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Why MMT can't work: A Keynesian Perspective

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WHY MMT CAN'T WORK: A KEYNESIAN PERSPECTIVE

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ABSTRACT

Using an ISLM open-economy model based on Keynes' liquidity preference theory, this article shows that, unless very specific country circumstances hold, Modern Money Theory (MMT) cannot work as an effective and sustainable macroeconomic policy program aimed to achieve and maintain full-employment output through persistent money-financed fiscal deficits in economies suffering from Keynesian unemployment or underemployment. Specific country circumstances include cases where the economy enjoys very high policy credibility in the eyes of the international financial markets or issues an international reserve currency; under such circumstances, the adverse outcomes of MMT policy can be prevented and expansionary demand shocks can be effective. Short of such features, an open and internationally highly financially integrated economy that implements MMT policy persistently would either see its money stock grow unsustainably large or would have to set domestic interest rates to levels that would be inconsistent with the policy objective of resource full employment and that would cause instead economic and financial instability.

Key words: Aggregate demand and output; Equilibrium prices; Fiscal deficits; Interest rate; Liquidity Preference Theory, Money; Policy credibility; Stocks and flows.

JEL Code: E12, E20, E40, E52, E62.

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WHY MMT CAN'T WORK: A KEYNESIAN PERSPECTIVE[1]

1. INTRODUCTION

1.1 A Preamble

In contemporary highly financialized and internationally integrated economies, the stocks of public sector liabilities issued by governments, and the prices at which they trade in global markets, play a crucial role in determining key domestic macroeconomic variables such as aggregate output, resource employment, price inflation, and interest and exchange rates. Whether these liabilities consist of "promises to pay" at some future dates (such as debt securities) or irredeemable representations of value used to settle transactions (such as fiat money), they all essentially embody claims on real resources. Therefore, their value reflects the credibility of their issuers, as perceived by the markets where they are traded; that is, their issuers' (proven or presumed) capacity to preserve their value over time. In today's globalized economies, not even full monetary sovereignty shields governments from the constraints that the market valuation of their liabilities poses on their monetary and fiscal policies, and no sound macroeconomic theory can ignore the effects of these constraints.[2]

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[1] I wish to thank Massimo Costa and Simon Wren-Lewis for their feedback, and Thomas Palley for his encouragement. I also wish to thank Keith Kuester and David VanHoose for their critical and very constructive remarks. Obviously, I am the only responsible for the views and opinions expressed in the article and for any remaining errors. I am immensely grateful to my wife Ornella for her unremitting support.

[2] Credibility lies at the core of the Portfolio Theory of Inflation, which shows it to be a critical determinant of the (in)effectiveness of monetary and fiscal policies (Bossone 2019, 2020a, 2020b). In a nutshell, according to the PTI (whose results inspire this article), international financial markets determine the value of all public sector liabilities of open and internationally highly financially integrated economies, including domestically denominated debts and currency. While anti-recessionary policies undertaken by credible governments are effective, those implemented by poorly credible governments cause markets to short their bonds and currencies, thus causing their value to fall. In response, policy makers may either correct nominal interest rates, though at the cost of dampening the expansion, or push still on the money lever in an attempt to support bond

This article is about how far Modern Money Theory (MMT) and its policy prescriptions account for this realization and the implications of neglecting it.[3] The article evaluates MMT's basic tenets – grounded on Abba Lerner's "functional finance"[4] – against the stock-flow consistency condition required under Keynes' liquidity preference theory (LPT) and the attentiveness to the psychology of the debt market (which derives from LPT) as a key determinant of policy effectiveness. The core message of this article is that, the persistent implementation of MMT policy by an open and financially integrated economy runs right against market psychology and proves unsustainable as a consequence, unless the economy is highly credible or issues an international reserve currency.[5]

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prices and sustain demand, yet only fueling capital outflows and depressing the (external and internal) value of the currency.

[3] Notice the distinction between the terminology "Modern Money Theory," which will be used here throughout, and "Modern Monetary Theory," often referred to in the literature and in commentaries on the subject. In the words of one of the leading MMT theorists and proponents, L. Randall Wray, «I will note here that I use the terminology Modern Money Theory —and have seen that usage as following on from the title of my 1998 book (*Understanding Modern Money*). We also used this terminology in our textbook. However, many of my colleagues had used the other terminology Modern Monetary Theory. I object to that as it draws attention to the word "monetary" and leads many to believe it is all about monetary policy—while in reality much of the focus is on fiscal policy (and we argue that the traditional division between the two is highly misleading in any case). Further, it seems to conjure in some minds a similarity to Monetarism.» (Wray, 2019).

[4] See Mitchell (2009). Wray (2018), too, as a leading proponent of MMT, agrees on the foundational role of "functional finance" for MMT, although he argues that it is the work Hyman Minsky (not Lerner) that remains essential for the further development of MMT.

[5] If anything, the arguments developed in this article suggest that, given his attentiveness to market psychology, Keynes should have been radically critical of functional finance, rather than supporting it with a *qualified endorsement* (Aspromourgos, 2018), had he considered that not all economies share the same policy credibility of the UK at the time and the country's global role as issuer of an international reserve currency. This conclusion will become clearer later on.

1.2 Purpose and scope of this article

MMT argues that in any country where the public sector combines the central bank and the Treasury into one (consolidated) entity that issues the national currency, the government is financially unconstrained: it can always finance spending to ensure resource full employment by printing the money needed, and it can never default on its obligations. Also, according to MMT, taxes and bond offerings are not needed to fund the budget but can be used to withdraw money from the economy in order to avoid that aggregate demand exceeds output and breeds inflation (Wray, 1998). As a corollary proposition, the interest rate is discarded as a tool of stabilization policy and the government should use bond offerings to set the overnight rate at (what MMT theorists regard as) its natural or normal rate of zero, allowing markets to factor in risk to determine credit spreads (Forstater and Mosler, 2005). As a further corollary, MMT considers floating exchange rates necessary to remove constraints on policy that compromise the government's capacity to maintain full employment (Mitchell, 2018a).

This article shows that, unless very specific country circumstances hold, *MMT cannot work as an effective and sustainable macroeconomic policy program aimed to achieve and maintain full-employment output through persistent money-financed fiscal deficits in economies suffering from Keynesian unemployment or underemployment*. Specific country circumstances include cases where the economy enjoys very high market credibility or issues an international reserve currency; here, the adverse outcomes of MMT policy can be prevented and expansionary demand shocks can be effective.

While MMT has been subject to various criticisms (see Section 2), this article aims at one specific (and yet very consequential) weakness of MMT: if MMT policy is applied systematically in economies other than those that are characterized by very high policy credibility or issue international reserve currencies, a twofold risk arises whereby i) either not all the (growing) money supply issued by the government is absorbed by the economy at an unchanged zero interest rate, thus failing to

achieve the MMT priority objective of full-employment output, or ii) the absorption of the growing money requires such a high interest rate to be paid on money balances, which would eventually also defy the achievement of full employment.

This twofold risk points to a fundamental question that often goes unaddressed when evaluating MMT: the theory holds that, in order to ensure full-employment output in an economy with structural private sector net (desired) saving surpluses, a future stream of fiscal deficits would have to be permanently financed through state issuances of an irredeemable (non-defaultable) zero-interest bearing instrument – i.e., money – instead of placing in the market redeemable (defaultable) positive interesting-bearing instruments – i.e., debt. Yet, the theory does not explain why, especially in the context of open and internationally highly financially integrated economies, wealth holders should prefer to hold money rather than debt, and what would happen to output and resource employment if wealth holders were in fact to prefer debt to money.

This point is well made by Aspromourgos (2018):

> «…in a world of inconvertible fiat currencies, public investment as a driver of aggregate demand faces little financial constraint. In the first instance, such a constraint would exist only to the extent that the suppliers of goods and services that government wishes to purchase are resistant to accepting payment in outside money or "cash" (including electronic or "book entry" outside money). But the willingness of private sector agents to accept payment in cash is one thing; their willingness to then *hold* money, as a desired asset, is another. If there results excess money balances for the private sector as a whole, then it is possible that the excess can be drained from the private sector via its purchasing government securities of various maturities…[I]f, at prevailing yields on government securities, the private sector as a whole is unwilling to substitute government securities for the entirety of any such excess money balances (net of taxation), then that money will find its way into other channels (expenditure on other assets or on goods and services) until it ceases to be an excess—unless government yields become more attractive.» (p. 510).

Mosler (2018) argues that the government spends money and then borrows what it does not tax, because deficit spending that were not offset by borrowing would cause the money market interest rate to fall. In this case, in fact, public debt would have to grow indefinitely as new debt is issued to absorb new injections of money and all the existing debt must be perpetually renewed (otherwise, the stock of money would start growing again). Each subsequent issuance of debt would add to the stock of debt outstanding and inevitably depress its price, all else equal. As a result, the interest rate required

by the market to absorb the increasing stock of debt would have to rise indefinitely, too, with obvious implications for the real economy In other words, if money-financed fiscal deficits are permanent, either the money stock grows indefinitely or the stock of debt must grow unboundedly in its place. In either case, and all else being equal, the price of the increasing stock would decline (its rate of return would rise).

A related way to consider the same issue is that a theory that, like MMT, builds on the unconstrained power of the state to issue money must assume that the state is capable to preserve the internal and external value of the money it issues. This calls into question the credibility of the money issuing state: the lower such credibility, the lesser the willingness of wealth holders to absorb the increasing stock of money supplied at zero interest rate (due to the risk of money losing value in future). This issue is especially relevant, and bears critical economic policy implications, where the economy is open and internationally highly financially integrated and where wealth is largely concentrated and managed by investors who can conveniently transfer funds across alternative assets through efficient financial markets.

This article addresses the MMT's inconsistencies just noted. The article is organized as follows: Section 2 makes reference to the relevant literature; Section 3 explains the reasons for using ISLM analysis to evaluate the MMT's main inconsistencies; Section 4 describes the economy's model used for the analysis; Section 5 applies the model to two hypothetical, identical economies that differ only for the degree of policy credibility that the markets attribute to them; Section 6 draws on the model's results to make a quick comment on LPT, functional finance and MMT. Section 7 close the article with policy considerations.

2. RELEVANT LITERATURE

Noting that the most recent and complete illustrations of MMT are reported in Wray (2015), Mosler (2018) and Mitchell (2019), strong criticisms have been raised at the theory by several mainstream economists (notably among them, Krugman (2019) and Summers (2019) as well as by economists

from the same Post Keynesian background as MMT theorists (notably among them Davidson (2019) and Sawyer (2019)). In a series of contributions by Palley (2013), recently subsumed in Palley (2020), these various critical arguments are discussed analytically, covering, inter alia, the macroeconomics of money financed budgets, the selection of optimal targets and instruments,[6] existing macroeconomic constraints on MMT policy and adverse policy feedbacks, the disingenuity about the role and necessity of taxes, the US centric thinking behind MMT, its unjustified dismissal of high inflation and default, and the downsides of its proposed Employer of Last Resort or Job Guarantee Program. The conclusion is that MMT underestimates the economic costs and exaggerates the capabilities of money-financed fiscal policy. Such criticisms were largely shared by a panel of distinguished economists whose opinions on MMT were recently surveyed (IGM Forum, 2019).

Criticisms to MMT have been addressed by Tymoigne and Wray (2013), while PERI (2012) reports contributions from MMT proponents and opponents and similarly RWER (2019) collects a series of works from both camps.

The discussions contained in the above references consider all major aspects of MMT. They are too many to be summarized here and summarizing them would transcend the scope of this article, which focuses instead on the one specific – yet foundational – aspect of MMT that was introduced in Section 1: the effectiveness and feasibility of MMT policies in achieving and sustaining full employment in the context of asset market (dis)equilibria, conditional upon the credibility of the governments issuing money. While important elements concerning this aspect have been raised by Palley (2020) and Sawyer (2019), they have not been analytically addressed as this article purports to do.

[6] This issued has been recently discussed by Jayadev and Mason (2018), which holds that MMT and orthodox macroeconomics rely on many of the same theoretical foundations, with the only difference that mainstream economists think that monetary policy should be privileged to look after full employment and price stability while MMT economists think fiscal policy should have that role. This conclusion (and the methodological approach applied to arrive at it) has been strongly opposed by Mitchell (2018b).

3. IS ISLM FIT FOR MMT?

Since the objective of this study is to show that MMT's inconsistencies emerge from the way macro policy shocks interact with the basic structural economic relations assumed by the theory, the analytical model necessary to test it should represent those relations as closely as possible, without forcing into them elements that do not belong to the theory, and yet possessing enough structure to evaluate the theory's consistency against stock-flow and price equilibrium conditions.

MMT draws on the Post Keynesian tradition where there is no general tendency for the economy to move toward full employment, even in the absence of market imperfections and rigidities. Also, in contrast to mainstream (New Keynesian) macroeconomics, the notion of a natural interest rate is meaningless in MMT, and the theory does not accept that policy administered interest-rate adjustments can be relied upon to generate full employment, including when the economy is not at its effective lower bound. MMT rejects the loanable funds theory that underpins mainstream macroeconomics (Kelton, 2020), it does not consider optimal intertemporal allocation choices from households and firms, and does not recognize any role for (rational) expectations in such decisions; it also discards the concept of government budget constraint as untrue, since governments (with monetary sovereignty) can always issue the money they need. The theory predicts mechanistically that changes in money-financed fiscal deficits raise aggregate output at no inflation cost, when output is below full employment. Finally, while MMT theorists have never subjected their theory to formal treatment by mathematical modeling, MMT is based on resource flow identities that give no consideration to the prices at which (financial and nonfinancial) assets must trade for their respective demand and supply to balance, or to the impact that equilibrium prices exert on the real economy.

The fact that the aggregate expenses of one sector of the economy is the income of other sectors, and aggregate saving is always a residual of aggregate investment, does not necessarily imply that savers are always willing to hold any asset stocks that are supplied to the economy, unless the prices of these asset stocks adjust adequately (and are expected to be sustainable). Failure of equilibrium prices to

attain, at which asset stocks are fully demanded, leads savers not to absorb any addition to those stocks in their portfolio and possibly even to reallocate their portfolios away from those stocks, causing their value to decline. On the other hand, equilibrium asset prices, even if achieved, might not be consistent with full employment and, with imperfect markets, there might not be mechanisms to ensure such consistency. Consistent with Keynes' LPT, this is not an issue of aggregate saving's adequacy, but one of optimal portfolio composition vis-à-vis wealth-holder preferences, with equilibrium prices being those that equate the supply of and demand for money vis-à-vis other assets into which wealth holdings can be placed, based on wealth-holders' preferences to hold them in liquid and/or less liquid forms (Tily, 2012).

With the theory showing such features, the use of dynamic stochastic general equilibrium (DSGE) models (even of New Keynesian extraction) is unnecessary – if not methodologically incorrect – to represent MMT's basic economic relations: revealing the MMT's inconsistencies noted in Section 1 does not require involving optimizing rules for agents' intertemporal resource allocation decisions, and should not involve the use of frameworks that (like those based on DSGE analysis) take aggregate saving to be independent of investment. However, given the centrality of money for MMT, it requires that the theory's basic economic relations are represented in a way that allows for evaluating analytically their consistency with the following three critical restrictions on money: i) money has a positive price, ii) the price of money (like any financial liability) reflects essentially the credibility of its issuer, and iii) there is always an optimal demand for money in the economy, based on money's stream of pecuniary and non-pecuniary returns and its associated opportunity cost; optimality implies the possibility that money supply exceeds its optimal demand.[7]

For all these reasons, an ISLM model can be proven to be sufficient to capture the basic MMT's economic relations, without imposing on them MMT-unfitting optimal rules (such as those of DSGE analysis), and yet framing them against the stock-flow consistency and price equilibrium conditions

[7] Mitchell (2018b) rejects DSGE modeling as irreconcilable with MMT.

that weigh on all open and internationally highly financially integrated economies. The strong criticism levelled at the ISLM approach by MMT theorists, discussed in Mitchell (2013), does not diminish its formal adaptability to the basic economic relations underpinning MMT, for the ISLM structure can be modeled to closely reflect the (not micro-founded) identities and the economic relations that underpin the MMT's view of the economic process, as Section 4 will show.

The use of ISLM analysis permits to make a direct comparison between the effects of MMT policy as anticipated by the theory and those that obtain once stock and price dynamics are duly accounted for (see Section 5).

A recent Congressional Research Service (2019) report noted that ISLM model can be used to provide a foundation for interpreting MMT and is useful for illustrating the differences between MMT and mainstream models. Also, while MMT theorists (as extreme Post Keynesians) generally reject ISLM analysis, one of MMT's leading proponents – Warren Mosler – is open to it (see Rowe (2011) and the comments therein reported) and even forcefully supports the sensitivity of aggregate demand to interest rates both through the consumption channel (to the extent that propensities to consume differ between debtors and savers) and, even more significantly, through investment (with its effect on the marginal efficiency of capital). More generally, the ISLM framework is flexible enough to accommodate for MMT's rejection of loanable fund theory (by assuming, as is done in Section 4, that aggregate saving is a complete residual of autonomous expenses) and general enough to consider money demand as a function of its services as a means of transaction and its opportunity cost as an asset).

To conclude, the choice of using ISLM analysis for the purpose of this article is not driven by which model should best describe the economy in general, but rather by which model can best mirror the economic relations underpinning MMT, in the absence of a formal representation by its proponents, while subjecting them to consistency checks. The framework developed in this article can then be

used by MMT theorists to identify the assumptions that are here relied upon to evaluate their theory, and hence to pin down on that basis their eventual points of disagreement.

4. THE MODEL

The model represents an open and internationally highly financially integrated economy (in a sense to be defined below). The economy has three markets: the market for real domestic output, *Y*, which can be used for consumption *C* and investment *I*; the market for money *M*, which supports domestic transactions; and the forex market where net export, $NX = X - IM$, is the difference between export and import. In a less than full employment economy, without public debt and taxation as noted above, money *M* is supplied through the fiscal expenses of a consolidated public sector, $\frac{\Delta M}{P} \equiv m = G$, where *P* is the general price level and G is government spending. Note that any taxes and public debt issuances would detract from the stock of money in circulation, while public debt repayments and interest payments would add to it.[8] *M* is injected in the economy to offset private sector net (desired) saving surpluses, *S – I,* causing actual output to be below the level of output, Y_f, corresponding to the full employment of the economy's resources. With inflation "off," both taxes and public debt in the model are set to zero and the government can determine monetary policy so that $G = \frac{\Delta M}{P} = g(Y_f - Y)$, where feedback response $g' > 0$ leads the government to issue and spend additional money to eliminate the output gap.

To simplify the analysis in a way that is consistent with MMT, price inflation below full-employment output is expected to be zero and expansionary policies do not affect inflation until full employment is reached. In other words, the an "on-off" model of inflation is adopted whereby the economy is initially below full employment and output responds fully and seamlessly to demand. Below full

[8] Thus, with non-zero tax and public debt, the complete expression for the money supply would be $\frac{\Delta M}{P} = G + B_{-1} i_{B_{-1}} - T - \frac{\Delta B}{P}$.

employment, the inflation switch is "off" and expansions of aggregate demand generate pure output gains and no inflation; at full employment, the inflation switch is "on" and expansions of aggregate demand generate only price rises with no real output effects (Palley, 2013). As the model's results show below, however, this inflation model proves invalid, as inflation may actually occur in response to expansionary policy shocks even when the economy operates at less than full employment.

Under high international financial integration, the economy's public liabilities (money and, when issued, debt) are traded in the international financial markets at prices that are determined by the allocation choices of "marginal investors" who, acting as wealth holders or on behalf of wealth holders, can shift capital in and out of countries in real time and at negligible transaction costs, do not suffer from "home bias," and manage investments taking on global perspectives.[9] Wealth holders (including a broad range of domestic and foreign agents, from households and firms accumulating savings and profits, respectively, financial intermediaries managing wealth on behalf of their clients on their own behalf) bear the primary interest to preserve and possibly increase the real value of the wealth holdings in their possession or custody. They ultimately determine the allocation of money to the economy and internationally: the easier their capacity to access (directly or indirectly) the markets and to mobilize funds through them, and the higher the concentration of wealth holdings, the larger and faster the diversion of excess money balances (to be defined below) into foreign asset positions, with consequent depreciation of the domestic currency.

The model (as specified below) is applied to two hypothetically identical economies that differ only for the level of policy credibility attributed to them by the markets: a highly credible (HC) economy

[9] See my works on the Portfolio Theory of Inflation, cited earlier. While even in closed and financially unintegrated economies, large wealth holders always find ways to move money abroad (not infrequently illegally), governments can rely on captive (if not repressed) markets to place their liabilities at subsidized conditions, without having to confront the judgment of the markets and the constraints imposed by them, though at the cost of significant economic distortions and limited or no access to valuable investment resources from abroad.

and a low credible (LC) economy. The expression "policy credibility," as here referred to country governments, indicates the extent to which economic agents believe the government will carry out the macroeconomic policies it has promised to pursue (Backus and Driffil, 1985a, b; Kreps and Wilson, 1982). This notion relates to both the will and ability of the government to deliver on its policy commitments. Market judgments on policy credibility, thus, draw on a country's past policy track record, its resolve to pursue pre-announced policy commitments and targets, and the adherence of its policy framework to what markets consider to be sound economic management and financial stability criteria. In the specific context of the model here used, the policy credibility factor is captured by the parameter $\beta_j \in (0,1), j = LC, HC$, which reflects the credibility that markets attribute to a country *j*'s policy regime, institutions and conduct, and ranges from extremely poor ($\beta \cong 0$) to very high ($\beta \cong 1$) (see Bossone, 2019). Section 4.2 will show this factor to play a key role in determining the demand for money.

4.1 Model specifications

The composition of aggregate output and the functional structure of its component variables are given by the following standard relations, all expressed in real terms and showing conventional derivatives:

(1) $$Y = C\left(Y, \frac{W}{P}\right) + I(\mu, i_M + s) + G - T + NX(Y^{RW}, Y, \varepsilon)$$

$$\text{with } 1 < c'_Y, c'_w > 0; I'_\mu > 0, I'_{i_M} < 0; NX'_{Y^{RW}} > 0, NX'_Y < 0, NX'_\varepsilon > 0,$$

where:

- In line with MMT, aggregate output adjusts fully and seamlessly to demand, until it reaches its resource full employment level (see also the above discussion on inflation).
- Consumption behaves in a typical Keynesian fashion with respect to income and is positive in real wealth (as defined below, see Eq. (5)).
- Investment is positive in the marginal efficiency of capital, μ, which in a typical Keynesian fashion responds to entrepreneurs' long-term expectations as influenced by psychological factors, and negative in the real cost of funding defined as $i_M + s$, where *s* reflects the cost of

intermediation and risk factors and is conveniently assumed to be constant.[10] Notice that, in line with MMT, saving is a residual to investment (i.e., no loanable funds theory is assumed), which, however, does not rule out ex-ante saving-investment inequalities.

- Net export is given by $NX(Y^{RW}, Y, \varepsilon EP^{RW}/P) = X(Y^{RW}, \varepsilon) - \varepsilon IM(Y, \varepsilon)$, where Y^{RW} is the output of the rest of the world, RW, and $\varepsilon = EP^{RW}/P$ is the real exchange rate, where E is the nominal exchange rate. $NX(\cdot)$ is assumed to satisfy the Marshall-Lerner condition;
- Net export and the capital account, K, determine the changes in the foreign asset position of the economy, $NX(Y^{RW}, Y, \varepsilon) + \varepsilon K(i_M - i_{RW}) = \varepsilon \Delta FX$, with $K' > 0$, that is, the capital account is uniquely determined by the interest rate differential between the domestic and rest-of-the-world economy. For simplicity, but with no loss of generality, the interest rate on foreign asset, i_{RW}, is exogenous to the model and conveniently assumed to be constant.

From the above assumptions, the following three relations yield:

a. The **IS schedule** for the goods market

$$(2) \qquad Y = \frac{1}{1-c'_Y}\left[c'_W \frac{W}{P}(Y) + I(\mu, i_M + s) + G + NX(Y^{RW}, Y, \varepsilon)\right],$$

where taxes are set to zero.

b. The **MM schedule** for the money market

$$(3) \qquad \frac{M}{P} \equiv m = \frac{M_{-1}}{P} + \frac{\Delta M}{P} = m(Y, i_M|\beta), \qquad \text{with } m'_Y > 0, m'_{i_M} > 0$$

where the optimal demand for money is derived in Appendix I and where the money supply grows by additions to the stock of money inherited from the previous period through government spending, $\frac{\Delta M}{P} = G$, when taxation is set to zero and no public debt is issued. In line with MMT, money is

[10] In a typical Keynesian fashion, the marginal efficiency of capital, μ, obtains as the value that equates the supply price of capital with the present value of the expected profit stream over a relevant future time horizon, $P_K = \sum_{t=1}^{n} \pi_t (1+\mu)^{-1}$ (Chick, 1983). As indicated by MMT proponents Bill Mitchell (2012) and Warren Mosler (see Rowe, cit.), MMT accepts Michal Kalecki's consideration that the risk of increasing indebtedness ensures that the marginal efficiency of capital is downward sloping with respect to the market rate of interest and that, all else equal, higher interest rates render unprofitable many projects that would otherwise be profitable.

demanded for its services as a means of payment and taking the interest rate as its opportunity cost. Notice that, unlike the conventional LM schedule in ISLM analysis, the MM schedule has a negative slope: for a given stock of *M* and all else being equal, a higher transaction demand for *M* driven by *Y* requires a decrease in interest rate paid on *M* balances, i_M, required to keep the money market in equilibrium.

c. The **BP schedule** for the forex market

(4) $NX(Y^{RW}, Y, \varepsilon) = -\varepsilon K(i_M - i_{RW})$,

that is, trade deficits must be financed by capital account surpluses, which are determined by the differential between the interest rate on *M* and *FX*, where the latter is constant, as noted.

d. Finally, stock-flow consistency requires that:

(5) $\frac{W}{P} = \left(\frac{W}{P}\right)_{-1} + (1 - c'_Y)Y = m(Y, i_M|\beta), +\varepsilon[FX_{-1} + \varepsilon K(i_M - i_{RW})]$

which captures Keynes' LPT by encompassing the demand and supply of asset stocks, defines real wealth, W/P , as the sum of preexisting wealth and current savings, and requires it to be equal to the real stocks of money and foreign assets inherited from the past plus any current net additions to them. Eq. (5) indicates that if an imbalance were to materialize, say, in the money market (e.g., the supply of money exceeds demand) and were not followed by the appropriate interest rate adjustment, then wealth holders would transform excess money balance into additional *FX* holdings, that is, $\frac{\Delta M}{P} = -\varepsilon \Delta FX$, and excess money would be withdrawn from domestic circulation. On the other hand, if the imbalance were followed by the interest (and exchange) rate adjustment, then there would be no change in *FX* holdings, that is $\Delta FX = 0$, and the excess money balances would be absorbed and become part of the optimal demand for money. Thus, under LPT, while wealth is always enough absorbs the stocks of assets supplied to the economy (through the residuality of saving to investment),

only equilibrium real interest rates (in this case, $i_M^*|\beta$ for a given i_{RW}) equates the demand and supply of each asset and match wealth-holders portfolio preferences exactly.[11]

4.2 Optimal demand for money and "excess" money supply

A critical point to notice, which is neglected by MMT, is that the money supplied through deficit spending is not subject to the law of reflux (as is the case with credit money): the money created and injected in the economy can only be withdrawn by taxation and/or bond issuances.[12] Therefore, for a given nominal output and all else being equal, any sequence of net injections of *M* in the economy causes the stock of *M* to accumulate indefinitely, if and until the private sector remains in a net (desired) saving surplus position.[13] Wealth holders unwilling to keep "excess" holdings of non-interest-bearing asset *M* (with the notion of "excess" money to be defined below) can dispose of it by

[11] As Tily (2012) well explains, «Liquidity preference is the decision about the degree of liquidity at which savings should be held. Furthermore, it is a decision concerning the stock of savings – wealth – at any point in time, rather than any new flow of saving alone. The rate of interest is hence not determined by the supply of and demand for (flows of) saving, but by the supply of and demand for assets into which holdings of (stocks of) wealth can be placed. In the theory of money as a store of value, money is one of these assets.» (p. 59).

[12] The money can simply be created by the central bank (as a department of the Treasury) and credited on the Treasury account for its use, including to pay for its costs (among which the cost of operating the central banking department). Alternatively, the central bank (as a separate agency) could issue money and purchase government bonds with the commitment to hold it forever (i.e., never sell it), renew all bonds that come to maturity, and turn back to the Treasury all interests maturing on the bonds, net of sum necessary to cover its own running costs. The two alternative options would be equivalent to each other, and under both options any money created by the central bank would not reflow back to it, unless through taxation or debt as indicated above.

[13] As Palley (2013) observes, «In a no growth economy, having the fiscal authority run persistent money financed deficits will cause the money supply to increase relative to GDP…» (p. 8), and dynamically the same would hold under MMT as the stock of money would grow at a rate not lower than GDP (all else being equal).

buying foreign assets *FX*, in so doing depressing the external value of *M* and thus raising the domestic price of goods and services.[14]

This implies that, under systematic implementation of MMT – that is, under the persistent application of MMT policy to maintain full-employment output on a long-term basis – the real money stock would grow indefinitely relative to real output, and a real interest rate would have to be paid on *M*-holdings from as the money stock were to exceed its optimal level to induce wealth holders to hold it without causing its value to fall. One could think of interest-bearing *M* as equivalent to the "Treasury electronic money" proposed by Cochrane (2015) as a new US Federal debt instrument.

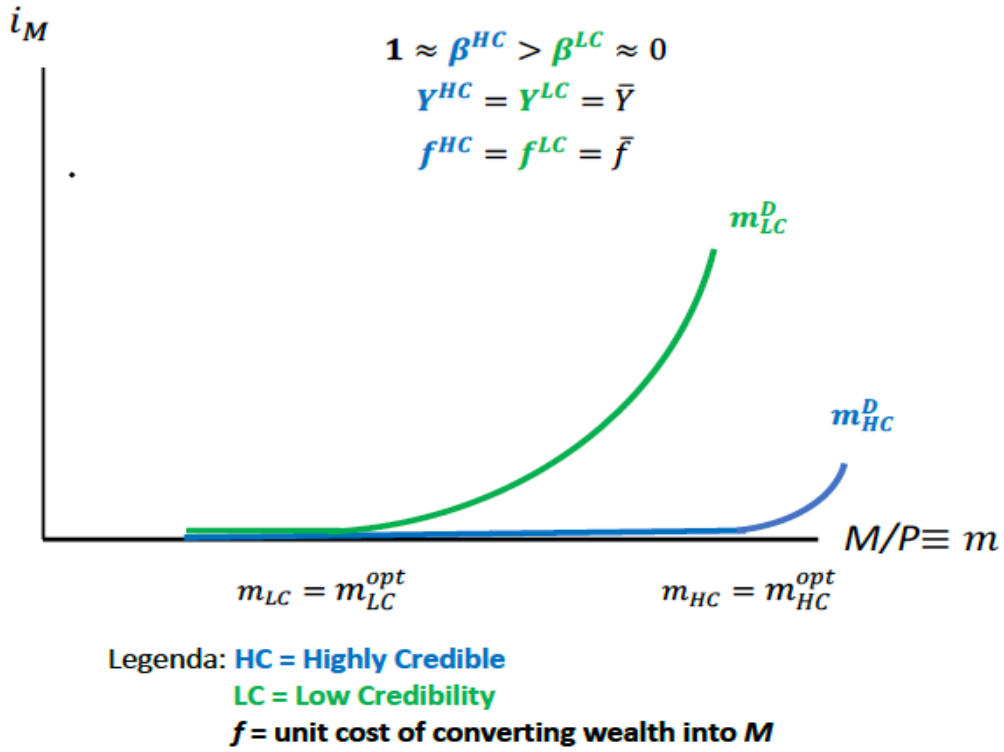
This is henceforth called the "required" real interest rate on money, and it is a government's policy decision whether to pay it or not, as discussed below. However, if the government were not to pay an interest rate on *M*-holdings, it would have to supply their holders with an alternative financial instrument that earned an adequate return (typically, debt), since they would refuse to hold excess balances of an asset running a net positive and increasing cost.

The optimal demand-for-money function derived in Appendix I and reported in Eq. (3) above allows for determining "excess" money holdings. Appendix I also shows that, all else being equal, the required real interest rate on money is higher the lower the level of credibility attributed to the economy by the markets. In highly credible (HC) economies, most notably those whose currency is

[14] In an economy with alternative assets in addition to *FX*, wealth holders would purchase also speculative assets (typically featuring very low output elasticity), with money shifting hands at an increasing velocity within select groups of (domestic and foreign) wealth holders, who would be acting in the expectation of extracting surpluses from further asset price increases, limiting money circulation in the economy, and eventually raising the risk of bubble bursts. In the model above, this chain of events would neutralize the wealth effect on consumption. At disequilibrium interest rates, while some individual wealth holders would be able to get rid of their own "excess" money balances, not all of them would be able to do so at the same time. If an equilibrium price is not reached, some wealth holders will ultimately be forced to stick temporarily to (at least part of) their excess balances, until new opportunities would again be available to restore normal (optimal) holdings.

in high demand domestically and internationally, governments can fight recessions or stagnations by supplying all the money needed: they would look unconstrained, as MMT argues. On the other hand, the supply of *M* in economies with low credibility (LC) is constrained by the interest rate that wealth holders require for holding it. Countries suffering from very low policy credibility might be facing very steep (and, past some point, even outright vertical) money demand schedules. Chart 1 compares the demand-for-money functions of the HC and LC economies, for a given level of output.

Chart 1. Stylized Demand-for-Money Schedules in Economies with Different Policy Credibility



Note to Chart 1. The money issued by the highly credible (HC) economy is always in high demand (especially at times of market stress), and there is always a large share of unsatisfied demand for it. Thus, a very low or even zero real rate of interest is required at which the supply of money is absorbed by demand: it would take extremely large issuances of money before markets worried about "excess" balances, at which point the equilibrium interest rate would start rising. In the low credibility (LC) economy, on the other hand, the required rate of interest on money is higher than in the HC economy, all else being equal, and the demand-for-money schedule starts verticalizing at a lower level of the money stock ($m^{opt}_{LC} < m^{opt}_{HC}$, see Appendix I): unless the interest rate adjusts, new issuances lead wealth holders to convert money into alternative assets including foreign currencies and securities. In the limiting case of an economy characterized by very low credibility, the demand-for-money schedule would tend to be vertical at a very low level of the money stock, relative to a GC economy, and money market equilibrium would require a very high interest rate.

Notice that, as discussed in Section 1, the government could mop up excess money through debt issuances; but then the debt stock would grow instead of the money stock, bearing the same interest rate implications.

5. RESULTS

Noticing that if saving equals investment (and $G = T$ and $NX(\cdot) = 0$), money supply equals demand and the real exchange rate equals the differential between the domestic and foreign real interest, Eq. (5) becomes:

$$(6) \qquad \frac{W}{P} = \left(\frac{W}{P}\right)_{-1} + I(\mu, i_M + s) = m(Y, i_M|\beta) - \varepsilon(FX_{-1}),$$

then any solutions that solve the IS-MM-BP system of equations also solve Eq. (6) and make the real wealth equation redundant as a result. Equation (6) will become relevant in the context of a disequilibrium situation that will be discussed in Section 5.2.2.

Thus, replacing Eq.'s (3) and (4) into (2) and solving for output, the real interest rate and the real exchange rate, with a given general price level, foreign real interest rate, risk factor and inherited stock of wealth, the triplet of equilibrium values $(Y^*, i_M^*, \varepsilon^*|\beta)$ would obtain, conditional on credibility factor β, which would clear simultaneously the three markets, yielding

$$(7) \qquad Y^* = \frac{1}{1-c_Y'}\left\{c_w' \frac{W}{P}(Y^*) + I(\mu, i_M^* + s) + [m(Y^*, i_M^*|\beta) - m_{-1}] - \varepsilon^* K(i_M^* - i_{RW})\right\}.$$

Based on this equilibrium equation, the effect of MMT policy is now analyzed. The analysis proceeds by charting the above relations for the HC and LC economies, respectively, and by investigating them graphically and analytically. In the charts below, the dynamics unfold as follows: quadrant I portrays the supply of, and demand for, money schedules, which determine the equilibrium real interest rate for any given stock of money; both schedules are considered in the relevant range, that is, in the range where the stock of real money approaches its optimal level and starts exceeding it as a result of persistent implementation of MMT full-employment policy.

Based on the MMT (**ex-ante**) schedule, in quadrant II, the government decides the additional permanent level of money-financed deficit spending required to bring output to full-employment level, Y_f. The MMT schedule mirrors the simple Keynesian multiplier when stock and price dynamics are not factored into the analysis. In quadrant IV, the $i_M + s$ schedule translates the real interest rate

on money into the real cost of investment funding. Finally, in quadrant III, the new level money-financed spending and the resulting real interest rate on money and real exchange rate cause the IS, MM and BP schedules to shift until they intersect each other (**ex post**) at a new equilibrium level of output, when stock and price dynamics are incorporated in the analysis. In quadrant III, the MM and BP schedules are scaled up to reflect the interest rate risk premium, *s*, that is incorporated in the IS schedule.

It should be noticed that, due to the static nature of the ISLM-based graphical representations of the analysis below, the indefinite growth of the money stock relative to output, caused by permanent additions to the money supply, cannot be portrayed. Yet, as discussed, such indefinite growth lies at the root of the required rate of return on money balances that MMT should consider as an equilibrium mechanism (see Eq. (A5) in Appendix I). This mechanism becomes relevant once the stock of money in circulation approaches and exceeds its optimal equivalent. In Chart 1, for example, and hence in all others, as the money stock grows indefinitely relative to output and exceeds its optimal equivalent, the economy is confronted with a verticalizing demand-for-money schedule.

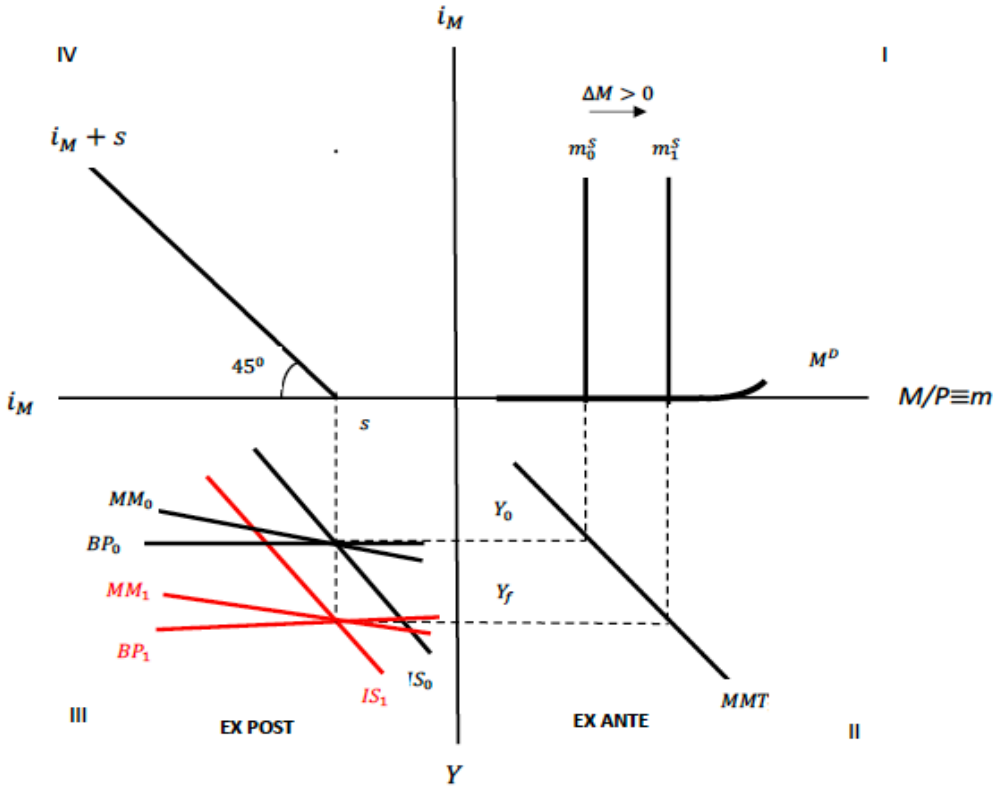
5.1 Where MMT can (exceptionally) work

This is the case where the economy enjoys high credibility. In terms of the above model, the case is one where the private sector's structural net (desired) saving surplus position impedes the attainment of full-employment output and the government engineers a permanent expansion of public spending financed with new money issuance, $G = \frac{\Delta M}{P}$, to offset the output gap and achieve full employment.

As Chart 2 shows, benefiting from a low and flat money demand schedule (i.e., $\beta^{HC} \approx 1$) (quadrant I), the higher level of government spending shifts the intersection of the IS-MM-BP schedules to the full-employment output position, with no change in interest rates (quadrant III), and fully in line with the expected policy impact derived from the MMT schedule (quadrant II). The shift of the BP schedule is due to the fact that the issuance of new money, either used as international reserve

currency or exchanging at par with the latter (in force of its strength), supports the larger flow of imports following the larger output.

Chart 2. MMT Policy in an HC Economy



This case is the MMT "prototype." To the extent that the money issued by the HC economy continues to be fully trusted by the agents domestically (and internationally, in the case of a reserve issuing economy), the solution portrayed in Chart 2 is sustainable over time. True, as the stock of money were to grow indefinitely with respect to output, and eventually exceeded its optimal level, the economy would end up encountering the point where the demand-for money schedule starts rising, engendering the effects that will be discussed in the next subparagraphs for the case of less credible economies. Yet, this does not need to happen in an HC economy. As its money is fully trusted, a closure of the budget deficit would come from the wealth effect on consumption, which is induced by the sequence of money supply injections through the budget.[15] The larger stock of real money – if

[15] This was noted by Palley (2013), which specifically refers to the Pigou effect. Also, in a model where taxation would be included in the form of income taxes (instead of, or in addition to, lump sum taxes), the adjustment of the budget deficit would occur not only through deliberate reductions in public expenses

spent on consumption – shifts the IS schedule outward; this increases output, reduces the private sector net (desired) saving surpluses and, hence, narrows the fiscal deficits needed to support aggregate demand, eventually allowing the economy to set at full-employment output with stock-flow equilibrium (and zero sector surpluses/deficits). In other words, the wealth effect would "rescue" the economy by preventing the money "floods" that would otherwise follow from MMT policy. One would be tempted to say that, when and where it works, the wealth effect saves MMT from itself…

In terms of Eq. (7), to the extent that the wealth effect works and that increases in money supply do not require interest rate adjustments (see Eq. (A5) in Appendix I), policy-driven shocks to the supply of *M* are fully reflected in aggregate output rises until full employment is reached, with no impact on inflation (by design):

(8) $$\frac{dY}{dM} = 1 - w'_Y = c'_Y > 0,$$

Thus, whether such new equilibrium is attained depends on how efficient the wealth effect turns out to be. It is likely that in HC economies, and especially in economies that issue international reserve currencies, the effect would be efficient as the currency is always high in demand. Under an optimal intertemporal framework of household consumption decision, the wealth effect would build up slowly and might even require some long interval until it pushes the economy to full employment, but this would eventually happen (absent adverse shocks).

It is no coincidence that MMT proponents largely base their view on the U.S. (Palley, 2020), whose economic, political and military prowess, as well as central role in the world economy, are such that (especially in times of crisis) people inside and outside of the country are willing to buy as many dollars get printed, in order to prompt aggregate demand, at little or no changes in interest rates. And

(mirroring the absorption of the private sector surplus) but also, or even exclusively, through higher government income. The same private sector saving surplus would be reduced not only by the wealth effect, but also by reductions in household disposable incomes.

it is no coincidence either that MMT proponents also use the apparently unlimited capacity of Japan to absorb the huge amounts of yen printed under Abenomics as evidence to support the sustainability of MMT policy prescriptions, thus generalizing what is in fact is a very atypical and exceptional country case: one where even panics originating domestically cause the currency to strengthen, not to weaken, as it would happen almost anywhere else.

On the other hand, in economies with weaker credibility (or if an economy's credibility were expected to weaken), expectations of an indefinite growth of the money stock relative to output, through the monetary financing of persistent fiscal deficits, would cause wealth holders either to decumulate money balances, as the demand-for-money schedule starts verticalizing, or to require an interest rate for being induced to hold the growing money stock, as discussed next.

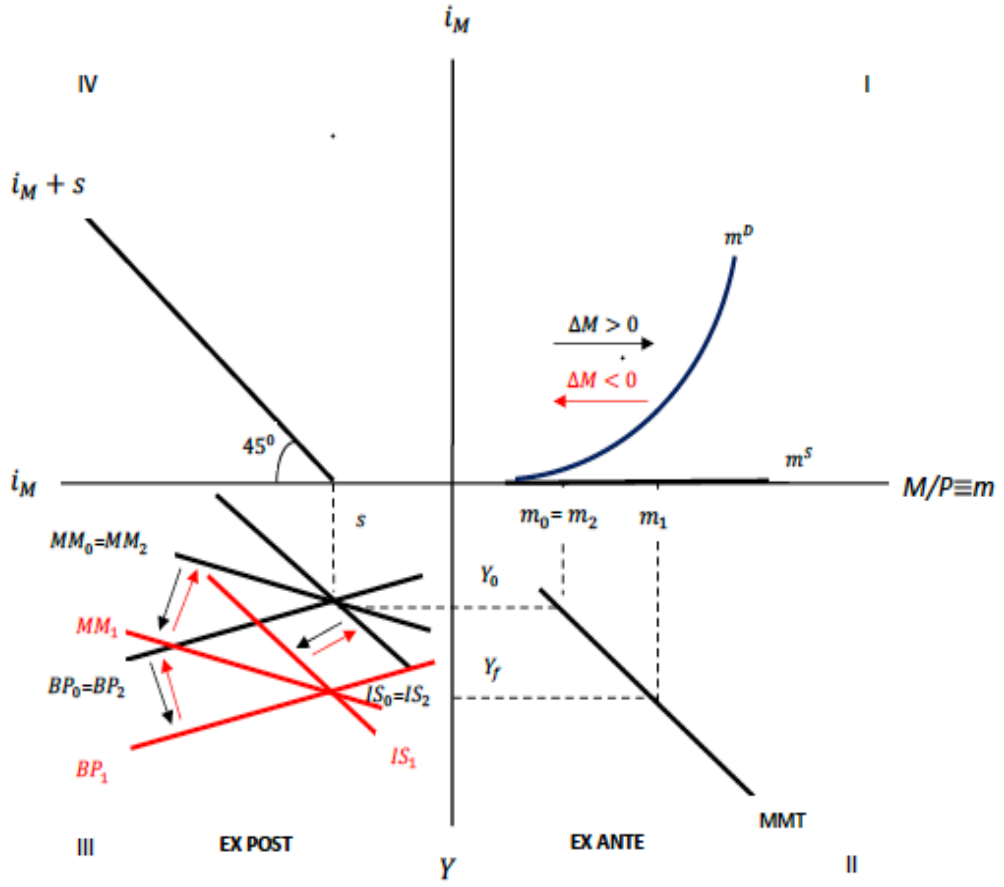
5.2 Where MMT can't work

Different would be the case when the same MMT policy were executed in an LC economy (i.e., with a low value of β). Here, two options would be available to the government: it could either pursue a zero-interest rate policy or pay on money balances the interest rate that the market would require for holding the growing money balances (see Eq. (A5) in Appendix I).

5.2.1 Zero interest rate

As above, the government permanently increases spending (from $M_0$to M_1, in quadrant I) in order to expand aggregate output to full-employment level Y_f, based on the (ex-ante) MMT schedule (quadrant II), at a zero-interest rate (Chart 3). This would be perfectly in line with MMT's prescription to pursue a zero-interest rate policy. Here, however, as the economy faces a steeper demand-for-money function, the expansionary effect dissipates into higher demand for *FX* (and alternative assets, if these were included in the model), as the larger stock of money supplied exceeds its demand at the unchanged interest rate. The dissipation neutralizes the increase in spending.

Chart 3. MMT Policy in an LC Economy: Zero-Interest Rate Money



As the increase in aggregate demand shifts the IS schedule from IS_0 to IS_1, and simultaneously the MM schedule from MM_0 to MM_1, the lack of an interest rate adjustment mechanism that re-equilibrates the money market, causes both the IS and LM schedules to shift back to their initial position, thus offsetting the policy change. Notice, at an invariant interest rate on money, the nominal exchange might depreciate unboundedly as a result of wealth holders keeping diversifying the increasing stock of *M* into *FX*, thereby temporarily shifting the *BP* schedule outward to BP_1 (from Eq. (4)). However, the exchange rate pass-through effect would swiftly translate currency depreciation into higher inflation (in line with empirical research[16]), thus restoring the original value of the real exchange rate and bringing the BP schedule back to its initial position $BP_2 = BP_0$. In fact,

[16] For a review of the empirical literature on policy credibility, the exchange rate, and inflation, see Bossone (2019). On the relevance of the exchange-rate pass-through effect in particular for developing economies, see Vernengo and Pérez Caldentey (2019).

the higher the expectation of currency depreciation driven by the expected indefinite growth of *M*, the swifter and more complete the pass-through effect of the nominal exchange rate on inflation: the real exchange rate would not change, but its numerator and denominator would both increase unboundedly. This would neutralize any expansionary effect of currency depreciation on output.

Indeed, the story might not end there: a high nominal exchange rate depreciation followed by large increase in the general price level would further depress output through the contraction in the money supply and real wealth (with further shifts of the MM and IS schedules, respectively, toward the *Y* axis, which are not reported in Chart 3). Notice that an LC economy would stand to gain nothing by adopting a floating exchange rate regime: excess money would either dissipate into larger *FX* holdings, currency depreciation and inflation, with negative real effects.

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In terms of Eq. (7), and considering Eq. (6) in light of the policy-driven money market disequilibrium, persistent increases in *M* at interest rate $i_M = 0$ cause $m > m^*$,[18] thereby increasing *FX*-holdings and driving *M*-balances back to equilibrium, that is, $m = m^*$, with no changes in real output:

$$(9) \qquad dY = \frac{(I' - \varepsilon K')i'_M|\beta}{(1-c'_Y)(1-c'_W)}(dM - \varepsilon dFX) = 0.$$

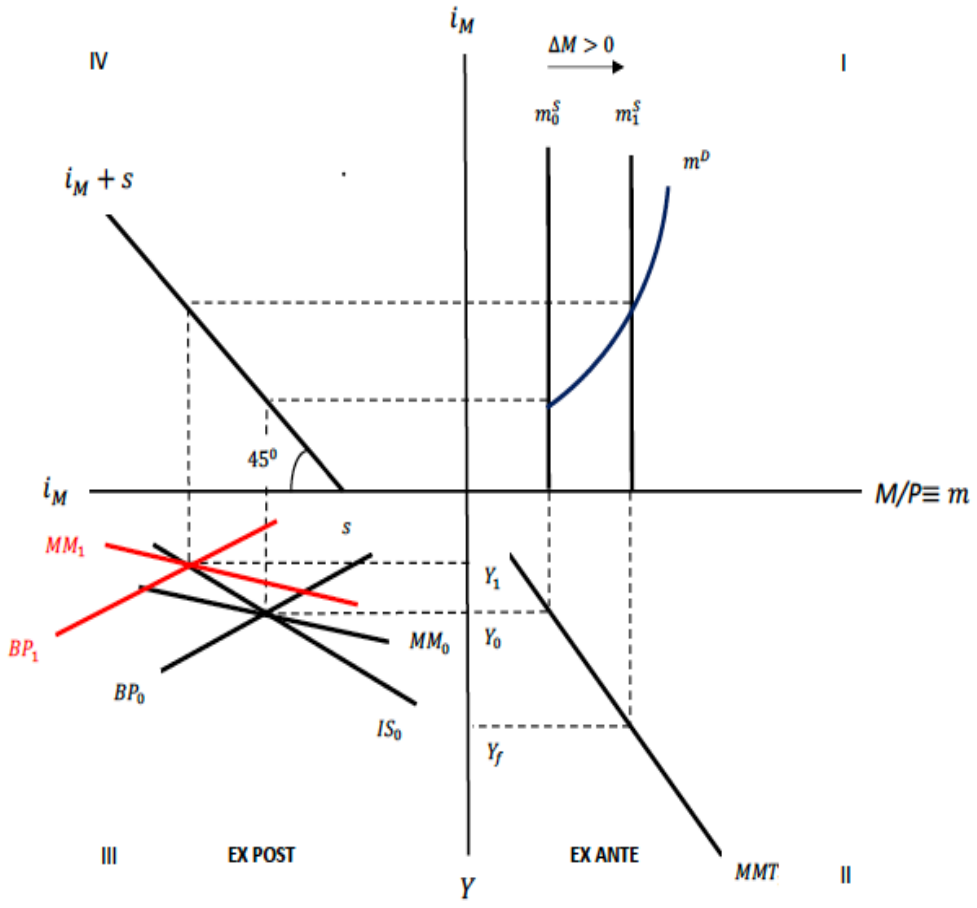
5.2.2 Market-based interest rate

Alternatively, the government takes the same action as above but, instead of pursuing the typical MMT's zero-interest rate target (irrespective of the positively sloped demand-for-money schedule), it pays the required interest rate, i_M, in an attempt to keep the money market in equilibrium (see Eq. (A5) in Appendix I). The effect of this policy choice is illustrated in Chart 4. While, as before, the desired effect along the MMT schedule is to ensure full-employment output, the permanent increase in aggregate demand through permanently larger money-financed fiscal deficits eventually depresses output, since the higher interest rate paid by the government on *M* requires both the MM and BP schedules to shift inward (toward the axes) along the IS schedule, until they cross each other again at a lower equilibrium level of output (quadrant III), causing an appreciation of the real exchange rate.

[18] Notice that it is always the case that $m^* = m^{opt}$, while the reverse is not necessarily true.

Specifically, the MM schedule must shift backward since, as output declines, the demand for money decreases and the interest rate on money must increase to make sure that the demand for money is enough to match the new (larger) supply. The BP schedule, too, must shift backward since, as output declines, the demand for imports decreases and the resulting improved external surplus strengthens the real exchange rate; at the new equilibrium levels of output and the exchange rate on the BP schedule, any increase in output (and, hence, in imports) would require an increase in the interest rate enough to attract more capital from abroad.

Chart 4. MMT Policy in an LC Economy: Positive-Interest Rate Money



Notice that if the output multiplier were (realistically) assumed to vary inversely with the interest rate, the higher required interest rate paid by the government on *M* would not only cause the MM and BP schedules to move along the IS schedule, as above, but would as well shift the IS schedule inward, thus reinforcing the contractionary effect on output. This would hold if the households' marginal propensity to consume out of current income were to decrease with the real interest rate, as supported

by recent evidence (Hviid and Kuchler, 2017). Finally, notice that, as the money stock exceeds its optimal level, the increase in the equilibrium interest rate and its contractionary effect can take place at output levels that are below full employment: the larger the stock of money accumulating over time, the higher the equilibrium interest rate required by wealth holders to hold it, and the lower the equilibrium output level obtained vis-à-vis its full-employment equivalent.

This case supports an important conclusion that MMT theorists neglect: as the rationale for policy action rests on the existence of private sector structural net (desired) saving surpluses (i.e., the reason for an economy's tendency toward Keynesian unemployment or underemployment), the existence of such surpluses does not necessarily imply that savers are willing to hold all the money stock that will result from the permanent addition of money through larger fiscal deficits. A positive and increasing return on money will be needed to satisfy wealth holders. Failure to do so would lead the latter to reallocate their portfolios, causing money to lose its (internal and external) value even at less than full employment. On the other hand, if the required rate of interest were indeed paid to wealth holders, no mechanism might be in place to ensure its consistency with full-employment output (Chart 4).

In terms of Eq. (7), persistent policy-driven increases in *M* require interest rate adjustments, which eventually cause aggregate demand, and hence output, to decline:

$$(10) \quad \frac{dY}{dM} = \frac{(I' - \varepsilon K')i'_M(m - m^*|\beta) - 1}{(1 - c'_Y)(1 - c'_W)} < 0 \qquad \text{for } m > \mu,$$

that is, considering the derivative signs of Eq. (10) and the properties of the interest rate on money function, $i_M = i_M(\cdot\,|\beta)$, derived in Appendix I, there is always a critical level of money, μ, such that for any $m > \mu \geq m^{opt}$, Eq. (10) is negative since $(I' - \varepsilon K')i'_M(m - \mu|\beta) - 1 < 0$. Notice that, as the stock of money is due to grow indefinitely under MMT policy, the above result will inevitably hold at some point. Also notice from Appendix I that the effect of policy credibility on $i_M = i_M(\cdot\,|\beta)$ is such that, all else equal, $\mu_{LC} < \mu_{HC}$, that is, the critical level of money will be lower for economies with weaker credibility, thus constraining their policy space more than would be the case for HC economies.

6. A QUICK REFERENCE TO THE ECONOMICS OF LORD KEYNES

As Section 5 has shown, an analysis grounded on Keynes' LPT leads to conclude that the persistent implementation of MMT policy, past some critical threshold of the money stock, is bound to become inconsistent with a sustainable equilibrium of stocks and flows that guarantee permanent full-employment output. And whereas there would be a natural corrective mechanism to disequilibrium (i.e., the wealth effect discussed in Section 5.1) in economies characterized by strong policy credibility, or that issue an international reserve currency, such flexibility could not be afforded by economies suffering from poor credibility.

Looking retrospectively, the results of the analysis suggest that, had Keynes applied more carefully his own LPT (and the attentiveness to the market psychology that goes with it) to functional finance, his "qualified endorsement" to Abba Lerner's creation (in Aspromourgos' (2018) words) would most likely have turned into an outright rejection instead.

This conclusion, moreover, is fully consistent with the overall conservative fiscal policy agenda that Keynes propounded, being him «revolutionary in thought and very cautious in policy,» as James Meade once remarked.[19] Indeed, and in spite of the radical innovativeness of his General Theory, Keynes advocated that public expenditure be matched by the benefits they generate over time (Brown-Collier and Collier, 1995; Dwyer, 2011).

Said otherwise, Keynes would not go for letting government liabilities grow unboundedly, as functional finance and MMT would necessarily imply. Rather, he would stick to his vision of a high socialization of investment to be implemented while carefully pursuing an intertemporally balanced budget.[20]

[19] Cited in Aspromourgos (2018), p. 493.

[20] Through the Portfolio Theory of Inflation, cited earlier, I show that under high international financial integration all governments are confronted with an intertemporal balance constraint (IBC), and that the IBC

7. CONCLUDING REMARKS

As discussed in this article, two major internal inconsistencies affect MMT. The first is that, due to the money creation process as envisioned by the theory, the money that is injected by the government in the economy through the fiscal deficits is never destroyed: it accumulates indefinitely somewhere in the economy (all else being equal), unless is taxed away or public debt is issued, and someone has to hold it. This requires that wealth holders must be paid a rate of return high enough to induce them to hold a money stock that, at some point, will *a fortiori* exceed its optimal level, all else being equal. In fact, the more the economy is internationally integrated and the more concentrated is its aggregate wealth, the higher is the tendency of wealth holders to diversify their holdings out of money and into other (domestic and foreign) assets, causing money to lose (internal and external) value at any level of output. If a price mechanism is not adopted to ensure equilibrium in the money market, taxation and/or debt issuances may need to be used even before full employment is reached. In both cases, thus, the achievement of full employment is prejudiced.

The persistent creation of "excess" money becomes a critical issue when the economy suffers from weak credibility. In today's open and internationally highly financially integrated economies, public sector liabilities (money and debt) are subject to close scrutiny by the financial markets, which attribute a degree of credibility to every economy's policy regime, institutions and conduct. Whether the market assessments of such credibility are right or wrong is not the issue; what matters is that public liabilities are "priced" in, and by, the markets on the basis of those assessments. In line with Keynes' liquidity preference theory, this pricing process determines the policy space available for national policymakers to make an active use of the macroeconomic levers and affects their effectiveness: some countries are more policy constrained than others, depending on their credibility, and only few enjoy a very large policy space.

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of governments is endogenous to the choices of global markets: it is more flexible for credible countries and tighter for less credible ones.

The fact that a country exercises monetary sovereignty and thus may not be forced into default on its financial obligations (indeed, one of the most critical MMT tenets) does not automatically imply that the money issued retains its value. On the contrary, any prospects of this sovereignty being abused by the government leads the markets to expect the value of money to decline (and even to drop to zero if money is expected to grow unboundedly). Well informed wealth holders with easy access to markets want their money to (at least) keep its (internal and external) real value: to them, default events are not just when the government cannot pay its debt back, but also when it pays its debt with depreciating money. If wealth holders expect such future occurrences and are not adequately compensated ex ante for potential losses, they can opt out of the money rapidly, at any time and at no cost, and shift their portfolios into alternative assets, causing money to further depreciate instantly. As regards the irredeemable money issued by a poorly credible government of an open and internationally highly financially integrated economy, a stock of such money that were to grow indefinitely relative to output would be expected to lose external value (that is, to depreciate) as well as internal value (through inflation) as a consequence of the exchange rate pass-through effect.

This is a characterizing feature of MMT policy, whereby the money stock is bound to grow indefinitely with the monetary financing of the future fiscal deficits intended to offset the private-sector's structural net saving surplus position. Only the wealth effect, earlier discussed, can break these dynamics; yet, its effectiveness relies on the policy credibility of the money-issuing economy: if the credibility is low, the opting out of money from wealth holders neutralizes the wealth effect on aggregate demand and output.

The government might try to bring equilibrium in the money market by paying an adequate interest rate on money holdings. Yet, the equilibrium interest rate required to restore equilibrium would be increasing (as the money stock would grow indefinitely) and it would soon become unsustainable and inconsistent with full-employment output.

Once again: sustainability depends on the credibility attributed by the markets to the national economies. A country that issues a currency that is used as international reserve and is always in high demand (especially in times of crisis) is largely unconstrained and can pursue MMT policy until the wealth effect allows private sector net (desired) saving surpluses to be eliminated; as a result, the need for monetizing additional fiscal deficits would be removed. At the other extreme, a country whose currency nobody wants to hold would not even be able to make it more attractive by paying extraordinarily high interest rates on it, which would be inconsistent with full-employment output anyway. As the only remedy, the country would have to reform its own policy regime and try to acquire credibility in the eyes of the markets by acting in a financially conservative way. This would most likely come at the cost of less than full employment.

As this article has shown, Modern Money Theory (or MMT) – understood as the permanent monetary financing of fiscal deficits aimed to offset the contractionary impact on output deriving from private sector structural net (desired) saving surpluses – would be no cure for an economy's persistent tendency to Keynesian unemployment or underemployment (except, perhaps, in very few country circumstances. Unless the economy were perceived to be strongly credible, the systematic implementation of MMT would expose it to significant risk of instability.

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APPENDIX I. THE OPTIMAL DEMAND FOR MONEY

This appendix develops a modified version of the Allais-Baumol-Tobin (ABT) inventory model for transaction money demand used in the article. The original ABT model is here modified to show that, as discussed in the text, equilibrium in the money market with a growing stock of money requires the government to pay interest to money holders, and that, all else equal, the required interest rate conditional on the government's policy credibility as perceived by the financial markets. The ABT approach was selected as a simple and yet effective method to incorporate an optimal demand-for-money framework in the economy's model used in this article. The objective was not to pick the best possible methodology available to derive optimal money but to recognize the role of optimal money demand as instrumental to assess MMT policy tendency toward the creation of "excess" money balances, in a context where money is demanded for its transaction services and based on its opportunity cost.

Suppose households receive nominal income PY at the beginning of each period and spend it evenly during the period. Average wealth is $PY/2$ and, according to the model assumptions, it is held in the form of money balances, *M*, earning interest i_M, and foreign asset balances, *FX*, earning interest i_{RW}. To finance transactions, households must first hold *M* balances; thus, before wealth held in the form of *FX* can be spent, it has to be converted into *M* at cost *f* per transaction. Suppose each household divides the period into *n* subperiods initially placing PY/n in money balances and the rest in *FX*. At the end of each subperiod, *FX* balances are converted into *M* balances

in $n - 1$ transactions of equal size PY/n. Thus, average money holdings over *n* subperiods will be $M = \frac{1}{n}\frac{PY}{2}$ and average foreign asset holdings will be $FX = \frac{n-1}{n}\frac{PY}{2}$.

Thus, the net gain, Γ, from holding wealth in both assets, taking into account the need to finance transactions, is given by:

(A1) $$\Gamma = \frac{1}{n}\frac{PYi_M}{2} + \frac{(n-1)}{n}\frac{PYi_{RW}}{2} - (n-1)f$$

Maximizing Γ with respect to *n* requires:

(A2) $$\frac{\partial \Gamma}{\partial n} = \frac{-2n^2 f + PYi_{RW}}{2n^2} - \frac{PYi_M}{2n^2} = 0.$$

Therefore, the optimal choice for *n* is

(A3) $n^{opt} = \sqrt{\frac{(i_{RW}-i_M)PY}{2f}}$.

Replacing Eq. (A3) into the equation for *M*, the optimal demand-for-money equation is

(A4) $\frac{M^{opt}}{P} \equiv m^{opt} = Y\sqrt{\frac{f}{2(i_{RW}-i_M)}}$,

which shows that the demand for money varies positively with real income, the transaction cost, and the interest paid on money balances, and negatively with the rate of return on alternative assets (in this case, foreign exchange).

Consider now that in an LC economy (i.e., characterized by a low β) the expectations that the government mismanages the money supply over the relevant future time horizon induce wealth holders, all else equal, to hold larger shares of their wealth held in *FX*, as they factor into their portfolio choices the future expected (internal and external) value of money. In particular, they may fear the risk of excess money supply creation and government's inadequacy or unwillingness to react to threats of currency depreciation and inflation through appropriate policy action. This implies that $n_{LC}^{opt} > n_{HC}^{opt}$ and, hence, $m_{LC}^{opt} < m_{HC}^{opt}$. Thus, in order to induce wealth holders in the LC economy and HC economy, respectively, to hold the same level of real money m, all else equal, it must be that $i_M^{LC}(m - m_{LC}^{opt})|\beta_{LC} > i_M^{HC}(m - m_{HC}^{opt})|\beta_{HC}$.

Similarly, the change in the interest rate required by a given rise of excess money balances will be larger in an LC than in an HC economy, and the difference will grow larger with the rise of excess money balances, that is, $i_M'^{LC}(\cdot)|\beta_{LC} > i_M'^{HC}(\cdot)|\beta_{HC}$. These relative differences in the interest rate adjustment will vary inversely with the difference in the level of policy credibility of the economies being compared, that is, the policy space available would be higher, the higher the level of policy credibility of the economy concerned (see Section 5).

Formally, all these features are formally captured by the following equation for the interest rate on money:

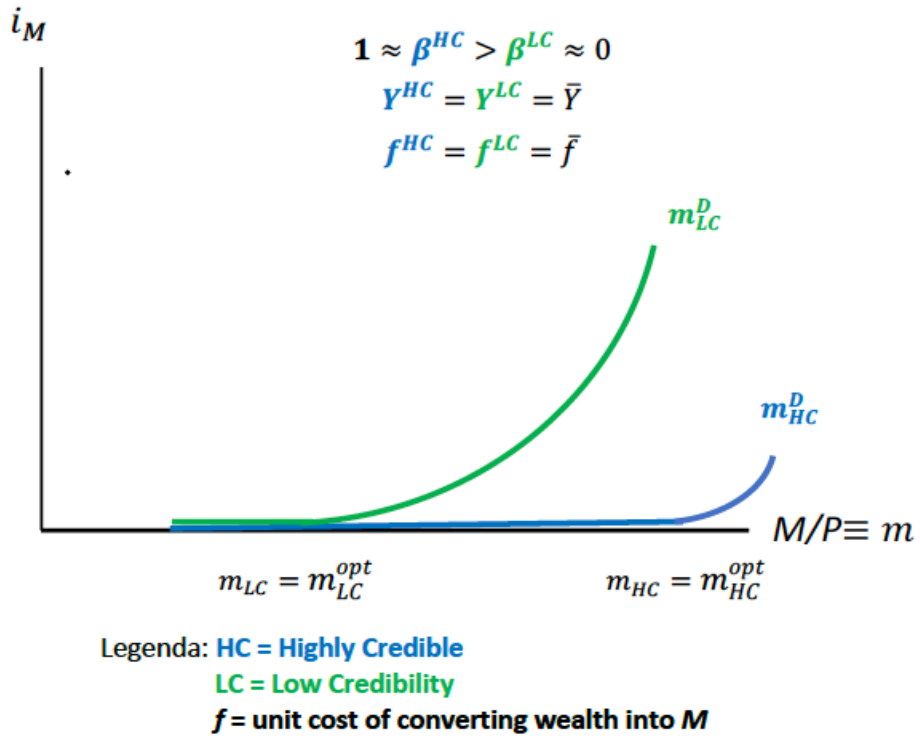
(A5) $i_{M,j} = i_M(m_j - m_j^{opt}|\beta_j)$,

with $j = LC, HC$ and $i_M|\beta_{LC} > i_M|\beta_{HC} > 0; i_M''|\beta_{LC} > i_M''|\beta_{HC} > 0; i_M'''|\beta_{LC} > i_M'''|\beta_{HC} > 0$,

where $m_j - m_j^{opt}$ measures "excess" money in country *j*.

Eq. (A5) defines the position and shape of the optimal demand-for-money function, and indicates that i) the required real interest rate on money rises with excess money balances and ii) the height and steepness of the demand schedule in the $(i_M, m|\beta)$ space is conditional on the economy's level of policy credibility, all else being equal. All this graphically represented in Chart A1 below, which appears as Chart 1 in the text.

Chart A1. Stylized Demand-for-Money Schedules in Economies with Different Policy Credibility



In light of Eq. (A5), and dropping the country index, the optimal demand-for-money function given by Eq. (A4) can be written in implicit form as:

(A6) $\frac{M^D}{P} = m(Y, i_M|\beta, f, i_{RW})$.

With f and i_{RW} set exogenously and assumed to be constant (for reasons of simplicity but at no loss of generality), Eq. (A6) reduces to:

(A7) $\frac{M^D}{P} = m(Y, i_M|\beta)$, with $m'_Y, m'_{i_M} > 0$,

which enters the money market equilibrium **MM schedule** of Eq. (3) in the text.

Unlike the conventional LM schedule in ISLM analysis, the MM schedule has a negative slope: for a given stock of M and all else being equal, a higher transaction demand for M driven by Y requires a decrease in interest rate paid on M balances, i_M, required to keep the money market in equilibrium.