that banks settle payments by transferring risk-free instruments like treasury bills. In this case, however, there would be no lender of last resort in case of shortfalls, so that banks would be obliged to hold large amounts of bills to guarantee that they can meet their obligations. Moreover, keeping treasury bills would be costly and, finally, they could become excessively scarce if the government's debt shrinks (Freedman 2000).

On the other hand, central banks do not "sit back" and watch passively the spontaneous evolution of markets. Quite to the contrary, in order to reduce the risk that financial innovations might give rise to a system in which their power is reduced, central banks have been keeping financial markets under close scrutiny and have

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<sup>27</sup> Krueger also observes that different media of exchange can coexist if they are perfectly convertible into one another at a fixed exchange rate of 1:1, as is the case, for example, of currency and demand deposits.

<sup>28</sup> Recently, Ingham (1996; 2002; 2004) has developed the analysis of money as a social process. The chartalist approach is also based on the rejection of the traditional neoclassical notion of money. See, e.g., (Wray 1998).

<sup>29</sup> Goodhart (2000: 201) points out that the demise of conventional money could happen only if "an authoritarian government should decree that it must happen".

<sup>30</sup> Hicks (1989: 47-54) offers a succinct but insightful analysis of the origins and role of central banks.

<sup>31</sup> Moreover, from when there were reserve-requirements in all countries, banks have been used to having reserves with the central bank.

taken several measures to control their evolution. Central banks, with the help of governments, can try to introduce new regulations, or adjust those already existing, to face the new situation. Moreover, they can make the use of conventional money compulsory for certain classes of transactions (for example, the payment of taxes).

## **5. Conclusion**

Woodford finds in Wicksell's notion of a pure credit economy the theoretical inspiration for his own analysis of monetary policy in a "world without money" (Woodford 2003). In this paper, without entering into a doctrinal dispute on the interpretation of past authors and theories, it has been argued that an inspiration for the sort of policy advocated by Woodford can be also found in the Keynesian-Kaldorian tradition.

If central banks are able to implement the control of interest rates in a world in which money is no longer used to make transactions, this is ultimately contingent on the fact that the central banks' liability still is the economy's standard of value and, hence, its ultimate means of payment. Money is relevant to the economy for its function as unit of account rather than for its other traditional roles. As we saw, although at a more general abstract level than Woodford, Kaldor made a similar point.

To lay emphasis on money as the standard of value and that central banks can implement effective monetary policy in so far as their liability is the economy's standard puts the discussion of the possibility of the demise of money and central banks in a more general perspective. Money essentially is a social relation and, as such, is characterized by features that make its displacement at least unlikely. The existence of externalities and network effects implies that the displacement of money by new instruments, which might be even technically more efficient, cannot take place through spontaneous processes, like the emerging of electronic media of exchange or other financial innovations deriving from technological advances.

In other words, the demise of money and central banks requires more than technological change and agents' decisions based on individual criteria of convenience. To paraphrase Goodhart, money "as we know it" can be replaced by new instruments if a government decrees that this must happen. But why should governments and central banks promote or even accept passively processes that mean renouncing to an important element of their power?

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