Modern Money Theory: a Critical Assessment and a Proposal for the State as Innovator of First Resort

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Abstract

Modern Money Theory (MMT) describes the functioning of a pure credit economy, assuming that the state can finance public spending via monetization on the part of the central bank: in this light MMT proponents maintain that taxation and bond issues are irrelevant to public deficit financing. Another feature peculiar to MMT is the belief that expansionary fiscal policies can guarantee full employment in a condition where the state acts as an employer of last resort (ELR). This paper (Sects. 1-2) aims at proposing a critical assessment of MMT, through a formal description of the logical model underlying these beliefs. In particular we will argue that, contrary to MMT'S claim, both taxation and bond issues may prove necessary for the correct implementation of economic policy. In addition, in Sect. 4 we discuss the view that the ELR programme can be used for the application of innovations by the state.

Keywords: endogenous money, fiscal policy, innovations, modern money theory, monetary policy, neokeynesian dynamic porfolio models

JEL classification:C62, C63, E32, E62

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1   Introduction

Modern money theory (MMT) describes the functioning of a pure credit economy, assuming that the state can finance public spending via monetization on the part of the central bank and that taxation is not needed in order to finance it (cf. Wray, 1998). It is stressed that expansionary fiscal policies can guarantee full employment in a situation where the state acts as an employer of last resort (ELR). Proponents of MMT also maintain that this intervention does not generate inflationary pressures. The aim of this paper is twofold:

  (i) to provide a formal model aimed at rationalising MMT's "logical framework";

 (ii) to address some controversial issues of this approach, providing an analytical description of its main policy prescriptions, i.e. a programme of the state as employer of last resort which can be expanded taking the dynamics of labour productivity into consideration. In so doing, we will modify the standard (though implicit) assumption of MMT that the private sector hires more productive workers. The rationale for this lies in the fact that in most European countries (particularly in the peripherical areas) the "buffer stock" is mainly populated by young high-skilled individuals. Public spending designed to increase the level of employment in the public sector and for R&D activities not only produces an increase in employment but also an increase in labour productivity and the growth rate.

Two aspects will not be tackled here: a) the analysis of the cost of the ELR programme and b) its political feasibility (cf. Kriesler and Halevi, 2001). Moreover, we maintain that MMT deserves credit for introducing the endogenous money view and the positive effects of expansionary fiscal policy in a cultural and political climate dominated by the conviction that fiscal consolidation and "structural reforms" are the most effective strategies to produce growth. One can also point out that the endogenous money view incapsulated in MMT is not radically new. Starting from the 1970s, many Italian and French scholars elaborated a macroeconomic scheme based on the assumption that money is endogenous and demand-driven: the so-called monetary theory of production or monetary circuit. In the current macroeconomic debate, the monetary theory of production and the modern money theory are the two main heterodox approaches to the endogenous money view. Both theories emphasise that the banking sector can create money ex-nihilo, i.e., without a previous collection of savings. In both cases, money is not conceived as neutral and, contrary to the mainstream view, inflation does not arise from excess money supply. The basic difference between these two approaches lies in the treatment of the central bank and the role of the government. While in the first case, money creation can be generated via transactions inside the banking sector (which implies that money supply on the part of the central bank and public spending are not necessary

to produce credit money), in the second case, credit money is generated by public spending on the condition that the central bank and the government act as a consolidated sector[1]. The exposition is organized as follows. Section 2 proposes an extended version of MMT, where the dynamics of private investment, labour productivity and private consumption are explicitly considered. We point out to the reader that we are mainly interested to describe the "logical framework", in a dynamic specification, of the MMT model: the authors are currently working on on the analysis of a complete dynamic model consistent with MMT's theoretical position. Section 3 discusses the proposal of the state as employer of last resort, while section 4 expands this proposal considering the possibility that the state can (also) act as an innovator of first resort. Section 4 concludes.

2 Modern money theory

2.1 The basic model

The basic model of MMT, as elaborated in particular by Wray (1998), is based on a chartalist approach to money and can be regarded as a variant of the so-called monetary circuit approach (Graziani, 2003). It describes the functioning of a pure credit economy which starts with an increase in public spending entirely financed via monetization on the part of the central bank. The central bank and the government are assumed to be a consolidated sector. Public spending aims at increasing the level of employment, in a context where the state acts as employer of last resort (ELR).

Proponents of MMT stress that the implementation of the ELR programme produces full employment and price stability. Unemployment is primarily seen as a social cost, involving self-destructive behaviours, lack of self-esteem and so on.
To the best of our knowledge, with the exception of Aspromourgos (2000) and partly Palley (2013), MMT has never been fully formalized in a mathematical model: Palley (2013) criticized the approach on these grounds, and proposed his own formalization. Palley mainly focuses on the existence of a Phillips curve, so that the ELR programme cannot guarantee, at the same time, full employment and price stability. He stresses that MMT proposed an "oversimplification" of the functioning of contemporary macroeconomic dynamics. He also observes that much of the debate takes place in the blogosphere, impeding the standard way economists communicate among them-

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[1]A further difference pertains to the effects of expansionary fiscal policies. As will be shown, MMTers support the view that the state should act as an employer of last resort, so expansionary fiscal policies are considered effective for the sake of increasing employment. By contrast, circuitist scholars maintain that expansionary fiscal policies generate inflationary pressures (cf. Graziani, 2003, p.108; for a critical discussion of this point, see, among others, Forges Davanzati, 2015).

selves. In this section we will investigate the problematic points stressed by Palley.

To begin with, in what follows – in line with Palley(2013b) – we will maintain that, in its essence, the MMT approach is based on a (neo)keynesian logical framework. It suffices to consider the dispute between Palley (2013) and Tymoigne & Wray (2015) to realize that the main discussion points are all related to a view of the economic system (and of the related economic policies) which may be traced back to standard (neo)keynesian models very popular in the 1970s[2]. In this light, we suggest that the main theoretical propositions of MMT (and some of its peculiarities) may be analyzed through a (neo)keynesian dynamic portfolio model like the one proposed (and fully investigated) by Turnovsky in various seminal contributions (see for instance Turnovsky (1977), Nguyen and Turnovsky (1979)).

Let us consider a closed economic system which contains only two economic assets: Treasury bonds and fiat money. For the sake of simplicity, at the moment, the banking sector – and therefore the role played by potential imbalances that may affect the private sector – is not taken explicitly into account, that is, for the moment we do not consider firms and workers' potential (positive or negative) indebtedness with the banking sector[3].

Let us define[4]:

Y= real output; Y^d =real disposable income;C=real private demand for consumption; I= real private demand for investments; G = real government expenditure;B_G = nominal value of government bonds ("Treasury Bonds") stock; $b_G = B_G/p$ =real value of government bonds; i = nominal interest rate[5]; M = nominal stock of money supply; $m = M/p$ = real stock of money supply; $L(\bullet)$=real demand for money; p = unit price; D=C+I+G=real aggregate demand; Y_{FE}=full employment real income; $\pi = \dot{p}/p$ = inflation rate; π^e = expected inflation rate; TX= real value of tax receipts; W=$(m+b)/p$= real value of wealth stock.

---

[2]Palley(2013b, p.12) even states that MMT would represent "a primitive version of neo-Keynesian stock-flow consistent IS-LM analysis".

[3]However, at the end of this section we will touch upon these matters.

[4]In what follows, the time argument is suppressed whenever this does not cause any confusion. All variables are specified at time t . As to the time unit, since we are dealing her with a short-run model, it may be set arbitrarily. As usual, a dot over a variable indicates differentiation with respect to time t. Sometimes, for the sake of readability, we will use the operator $g(\bullet)$ as the growth rate of a variable, i.e., $g(x) = \dot{x}/x$. Furthermore, when it does not cause confusion, we will denote the first total derivative with a prime mark, and the first partial derivative with a subscript, that is if y=$f(x)$ and $z = g(x_1, x_2, .., x_i, .. x_n)$ are two functions of respectively one and n variables, we put: $\frac{dy}{dx} = f'$ and $\frac{\partial z}{\partial x_i} = g_i$.

[5]In the light of what we have just said about the banking sector, i is the sole interest rate of the economy.

As to the components of aggregate demand, we make the usual assumptions[6]:

$$
\begin{aligned}
C &= C(Y^d, W), \quad 0 < C_{Y^d} < 1, \; C_W > 0 \\
I &= I(i - \pi, Y), \quad I_{i-\pi} < 0, \; I_y > 0
\end{aligned}
\tag{1}
$$

while for π and π^e we assume respectively a simple backward looking adjustment mechanism and a standard "augmented" Phillips curve, that is:

$$
\begin{aligned}
\dot{\pi}^e &= \theta(\pi - \pi^e) \\
\pi &= \gamma(Y - Y_{FE}) + \pi^e
\end{aligned}
\tag{2}
$$

Coming up to the financial sector, its equilibrium may be described by a standard LM curve:

$$
\frac{M}{p} = L(Y, i, W), \; L_y > 0, \; L_i < 0, \; L_W > 0
\tag{3}
$$

Lastly, and consistently with the presence of a "consolidated sector", we assume that the public deficit may be financed throughout the issue of new bonds and/or by issuing additional money[7], which implies in nominal terms that:

$$
\dot{M} + \dot{B}_G = p(G - T) + iB_G
\tag{4}
$$

From the definition of m and b_G given above, we have that: $\dot{M}/p = \dot{m} + \pi m$ and: $\dot{B}_G/p = \dot{b}_G + \pi b_g$. Hence, Eq(4) may be conveniently expressed in real terms as:

$$
\dot{m} + \dot{b}_g = G - TX + ib_G - \pi(m + b_G)
\tag{5}
$$

At this point the economy may be described by the following simple "semi-dynamic" system:

$$
\begin{cases}
Y = C(Y^d, W) + I(i - \pi, Y) + G \\
m = L(Y, i, W) \\
\pi = \gamma(Y - Y_{FE}) + \pi^e \\
\dot{\pi}^e = \theta(\pi - \pi^e) \\
\dot{m} + \dot{b}_g = G - TX + ib_G - \pi(m + b_G)
\end{cases}
\tag{6}
$$

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[6]For the sake of simplicity we ignore the relationship between consumption demand and the interest rate.
[7]For the moment we do not distinguish between monetary base and money supply.

where[8]: $W = m + b$; $Y^d = Y - TX + ib_G - \pi W$.

Given the values of TX, Y_{FE}, which are assumed as exogenous, and for a given value of G – that, as we will see, may be also considered a "control parameter" – the first three equations of system (6) determine instantaneously the equilibrium values of Y, π, i in terms of π^e and W. We have defined the system reported above "semi-dynamic" because, as is evident, its only dynamic part is represented by the last couple of equations that describe, respectively, the dynamics of π^e and that of stocks accumulation.

As we have already said, a system like the one reported above may be considered a "prototype" of a large class of models that were fully investigated during the 1970s. In particular, scholars focused their attention on the effects – on the equilibrium – and on the effectiveness of monetary policy in different public deficit financing scenarios. Following Turnovsky's classification, we may distinguish between: *a)* a passive monetary policy which keeps a fixed real stock of money; *b)* a passive monetary policy which keeps a fixed growth rate of nominal money supply; *c)* a passive monetary policy which keeps a fixed real stock of government bonds. It goes without saying that choice *c)* is the one we are particularly interested in, since it involves a pure money financing of the public deficit and is therefore consistent with MMT prescriptions.

Let us consider a perturbation of the equilibrium caused by an increase in public expenditure, which is what we really want to focus. The well-known conclusion of Turnovsky's analysis was that the third policy would be more stable than the other two, because "it tends to be the most inflationary policy, generating the greatest inflation tax revenues and thereby providing the strongest stabilizing influence" (Turnovsky, 1977, p. 53). As to the other two policies, the main sort of instability is represented by the fact that both of them require an increase in bond issues and then an increase in interest payments that need to be further financed. This fact plus the inflation dynamics implied by the Phillips curve stand as a key destabilizing effect.

Having said that, we can now come back to MMT. As we have pointed out, the model described by system (6) may be of help in understanding the main theoretical implications of MMT, even if we are well aware that it differs from MMT in some crucial aspects. In particular, MMT rejects the traditional trade-off between inflation and unemployment described by the Phillips curve (see Tymoigne-Wray, 2013, p. 3) and in the absence of this curve, we are left without a clear rigorous theoretical explanation of the inflation rate[9]. Furthermore, from a dynamic point of view, without such a curve it is not clear how one can define an equilibrium (un)employment rate and the re-

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[8]The last term in the definition of disposable income, πW, stands for expected capital losses on wealth.

[9]This particular feature of MMT brings us back to Friedman's statement that Keynes's system is characterized by a "missing equation", that is, the equation that relates the real with the monetary part of the economic system. See Fiedman (1975).

lated non-inflationary full employment equilibrium income. Even if we think that the presence of a Phillips curve may be consistent with the MMT theoretical framework – actually, we maintain that it may strengthen the MMT theoretical framework – for the moment one can merely refer to the "on-off" interpretation suggested by Palley, according to which the MMT explanation of the inflation rate can be described by the simple rule:

$$\pi = \begin{cases} 0 & \text{if} \quad Y < Y_{FE} \\ \gamma(Y - Y_{FE}) + \pi^e & \text{if} \quad Y \geq Y_{FE} \end{cases} \tag{7}$$

As is evident[10], if one replaces Eq(7) into system (6) and if one assumes – consistently with the MMT view – that $\dot{b_G} = 0$, we are left with a "pure" short-run keynesian model characterized by fixed prices and infinite underemployment equilibria Y^* (for $Y^* < Y_{FE}$), where Y^* depends on the implementation of economic policy, while the rate of change of real money equals the real public deficit, since now: $\dot{m} = G - TX + i\overline{b}_G$, where $\overline{b}_G$ is the fixed real bond stock. In our opinion, this "pure" keynesian model represents a good "rational reconstruction" of MMT. Evidently, even in the presence of the on-off assumption, Turnovsky's conclusions are still valid, that is, this kind of fiscal policy – also thanks to the presence of real balance effects – may succeed in pushing the economy to full employment income[11].

Having said that, we can now draw up a more in-depth analysis of some particular features of MMT.

2.2 The ELR programme

According to the ELR programme, public spending should aim at increasing the level of employment, in a context where the state acts as employer of last resort (ELR). All workers who cannot find a job in the private sector are hired in the public sector with a wage that is decent, but lower than that of the private sector.

To address the ELR matter we need to introduce some more variables and definitions. Let us define: Y=real output; w=money wage of workers employed in the "private sector" of the economy; $w_G = \eta w$, $0 < \eta < 1$, = money wage of workers employed in the ELR programme; $N = \overline{N}$=labor supply, assumed as given in the short run; L_P=private sector employment; L_G= employment in the

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[10]We point out that there may be alternative formulations of the "on-off" rule. For instance, the following one: $\dot{p} = 0$ if $Y < Y_{FE}$; $\dot{p} = \gamma(Y - Y_{FE}) + p^e$, if $Y > Y_{FE}$, is still consistent with Palley's suggestion. However we will follow formulation (7), since it allows us to easily compare the MMT model with the one described by system (6).

[11]However, what happens when – in the presence of a money financed public deficit – the economy *is* on the steady state path, is a point of special relevance. We will touch upon this matter in the next section.

ELR programme[12]; $v_p = L_p/\overline{N}$ = private sector employment rate; $v_G = L_G/\overline{N}$ = "ELR employment rate"; $v^* = L^*/\overline{N}$ = equilibrium employment rate; $v^d = L^d/\overline{N}$ = desired employment rate[13]. As to the real public expenditure G, it may be useful to split it in two parts, that is: $G = G_1 + G_{elr}$, where G_1 is the minimum level of public expenditure necessary for optimal operation of the economic system and G_{elr} is the government spending for the ELR programme. As far as the labor productivity of workers employed in the private sector is concerned, we make the customary short-run assumption that: $Y/L_p = \alpha$ = constant. With regard to workers employed in the ELR programme, we assume instead, for the sake of simplicity and following Aspromourgos (2000, p.145), that they produce a sort of "free output" "which is allocated to consumers in some non-price manners" (think for instance of a sort of "free services" for the private sector)[14]. As a result of these assumptions, income Y coincides with the output produced by L_p, that is: $Y = L_p\alpha$.

To begin with, let us assume that $v^d = v^*$. The rationale at the basis of the ELR proposal is to choose the amount of G_{elr} in order to get: $v_p + v_G = v^*$. Let us first consider an *extreme* case of the ELR programme, according to which *all the unemployed* are involved in the ELR programme. From the definition of v_p and v_G given above, and since L_G cannot be negative, the fiscal policy related to this extreme case may be simply summarized in the following way:

$$\Delta G = G_{elr} = \begin{cases} \eta w \left(1 - \dfrac{v_p}{v^*}\right) L^*, & \text{if} \quad v_p < v^* \\ 0, & \text{if} \quad v_p \geq v^* \end{cases} \tag{8}$$

which means that:

$$L_G = \begin{cases} \left(1 - \dfrac{v_p}{v^*}\right) L^*, & \text{if} \quad v_p < v^* \\ 0, & \text{if} \quad v_p \geq v^* \end{cases} \tag{9}$$

As is evident, the economic policy rule described by Eq(8) or Eq(9) is nothing but a pure Keynesian fiscal policy (however it may be financed, as we will see below), and it is consistent with the general model we have presented in the previous section (that is, one has to simply replace, in system (6), G with $G_1 + G_{elr}$). However this policy has a serious implication: since, by assumption, Y_p is given, Eq(8) and/or Eq(9) involve a redistribution of (private sector) output between private sector

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[12]The measurement unit of employment, of course, may be expressed in hours or equally in number of workers.

[13]As we will see in what follows, v^d may differ from v^*; in any case, v^* must be considered the "natural employment rate", that is, $\overline{N} - L^*$ stands as the "natural unemployment" level.

[14]With regard to workers employed in the ELR programme, at least two alternative assumptions could be made, both consistent with a single-commodity economy and with the MMT logical framework: *a)* their productivity is positive but lower than that of workers employed in the private sector, i.e., $Y/L_G = \alpha' = \text{constant}, \alpha' < \alpha$; *b)* they produce services that support the private sector of the economy. We point out that assumption b) may also imply the possibility that L_G output may affect, e.g., increase, α. However, as will be clear in the following, we can safely avoid these complications with no major consequence for the rest of our investigation.

agents and workers employed in the ELR programme. It is easy to realize that this redistribution may take place only in the following ways: *a)* Through inflation tax: this adjustment mechanism is, as we have already said, strongly consistent with a money-financed deficit (that is, financing G_{elr} by issuing additional money); *b)* Financing the ELR through an increase in taxation (of course the increase in tax rates may differ with relation to workers and firms); *c)* a mixture of *a)* and *b)*.

However, there may be an alternative way of implementing the ELR programme that, *if feasible*, would lead to a Pareto-superior resource allocation with respect to the one associated to Eq(8). The government, instead of involving all the unemployed in the ELR programme, can simply choose that value of $\Delta G = G'_{elr}$ which, thanks to the income multiplier effect, leads to full employment. As is evident, in general this kind of policy requires a smaller ΔG, that is, in general $G'_{elr} = \tau G_{elr}, \tau < 1$, leading at the same time to a higher equilibrium income.

If we define m = income multiplier, $m>1$, and as usual α = private sector labor productivity, this kind of ELR programme can be described by the following rule:

$$\Delta G = G'_{elr} = \begin{cases} \tau \eta w \left(1 - \frac{v_p}{v^*}\right) L^*, & \text{if} \quad v_p < v^* \\ 0, & \text{if} \quad v_p \geq v^* \end{cases} \tag{10}$$

which means that:

$$L'_G = \begin{cases} \tau \left(1 - \frac{v_p}{v^*}\right) L^*, & \text{if} \quad v_p < v^* \\ 0, & \text{if} \quad v_p \geq v^* \end{cases} \tag{11}$$

$$\text{where} \quad \tau = \frac{\alpha}{m\eta w + \alpha}$$

As is evident, this kind of fiscal policy leads to an increase in both Y and L_p values, since now: $L'_p = L_p + (1 - \tau)(L^* - L_p)$ and, therefore, $Y' = \alpha L'_p = Y + \alpha(1 - \tau)(L^* - L_p)$. Furthermore, as one would expect, τ has the expected partial derivative signs[15] with respect to labour productivity and income multiplier, that is: $\partial \tau / \partial \alpha > 0$ and $\partial \tau / \partial m < 0$.

At this point the reader may wonder why the government should follow one of the rules described by Eq(8) and/or Eq(10), instead of simply increasing public expenditure, that is, instead of simply choosing the appropriate $\Delta G_1 > 0$ which leads to full employment L^* with the related full employment income $Y^* = \alpha L^*$. It is indisputable that this kind of fiscal policy would with no doubt

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[15]The first inequality is obvious, implying that the greater the income multiplier, the smaller G'_{elr} must be in order to guarantee full employment $L^* = L_p + L_G$. The second inequality may be less intuitive. Its explanation lies in the fact that the greater the labor productivity α, the smaller will be the increase in private employment ΔL_p in response to the increase in public expenditure G'_{elr}: as a result, as α increases, G'_{elr} must increase too – that is, the proportion of L_G with respect to L_p must increase – in order to guarantee full employment.

represent the Pareto-optimal resource allocation. However, in favour of MMT one can argue that there is no guarantee that this "pure" keynesian fiscal policy would always be feasible: if so, the fiscal policy required by the ELR programme may be, in some cases – at least in the short run – the right choice.

By way of example, in what follows we consider two cases for which the ELR programme could be a good choice:

a) Let us rewrite the first equation of system (6) in a truly dynamic specification:

$$\dot{Y} = \frac{1}{\xi}[C(Y^d, W) + I(i - \pi, Y) + G - Y], \qquad \xi > 0 \tag{12}$$

where $\xi > 0$ is a speed of adjustment parameter. If in the presence of a high unemployment rate – which is therefore considered unacceptable by government authorities – the value of ξ associated to the ELR programme is smaller than that associated to the simpler policy $\Delta G_1 > 0$, in the very short run the fiscal policies described by Eq(8) and/or Eq(10) may represent the right choice.

b) More interestingly, let us remove the assumption that the labor supply is homogeneous. For the sake of simplicity let us assume that workers can be divided into two groups: a first one that has the right skills and matches labor demand, and a second one, numerous one, that does not have these right skills – think for instance of very low skilled workers – and consequently does not match the labor demand, and so is unemployed[16]. This is a typical case for which ELR may do the trick. By adopting the economic policy described by Eq (8), in the very short-run the ELR programme may lead to an income redistribution that alleviates the social conditions of the unemployed. In the medium-run, if workers employed in the ELR programme are involved in vocational and training programmes which increase their human capital, the ELR programme may lead to an increase in the natural rate of employment. We point out that this mixture of redistributive plus active labour market policies are on the agenda of various policy-makers of industrialized countries[17] (see below, Sect.4).

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[16]This kind of mismatches are well-known and are at the center of economic investigation by policy-makers, see for instance Nikolov et al. (2018).

[17]Clearly, in the implementation of the ELR programme the institutional and social context must be taken into due account. See for instance Sovilla's proposal for Mexico (Sovilla, 2018).

2.3   Taxation, bonds and deficit financing

A distinctive well-known hallmark of MMT is its claim that taxation and public bonds are irrelevant to public deficit financing, in other words, that public expenditure "comes first" before taxation and/or public bonds issue. At first sight this statement appears obvious, since it is logically implied by the operating mode of the "consolidated sector": taxes and public bonds are evidently unnecessary, or if you like redundant, if public expenditure can be financed by issuing additional money. The point, however, is not if taxes and new bonds are the source of public expenditure financing: we can agree with MMT that they are not. The crucial question is if they are necessary for the correct implementation of economic policy, and the answer is: *yes, they are*.

Apart from the fact that taxation is an important automatic stabilizer, one has to recognise that it plays a crucial role in the redistribution of income between social classes: for that very reason it may prove necessary for the efficient implementation of economic policy. The reader only has to think of the financing of social and sanitary services or of the allocation of public funds for education, etc.. In all these cases the modulation of tax rates allows the desired contribution levied on the various social classes to be established. This redistributive aspect is of special relevance also to the implementation of the ELR that we have discussed in the previous section. As we have seen – with particular reference to what we have previously called the "extreme case" – ELR may be financed through new money or through (new) tax receipts (we can ignore here the combination of the two measures). If one follows the first option, the effect will be inflationary and, in principle, it is not known exactly how the increase in price level will affect the income of the various social classes. If the second option is chosen, instead, there will be a direct redistributive effect which may be well-modulated through the choice of the appropriate tax rates. In this light, if one takes the latter option, it is evident that the question whether or not taxes are financing public expenditure becomes redundant. All we see is an inflow (*TX*) and an outflow (*G*): to state that one dollar that we find in *TX* inflow is not *the same* dollar that we find in *G* outflow becomes nonsensical. After all, all that matters may be summarized by a simple question: if there are two instruments of fiscal policy available, e.g., *TX* and *G*, why give one of them (*TX*) up?

As to public bonds, the situation is similar to that of taxation. Here too, the point is not whether public expenditure is actually financed by government borrowing, but whether Treasury bond issues may be necessary for the implementation of economic policy – with particular regard to monetary policy – and once again the answer is: *yes, they are*.

To begin with, it should be evident that the presence of an adequate stock of public bonds can make the process of wealth reallocation easier after some kind of "perturbation", think for instance – consistently with MMT – of a money-financed expansionary fiscal policy. Let us come back to the

second equation – which describes the equilibrium on the money market – of the model we have presented in Sect. 4.1. Even if it is generally assumed that financial market adjustment is very fast, which allows one to take for granted market clearing at any instant, in a truly dynamic specification the LM equation should be replaced by the following specification[18]:

$$\dot{M} = \dot{p}L(Y,i) + p\left(\frac{\partial L}{\partial y}\dot{y} + \frac{\partial L}{\partial i}\dot{i}\right)$$

which may be conveniently rewritten as:

$$\frac{\dot{M}}{p} = L(Y,i)\left(\pi + \varepsilon_{LY}g(Y) + \varepsilon_{Li}g(i)\right) \tag{13}$$

where $\varepsilon_{LY} = \dfrac{\partial L}{\partial Y}\dfrac{Y}{L}$ and $\varepsilon_{Li} = \dfrac{\partial L}{\partial i}\dfrac{i}{L}$ are respectively the income and the interest elasticities of money demand.

Recalling that $m = M/p$, Eq(13) may be specified in real terms as:

$$\dot{m} = L(Y,i)\left(\varepsilon_{LY}g(Y) + \varepsilon_{Li}g(i)\right) \tag{13'}$$

where we have used the fact that before the "perturbation": *M/p=L(Y,i)*.

>From Eq(13), or Eq(13'), we realize that in response to an expansionary fiscal policy – financed by issuing additional money – the effects on *Y,i* and *p* (and π if the economic system is characterized by a non zero inflation rate) crucially depend on the value of elasticities of money demand. Now let us make the obvious assumption that the "consolidated sector" has a target specified in terms of real income level *and* of *i* and *p* (or π) values: it is evident that it is much simpler, in order to achieve all these objectives at the same time, to combine the monetary expansion with the right *T*-bond variations, rather than to hope that the financial markets will do the job for us[19]. Furthermore, from Eq(13) or Eq(13') one immediately gets the well-known results related to the steady state. For a stationary economy (i.e., $g(Y) = 0$) the existence of a public deficit financed by issuing additional money is purely inflationary, unless the deficit is reduced through bond issues and/or tax increases. For an economy characterized by non zero steady state growth rate, instead, the effect on the inflation rate will depend – elasticities of money demand a part – on the values of *m* and *Y*

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[18]For the sake of simplicity in what follows we ignore the relationship between money demand and the wealth stock: we point out that this omission is of no consequence in our discussion, since we are mainly interested to the "impact effect" of the perturbation.

[19]For a similar position, see Aspromourgos (2000). The belief that the task may be accomplished by taxes, as Tymoigne and Wray (2015) seem to suggest, is very hard to conceive, since it would imply that tax rates should *continuously* vary in order to promote price stability and a given targeted equilibrium on the financial market.

growth rates.

We are aware that MMTers recognizes that both taxes and bond issues may in some cases be useful for removing purchasing power from the private sector (see Tymoigne and Wray, 2014, pp. 27-28 and p. 37 and Wray (1998, pp. 85-86)): we simply maintain that this acknowledgement is merely the proof that, as we have already said, both taxes and bonds are necessary to the effective conduct of economic policy.

Besides these specific considerations, there is a more general argument in favor of Treasury bonds. It is well known that, as a result of the innovations in the financial markets and of the competition inside the banking sector, the elasticities of money demand have became more and more unstable. Of course, this instability is further increased by sudden variations in interest rate expectations. In addition, on the supply side, the money stock growth rate is not always in line with that of the base money. It has has been recognized that this is particularly evident during economic crises and stagnation phases, when the sensitiveness of money stock to monetary base variations becomes weaker (see, for instance, De Grauwe (2018)). As a result of all these facts, the effects of monetary policies engendered by variations of the monetary base have became more and more uncertain. It is notorious that, in order to get around this problem, most central banks have progressively abandoned monetary policies based on monetary targeting in favour of some kind of "interest rule" (think for instance of the Taylor rule). Central Bank fixes the T-bond interest rate, so determining the overnight interest rate that should trigger a cascade effect on the other interest rates, with particular regard to short term bonds and bank loan interest rates.

The well-known most important consequence of this way of implementing monetary policy, is that the stock (and the variation) of monetary base and of money supply become endogenously determined. There is no need to deal here with matters that have become an integral part of the most common macroeconomic textbooks: we only just recall that the implementation of this kind of monetary policy is simpler and more efficient than alternative operational procedures based on some kind of money targeting. What really matters here is that this kind of monetary policy may be consistent with the operational procedures of the "consolidated sector" as described by MMT[20]. Actually, in order to keep the interest rate fixed at the targeted value, all it needs is that the consolidated sector combines variations of the monetary base– think for instance of an expansionary fiscal policy financed through additional money – with the due variations of bond stocks (through open market operations). In this light one can realize, once again, that public bonds issue may be useful to the effective implementation of monetary policy, since the ability to fix interest rates at the

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[20]Asada and Ouchi(2013), for instance, have investigated the long run dynamics of a model characterized by the presence of a "consolidated sector" that follows a monetary policy based on the Taylor rule.

desired values may prove crucial for the monetary policy transmission mechanism[21]. Furthermore, it should be pointed out that, given the presence of the consolidated sector, the flux of interest payments on public bonds presents *in principle* no problem at all, since it can be paid by simply issuing new base money: it could be shown that in a situation like this, if the dynamics of the economic system and that of *primary* public deficit are bounded, the public debt – and therefore the public debt to output ratio – may also explode with no effect on the long run dynamics of the system[22]. Notice that we are well aware that things change dramatically if there is no consolidated sector and the Central Bank may refuse to buy Treasury Bonds on the primary market. In other words, the situation is quite different if one assumes that the Central Bank cannot in any case– for instance because it is expressly forbidden by its statute – monetize (part of) new bond issues. This is for instance the situation in the Eurozone, where countries issue bonds denominated in a currency on which they have no control, a situation that may lead to undesirable effects, as shown by the sovereign debt crisis that hit some "peripheral" countries between 2011-2014[23]. We can conclude this section with a question similar to the one we posed above with regard to taxation: if, in the implementation of monetary policy, the consolidated sector has two instruments, bonds and money supply, why should it get rid of one (B_G) of them?

3 The State as innovator of first resort: the case of Italy

As shown above, the fundamental economic policy proposal of the MMTers focuses on a full employment programme driven by the expansion of public spending. Proponents of MMT argue that a state of unemployment is associated with lack of self-esteem and self-destructive behaviour. Thus,

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[21]One only has to think of the determination of loan interest rates. It is usually assumed that, following the seminal contributions of Monti (1971) and Klein (1971), the interest rate on loans is determined by adding a mark-up – related to the monopolistic degree of the banking sector – upon the overnight interest rate. Furthermore – in line with the so-called "Credit view" (see Bernanke-Blinder(1988)) –this mark up should also reflect the riskiness of the loan, as expressed for instance by firms debt to capital ratio. As is evident, the right choice of a given targeted interest rate by the Central Banks may determine – via loan interest rates – the stock of firms indebtedness, thus preventing, for instance, potential speculative bubbles. See Colacchio (2014) for a long-run dynamic model where all these interrelations are taken into account in the long-run

[22]As has been shown, this proposition holds even if we assume that public bonds are entirely and passively bought by the private (and/or the banking) sector: all it needs, once again, is that the dynamics of the primary public deficit is bounded. For this *curiosum* see Colacchio(2014).

[23]However this is a well-known bone of contention, see for instance De Grauwe (2011; 2018). It goes without saying that these issues are a dramatic example of economic policy trade-off. In order to avoid the temptation for governments to use, and increase, the inflation tax in an opportunistic manner, there has been a progressive shift toward a greater central banks independence. The other side of the coin is that this increased independence has exacerbated the fragility of governments, with particular regard to economies characterized by high public debt-to-output ratios. A classical example of this trade-off is the Eurozone. For an authentic "interpretation" of ECB independence, see for instance Bini Smaghi (2007).

expansionary fiscal policies are designed to reduce unemployment, but no link is established between increasing employment in the public sector and economic growth. There are a number of channels which link the increase in the size of the public sector and the path of labour productivity: for instance, infrastrucures and welfare services. Post Keynesian scholars paid attention to these issues, working within a theoretical framework where increasing public spending has positive effects on the path of labour productivity. An extension of this view has been proposed based on the operation of the so-called Kaldor-Verdoorn Law (cf. Colacchio and Forges Davanzati, 2017, Forges Davanzati, Patalano and Traficante, 2017; Perri and Lampa, 2014). Less attention has been devoted to the possibility that expansionary fiscal policies are used to generate innovations by means of increasing gross domestic expenditure on R&D. This would lead to the idea that the role of the state is not only that of employer of last resort, but also that of innovator of first resort. This could particularly apply in economies where the private sector is incapable of spontaneously generating innovations. The idea that the state can produce innovations is not new and it has been proposed in three ways. First, as emphasised by Mazzucato (2013), the State provides a stock of fundamental knowledge which is at the basis of innovations in the private sector. Second, it has been argued that the state can directly produce innovations – the so-called social-driven innovation – with the aim of satisfying social needs which the private sector does not find it convenient to do (see Vertova, 2014). This latter view can be expanded based on the MMT proposal, and considering that expansionary fiscal policies also impact on the supply side of the economy, via their effect on productivity growth. This argument rests on a modification of one of the basic MMT assumptions, namely that the private sector hires the more productive workers while the State hires the less productive workers.

Arguably, this assumption cannot be considered generally applicable. In some countries, private firms mainly demand low-skilled workers, which may be due to their small sizes and low propensity to innovate. Therefore, high-skilled workers are an important proportion ofthe unemployed. In this respect, Italy is a significant case-study[24], on two grounds. First, the size of the Italian public sector has fallen dramatically in the last few decades, combined with a massive reduction of gross domestic expenditure on R&D. Second, the unemployment rate of young high-skilled workers has massively increased.

The key figures of the Italian public sector and its contribution to innovations are the following. OECD 2019[25] (Research and development (R&D) - Gross domestic spending on R&D) reports that in 2017 gross domestic spending on R&D was 1.354% on GDP while the average OECD spending

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[24]The book recently edited by Foggi (2019) collects a number of contributions also on the implementation of an ELR programme in the Italian economy.

[25]See: OECD 2019

was 2.368%. The Italian economy employed 5427 researchers per 1000 employees, while the average OECD reserachers was 8287 per 1000 employees[26]. Employment by education level in Italy[27] is lower than the OECD average[28]. The percentage of unemployed graduates in Italy is approximately double the Eurozone average, and the percentage of graduates is lower than the average of OECD countries. OECD (2017) reports that workers employed in the Italian public sector are, on average, over 55 years of age, while in OECD countries the average age is 34. The workers employed in the Italian public sector are 13% of the total labour force, while on average OECD countries employ 18%. The average salary is lower than in other OECD countries.

The size of the public sector affects the performance of the private sector and, in particular, the path of labour productivity. It is well known that labour productivity in Italy is lower than most OECD and European countries and that it has been constantly declining since the early 1990s (see Fig.1). Post Keynesian scholars support the view that the so-called Italian economic decline is to be imputed to the effects of the continuous decline of net public spending on productivity growth, according to the Kaldor-Verdoorn effect (cf. Perri and Lampa, 2014). Importantly, the continuous decline of productivity growth – starting from the beginnining of 1990s – can be largely explained by the continuous reduction of both private and public investment, particularly in R&D (cf., among others, Bugamelli et al. 2012).

The dominant view, in Italian academic and political circles, is based on the convinction that the Italian public sector is inefficient. As a result, there is the demand for a policy designed to incentivize a managerial approach. Greater public sector-efficiency is seen as a necessary condition for private firms to invest (cf. Paolazzi, 2014). A similar argument is applied to universities: it is argued that they are unable to provide students with the competences required by the private sector. Accordingly, Italian unemployment is assumed to depend on the mismatch between labour supply and labour demand.

The argument proposed here is radically different. First, unemployment depends on lack of aggregate demand, which, in the theoretical context of MMT, is generated by policies of fiscal consolidation. Second, unemployment (particularly, unemployment of young high-skilled individuals) also

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[26] The so-called Manuale Frascati states that "Researchers are professionals engaged in the conception or creation of new knowledge, products, processes, methods and systems, as well as in the management of the projects concerned". See: https://data.oecd.org/rd/researchers.htm#indicator-chart.

[27] This indicator shows the employment rates of people according to their education levels: below upper secondary, upper secondary non-tertiary, or tertiary. The employment rate refers to the number of persons in employment as a percentage of the population of working age. The employed are defined as those who work for pay or profit for at least one hour a week, or who have a job but are temporarily not at work due to illness, leave or industrial action. This indicator measures the percentage of employed 25-64 year-olds among all 25-64 year-olds.

[28] See: https://data.oecd.org/emp/employment-by-education-level.htm#indicator-chart.
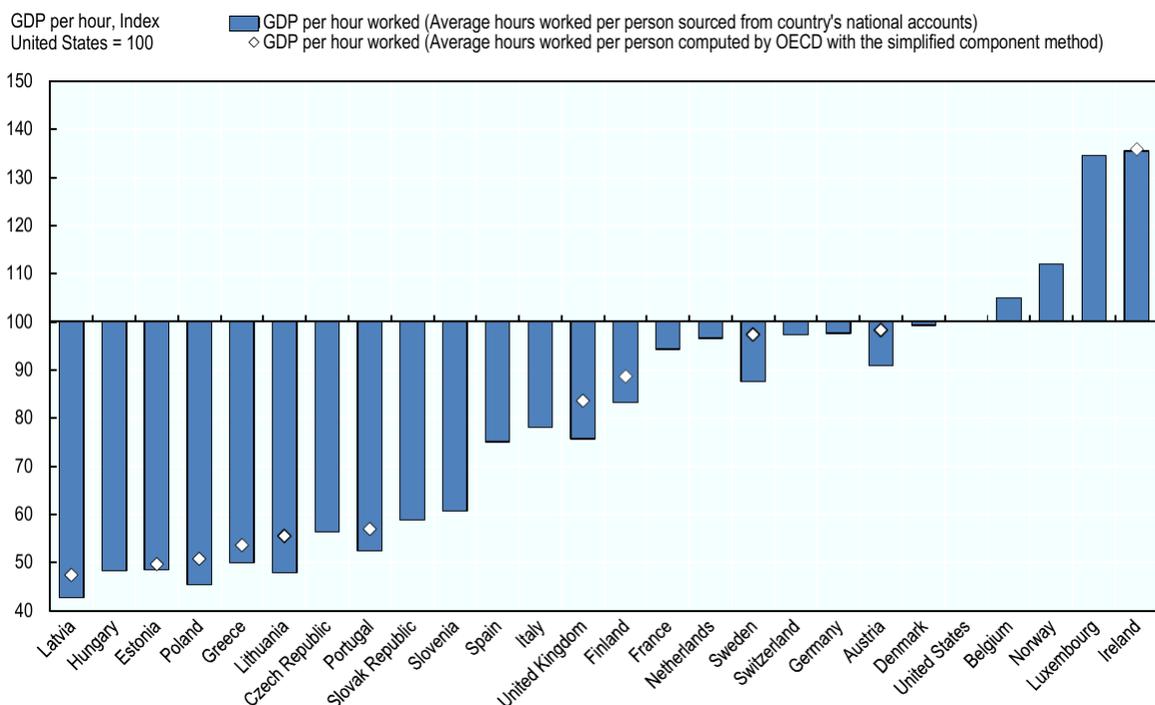
Figure 1: International productivity gaps (Source: Ward et al.(2018)).

depends on the *mismatch in the public sector*: the low demand for high-skilled workers depends on political decisionž namely the decision to reducing the size of the Italian public sector, via the reduction of funding and the imposition of fixed term employment[29].

MMT suggests that no contraints on the expansion of public spending exist and that all constraints are endogously generated by political decisions (cf. Parguez, 2008). Moreover, in the case under consideration, there is a country-specific constraint which pertains to the public funding of the public sector.

Notwistanding, a policy of expansion of the public sector, particularly for R&D activities, would produce significant macroeconomic outcomes.

   i It would involve directly more *high-skilled* workers hired by the state in order to direcly produce innovations. This would lead to an increase in the rate of growth of labour productivity, giving rise to a potential virtuous circle between increasing aggregate demand and increasing

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[29] SVIMEZ shows that the Fondo di Finanziamento Ordinario (FFO) for state universities fell from 7 billion 250 million euros in 2008 to around 6 billion 500 million in 2014, with a reduction of 14%. This measure appears designed to reduce the quality of the workforce, since Italian firms do not express a great demand for high-skilled workers. The outcomes are intellectual unemployment, intellectual underemployment and, above all, migration of high-skilled workers from Italy to other countries (in the absence of high-skilled workers attracted from abroad to Italy), with the consequent loss of labour productivity in Italy.

productivity.

ii It would directly involve mainly young workers, which, as a norm, are more productive than older workers. This effect would (at least partially) compensate for the high average wage of workers employed in the Italian public sector. Arguably, its inefficiency depends more on this than on the lack of managerial attitudes.

iii It would have a positive impact on domestic aggregate demand, not only because of the increase in the money wage bill, but also because of the higher propensity to consume on the part of young individuals.

iv This policy prescription also aimed at creating more good jobs, counteracting the growing tendency among private firms to use underpaid workers (often in a condition of intellectual underemployment).

v Above all, it could eliminate a paradox: a "buffer stock" of young high-skilled workers, unemployed or underemployed, ready to emigrate and prepared to work in R&D activities, cannot be hired in the public sector because the Italian public sector hires few workers of a relatively advanced age.

Consider also that the programme of the state as innovator of last resort should not provoke a strong reaction from the capitalist class, insofar as higher productivity can also benefit the private sector, via the availability of a stock of inventions which it can use. In this respect, one could consider that most Italian firms import high value added capital goods (cf. Palma, 2016). Accordingly, at least in the Italian case, this programme would not necessarily compromise private firms' competitiveness and could reduce the dependence of the Italian economy on innovation produced abroad.

Proponents of MMT emphasise that an increase in employment in the public sector, insofar as it increases aggregate demand, also stimulates an increase in employment in the private sector (cf. Wray, 2019). A similar mechanism can be in operation as regards the channel of transmission of innovations from the public to the private sector. Higher aggregate demand deriving from the increase in public sector employment stimulates innovations in the private sector, not only because of the operation of the Kaldor-Verdoorn Law, but also because as the employment rate increases it becomes more difficult for private firms to gain competitiveness via wage moderation (Dutt, 2012)[30]

This argument leads to conclude that:

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[30]The state cannot only finance R&D but also directly produce innovations, via public firms. As stressed by Proponents of the so-called National system of innovations, this could be a case where innovations spread via imitation.

a) MMT policy prescriptions should take the institutional context into account, with particular reference to the configuration of the labour market. In particular, the fact that, in some periods and/or in some countries, the "buffer stock" does not necessarily include only poor-quality low-skilled individuals should be considered in implementing an ELR policy.

b) Most MMT proponents stress that fiscal policy is countercyclical and this view is (implicitly) based on the view that the business cycle is exogenous. In recessions, the buffer stock increases and so does public spending, while in expansionary phases the opposite outcome occurs. By contrast, if the dynamics of labour productivity is taken into consideration and linked to the direction of economic policy, the result is that the performance of the economy is endogenously generated by a dynamic interation between increasing aggregate demand and increasing labour productivity (cf. Bellofiore, 2019): recessions result from restrctive fiscal policies, which, in turn, depend on political constraints on the expansion of the public deficit.

4   Conclusions

This paper dealt with modern money theory and the proposal of the state as employer of last resort. As we have already said, modern money theory describes the functioning of a pure credit economy, assuming that the state can finance public spending via monetization on the part of the central bank and that taxation and/or bond issues are not needed in order to finance it. Furthermore, according to MMT, expansionary fiscal policies can guarantee full employment in a condition where the State acts as an employer of last resort (ELR). In this paper we have shown that the *core* of the MMT approach can be traced back to simple (neo)Keynesian models, like the ones very popular in the1970s. Furthermore, we have argued that – contrary to MMT claims – both taxation and bond issues may prove necessary for the effective conduct of economic policy. More in general, one gets the impression that the emphasis placed on the state as *prime mover* (and therefore the emphasis placed on fiscal policy) leads MMT proponents to underrate the role played by monetary policy. However, in the last section of this paper we have shown how the main MMT policy prescription – i.e. a program of the state as employer of last resort – can be expanded by taking the dynamics of labour productivity into consideration.

References

Asada, T., Ouchi, M., 2013. *Fiscal and Monetary Policies in a Keynesian Model of Endogenous Growth Cycle with Public Debt Accumulation*, mimeo.

Aspromourgos, T., 2000. *Is an Employer-of-Last-Resort Policy sustainable? A review article*, Review of Political Economy, Vol. 12, No. 2, pp. 141-155

Atkinson, B., (1992). *Institutional features of unemployment insurance and the working of the labour market*, in P. Dasgupta, D. Gale, O. Hart and E. Maskin, Editors, Economic analysis of markets and games, Cambridge, MIT Press.

Bellofiore, R., 2019. *Le contraddizioni delle soluzioni "keynesiane" al problema della disoccupazione e la sfida del 'piano del lavoro'*, in J. Foggi (ed.), *Tornare al lavoro. Lavoro di cittadinanza e piena occupazione*. Castelvecchi: Roma, pp.?.

Bernanke, B., S., Blinder, A., S., 1988. *Credit, Money, and Aggregate Demand*, The American Economic Review, Vol. 78, No. 2, pp. 435-439.

Bini Smaghi, L., 2007. *Central bank independence: from theory to practice*, Speech by Lorenzo Bini Smaghi, Member of the Executive Board of the ECB at the conference Good Governance and Effective Partnership Budapest, Hungarian National Assembly.

Bliek, J.G. and Parguez, A., 2006. *Le Plein emploi ou le chaos*, Paris, Economica.

Bliek, J.G. and Parguez, A., 2007. *Full employment: can it be a key policy objective for Europe?*, International Journal of Political Economy, vol. 36, n. 3, pp. 24-46

Bougrine, H., 1999. *Unemployment benefits and unemployment : an analysis of the aggregate demand- side effect for postwar Canada*, International Review of Applied Economics, vol. 13, n. 5, pp. 5-21.

Bugamelli, M. Cannari, L., Lotti, F. and Magri, S., 2012. *Il gap innovativo del sistema produttivo italiano: radici a possibili rimedi (The innovation gap of Italy's productive system:Roots and possible solutions)*, Bank of Italy – Occasional Paper (Questioni di Economia e Finanza), n.21.

Bussetti, F., Giordano, C. and Zevi, G., 2016. *The drivers of Italy's slump during the double recession*, Italian Economic Journal, vol.2, n.2, pp.143-166.

Caliendo, M., Tatsiramos, K. and Uhlendorff, A., 2009. *Benefit duration, unemployment duration and job search quality: A regression-discontinuity approach*, working paper IZA, December.

Colacchio, G., 2014. *Taxation, income redistribution and debt dynamics in a seven-equation model of the business cycle*, Journal of Economic Behavior & Organization, Vol. 106, pp. 140-165.

Colacchio, G. and Forges Davanzati, G, 2017. *Endogenous money, increasing returns and economic growth: Nicholas Kaldor's contribution*, Structural Change and Economic Dynamics, vol.41, June, pp.79-85

Courvisanon, J., Laramie, A.J. and Mair D., 2009. *Tax policy and innovation. A search for common ground*, Intervention. European Journal of Economics and Economic Policies, vol. 6, n. 2, pp.271-287.

De Grauwe, P., 2011. *The Governance of a Fragile Eurozone*, Centre for European Policy Studies, Brussels.

De Grauwe, P., 2018. *Economics of Monetary Union*, Oxford University Press, Oxford.

Dutt, A. K., 2012. *Distributional dynamics in Post Keynesian growth models*, Journal of Post Keynesian Economics, vol. 34, 3, pp.431-452.

Foggi, J. (ed.) (2019). *Tornare al lavoro. Lavoro di cittadinanza e piena occupazione*. Castelvecchi: Roma.

Forges Davanzati, G., Patalano, R. and Traficante, G., 2017. *The Italian economic stagnation in a Kaldorian theoretical Perspective*, Economia Politica – Journal of Analytical and Institutional Economics, November, pp.1-21.

Friedman, M., 1975. *Unemployment versus Inflation? An Evaluation of the Phillips Curve*, Institute of Economic Affairs, London.

Gnesutta, C., 2018. *L'employers of last resort come politica per il lavoro*, "Economia e Lavoro", LII, pp.89-112

Graziani, A., 2003. *The monetary theory of production*, Cambridge, Cambridge University Press.

Kalecki, M., 1971. *Selected essays on the dynamics of the capitalist system*, Cambridge, Cambridge University Press.

Klein, M., A., 1971. *A theory of the banking firm*, Journal of Money, Credit, and Banking 3 (3), pp. 205-218.

Kriesler, P. and Halevi, J., 2001. *Political aspects of buffer stock employment*, Centre for applied economic research, University of New South Wales, working paper.

Lampa, R., Perri, S., 2014. *Il declino e la crisi dell'economia italiana: dalla teoria ai fatti stilizzati*, in R. Cerqueti (ed.) Polimorphic crisis. Macerata: Edizioni Università di Macerata.

Layard, R., Nickell, S. and Jackman, R., 1991. *Unemployment. Macroeconomic performance and the labour market*, Oxford, Oxford University Press.

Levrero, E. S., 2018. *Sulla proposta di Minsky dello Stato come "occupatore di ultima istanza"*, Economia e Lavoro, LII, pp.113-129.

Lundberg, G., 1985. *The added worker effect*, Journal of Labor Economics, vol.3, n.1, pp.11-37.

Mazzucato, M., 2013. *The entreprenerial State*. London UK: Anthem Press.

Monti, M., 1971. *A Theoretical Model of Bank Behavior and Its Implications for Monetary Policy*. L'Industria 2, 165-191.

Nguyen, D., Turnovsky, S. J., 1979. *Monetary and Fiscal Policy in an Inflationary Economy: A simulation Approach*, "Journal of Money, Credit, and Banking, Vol. 11, No. 3, pp. 259-283

Nikolov, A., Nikolova, D., Ganev, P., Aleksiev, Y, 2018. *Skills Mismatches. An Impediment to the Competitiveness of EU Businesses*, The European Economic and Social Committee (EESC), Sofia: Bulgaria.

OECD, 2017. *Government at a glance*: Paris.

OECD, 2019. *Gross domestic spending on R&D (indicator)*. doi: 10.1787/d8b068b4-en (Accessed on 26 March 2019)

Palley, T.I., 2013. *The critics of Modern Money Theory (MMT) are Right*, Review of Political Economy, Vol. 27, No. 1, pp. 45-61.

Palley, T.I., 2013b. *Money, fiscal policy, and interest rates: A critique of Modern Monetary Theory*. Mimeo.

Palma, D., 2016. *Industria. Il tarlo delle innovazioni*, Sbilanciamoci, 16 febbraio.

Paolazzi, L., 2014. *Italy hobbled by an inefficient public sector*, Review of Economic Conditions of Italy, special issue on Italy and the Eurozone on a knife-edge, pp.45-60

Parguez, A., 2008. *Money creation, employment and economic stability: The monetary theory of unemployment and inflation*, Panoemicus, pp.39-67.

Sovilla, B., 2018. *Increasing the Minimum Wage with the State as Employer of Last Resort: A "Predistribution" Proposal for Mexico*, International Journal of Political Economy, 0: pp. 1-22.

Turnovsky, S. J., 1977. *Methods of Macroeconomic Dynamics*. The MIT Press, Cambridge MA.

Tymoigne, E., & Wray, R., 2013. *Modern Money Theory: A reply to Palley*, Review of Political Economy, Vol. 27, No. 1, pp. 24-44.

Vertova, G., 2014. *The State and national systems of innovation: a sympathetica critique*, Levy Economics Institute, working paper n.823, December.

Ward, A.,Zinni,M.,B.,Pascal, M., 2018. *International productivity gaps: Are labour input measures comparable?*, OECD SDD WORKING PAPER No. 99.

Wray, R., L., 1998. *Zero unemployment and stable prices*, Journal of Economic Issues, Vol. 32 pp. 539-46.

Wray, R., L., 1998. *Understanding Modern Money: the key to full employment and price stability*, Elgar, UK.

Wray, R., L., 2019. *L'importanza economica e sociale della piena occupazione*, in J.Foggi (ed.), Tornare al lavoro. Lavoro di cittadinanza e piena occupazione. Castelvecchi: Roma, pp.32-42.