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Does Fiscal Policy Affect the Monetary Transmission Mechanism?

A Monetary Theory of Production (MTP) Response to the New Consensus Macroeconomics (NCM) Perspective

By

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Abstract:

Drawing on the contributions of Augusto Graziani to the so-called monetary theory of production, this paper aims to show that an accommodative monetary policy – as defended in the New Consensus Macroeconomics (NCM) theory and supported by current practice around the world – has the maximum effect in stimulating aggregate demand and income when it is implemented in conjunction with a coordinated discretionary fiscal policy that boosts the demand for and the supply of loans via the reduction of the liquidity risk and the insolvency risk. As a result, the potentially beneficial effects of the traditional Keynesian fiscal multiplier are significantly amplified.

Keywords: Monetary theory of production, monetary circuit, Post Keynesian economics, monetary policy, fiscal policy

JEL classifications: E12, E23, E51, E52, E62

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1. Introduction

The main tenet of the current dominant view in macroeconomics, the so-called New Consensus (NCM hereafter) theory, is that central banks, via changes in the nominal interest rate, are able to manage aggregate demand and current output in the short run (Arestis, 2009). During recessive phases of the business cycle, the conventional rule requires a reduction of the short-run nominal interest rate, with the objective of increasing consumption (and possibly, though indirectly, investment). At the same time, the NCM maintains that fiscal policies should be used for the control of public finances. Discretionary fiscal policies could destabilise the market economy, and hence be counter-productive for long-run economic growth.

This paper aims to challenge these policy recommendations by using the monetary theory of production (MTP hereafter; also often labelled the theory of the monetary circuit) in the version developed by Augusto Graziani (1987, 1989, 1996, 2003a and 2003b; see also, for recent developments, Arena and Salvadori, 2004; Delaplace and Nell, 1996; Fontana and Realfonzo 2005, 2015; Rochon and Rossi, 2003). The MTP has a long history. In addition to Keynes (1930, 1933), early statements of the MTP can be mainly found in Wicksell (1936 [orig. 1898], Ch. 9, Section B), Schumpeter (1934 [orig. 1912], Ch. 2), and Kalecki (1971). The MTP assumes a rigorous distinction between the core private macro agents of an economy, namely commercial banks, firms and workers. It describes the working of the economy as a sequential process, characterized by successive stages forming a monetary circuit. The circuit starts when banks finance the production plans of firms. In the simplest models, the amount of financing equals the wage bill. Once labour services have been purchased, firms carry out production plans, and then sell the output in the goods market. The monetary circuit closes when firms reimburse

commercial banks. The main tenets of the MTP are: 1) the money supply is endogenous, since loans are created by banks in response to creditworthy demand by firms; 2) the total levels of output and employment depend on the level of aggregate demand; 3) the distribution of income is not determined by the marginal theory of distribution (see, for a detailed discussion of these tenets, Fontana 2009a; Realfonzo 1998, 2006; see, also, Rochon, 1999). These three tenets will also be the guiding principles of the model presented in this paper.

Graziani has always given a prominent role to macroeconomic policies in order to improve the economic performance of a country. For instance, Graziani (2003a) assigns to the central bank the important role of safeguarding the smoothing functioning of the banking system. In this way, the central bank could prevent an excessive expansion of credit that jeopardizes both the liquidity needs of lenders (banks) and the solvency requirements of borrowers (firms). Furthermore, by influencing the lending activities of commercial banks, the central bank could contain the risk of high inflationary pressures. As far as fiscal policy is concerned, Graziani has often maintained that government expenditure produces an increase of income, employment and monetary profits (e.g. Graziani 2003a, Sec 5.4).[1] Similarly, another leading scholar of the MTP and close friend and colleague of Graziani, Alain Parguez (2008) has maintained that an expansionary fiscal policy has to be regarded as an "anchor" of profits, since a high level of government

[1] Some followers of Graziani and the MTP have further developed this argument that discretionary government expenditure contributes to the increase of profits and income. For in-stance, Forges Davanzati, Pacella and Realfonzo (2009, p. 610) argue that "an initial increase in public expenditure [...] can generate extra profits to the benefit of firms. Due to the improvement in a firm's expectations, this leads to an increase in investment and output".

expenditure is associated with a high inflow of money into the goods markets (see, also, Parguez and Seccareccia, 2000).

The main goal of this MTP-inspired paper is to build on these propositions and to show that an accommodative monetary policy – as defended in the NCM theory and supported by current practice around the world – has the maximum effect in stimulating aggregate demand and income when it is implemented with a discretionary fiscal policy that boosts - via the reduction of the liquidity risk and the insolvency risk – the demand for and the supply of loans. As a result, the potentially beneficial effects of the traditional Keynesian fiscal multiplier are significantly amplified (Dalziel, 1996).

The paper is organised as follows. Section 2 presents a critical assessment of the dominant New Consensus Macroeconomics (NCM) theory and its policy implications. Section 3 introduces the core features and assumptions of the model, together with a formal analysis of the loans market, where the difference between the insolvency risk and the liquidity risk faced by commercial banks is fully explored. Section 4 discusses the intimate link between the loans market and the equilibrium in the good market. It analyses in details the coordinated effects of a discretionary expansionary fiscal policy and an accommodative monetary policy that boosts - via the reduction of the liquidity risk and the insolvency risk – the demand for and the supply of loans. Section 5 proposes a stock-flow consistent representation of the model. Finally, Section 6 concludes.

2. The New Consensus Macroeconomics Theory and Policy Implications

The New Consensus Macroeconomics theory is based on a core 3-equation model, namely an IS-type curve, a Phillips curve, and a monetary policy rule. Fontana (2009b) and Arestis (2009), among others, have critically assessed the nature and origin of the

model and its policy implications. The model has several standard features of the New Keynesian approach to macroeconomics. All three equations can be derived from explicit optimising behaviour of individual agents in the presence of market failures, including imperfect competition, incomplete markets, and asymmetric information. These market failures generate transitory price and wage stickiness, which in turn gives support to the view that in the short run the aggregate supply responds to changes in the aggregate demand. Aggregate demand has thus a transitory, yet non-trivial role in determining the equilibrium level of output and employment in the economy. In other words, where individual agents behave rationally, due to market failures the outcome of their actions has adverse macroeconomic effects. On this basis, macroeconomic policies are then justified to eliminate or limit some of these effects.

In terms of the mechanics of the core model, price and wage stickiness plays a key role in relating the monetary policy rule to the IS-type curve. The central bank via changes in the short-run nominal interest rate is actually able to control the short-run real interest rate. In this way, the central bank is able to directly affect the consumption component of aggregate demand, and hence the current level of output. This is an important theoretical result, because it goes well with another important tenet of the NCM model, namely that low and stable inflation is conducive to growth, stability and the efficient functioning of market. When the economy is hit by shocks, taking it away from its natural path, the central bank is responsible for achieving the desired rate of inflation in the long run, and subject to that, also for bringing output and employment to their equilibrium levels in the short run. However, in pursuit of its objectives the central bank faces a short-run trade-off between inflation and output. This trade-off is captured by the Phillips curve, which can be thought as the aggregate supply component of the NCM model.

Over the past decade the NCM theory has received several criticisms. Some of these criticisms originate from economists who have contributed to its creation and development. For instance, Blanchard (2016; see also 2008) assesses current dynamic stochastic general equilibrium (DSGE) models, which are grounded on the NCM theory, and the role that they play in current macroeconomic research and policy making. He maintains that current DSGE models are based on assumptions which are poorly supported by empirical evidence. They are seriously flawed descriptions of the behaviour of consumers and price and wage setters in the real world. Similarly, he founds unconvincing the mix of calibration and Bayesian estimation methods utilised to estimate DSGE models, or the use of DSGE models for normative purposes. These are internal critiques of the NCM theory and its policy implications. As a result of them, many macroeconomists are now working on various ways to amend the NCM theory, possibly adding more realism to its core equations (see, for instance, Linde et al., 2016).

Other criticisms of the NCM theory and policy implications originate from economists that have been sceptical of recent theoretical and empirical contributions. These economists show appreciation for some features of NCM, including the rejection of the monetarist hypothesis that the central bank is able to control monetary aggregates. Yet, they reject some of the core features of the NCM theory, which are considered a dangerous dead end. These are external critiques of NCM and its policy implications. This paper is part of this tradition in that it rejects the so-called transversality condition of the NCM theory, and it challenges its main policy implication, namely the current "consensus assignment" on the interaction between monetary and fiscal policies.

The transversality condition is a restriction that describes the optimal paths of dynamic economic models (Kamihigashi, 2006). In the NCM core model it means that credit and

default risks are removed, such that all debts are always paid in full. This makes the NCM core model essentially non-monetary, with no meaningful role for banks, liquidity or solvency constraints. Therefore, one of the main features of real world economies, namely the nature of money as an indirect debit-credit relationship, is conspicuously ignored.[2] Any IOU is and will be accepted in exchange for goods and services in the NCM core model. In other words, there is no need for money in the model (Arestis, 2014, pp. 5-10).

The main implication of the NCM theory is that monetary policy has been upgraded as the most powerful macroeconomic instrument in the hands of the government. The central bank via interest rate manipulation is in charge of achieving the desired inflation target, and subject to that to deliver as much output stabilisation as possible in the short run. By contrast, drawing on the so-called Ricardian equivalence theory and controversial interpretations of historical evidence, fiscal policy is limited to the control and sustainability of public finances. This had led to a so-called "consensus assignment" on the interaction between monetary and fiscal policies:

> The consensus assignment from the title refers to the idea that monetary policy (in a closed economy, or a small open economy with flexible exchange rates) should normally focus on business cycle stabilisation and inflation control, while fiscal policy (at the macro level) should focus on the control of government debt or deficits (Kirsanova et al., 2009, F482).

This paper rejects the transversality condition, and it challenges the current dominant consensus assignment. It aims to show that: (a) banks, liquidity and solvency constraints do matter; and (b) monetary policy has the maximum effect in stimulating aggregate demand and income when it is implemented with a coordinated discretionary fiscal policy

[2] See, for an historical analysis of the role of money and banking in different theoretical frameworks, Realfonzo (1998).

that boosts the demand for and the supply of loans, via the reduction of the liquidity risk and the insolvency risk.[3]

A word of caution is important here about the contribution of this paper vis-à-vis the NCM theory and policy implications. Building on the MTP, the case could be made that the current role played by monetary policy in the NCM is unwarranted, and that fiscal policy should be the main macroeconomic policy. The case could rest on the following two reasons. First, fiscal policy could be used at least as efficiently as monetary policy for a variety of goals, including high levels of income and employment, and price stability (Fontana, 2009b; Forges Davanzati, Pacella and Realfonzo 2009). Secondly, changes in the short-run nominal interest rate set by the central bank may not always translate in changes in the interest rate on loans, which in turn may not always lead to changes in aggregate demand and income, i.e. the NCM view of monetary policy is too mechanistic (Kriesler and Lavoie, 2007).

Whatever the merit of the proposal of replacing monetary policy with fiscal policy as the main macroeconomic policy, this paper has a different objective. It aims to analyse how fiscal policy could conveniently interact with the monetary transmission mechanism in order to achieve high levels of income, while upholding the emphasis of the NCM on monetary policy and current policy making around the world. In order to understand this point, it must be stressed that the aggregate demand may not be significantly affected by changes in the short nominal interest rate set by the central bank as long as the demand for loans and the supply of loans do not change. Therefore, the factors influencing the

[3] See, on the role of the aggregate banking system (i.e. commercial banks and the central bank) and fiscal authorities in the Keynesian multiplier process, Kahn (1931, pp. 174-175), Trevithick (1994, p. 78), and more recently Rochon (2014).

demand for and the supply of loans play an important role in the transmission mechanism of monetary policy. Then, the argument advanced in this paper is that fiscal policy can influence these factors, and hence interact purposefully with monetary policy in order to achieve high levels of aggregate demand and income.

There are different factors influencing the supply of loans. Building on the MTP, this paper gives priority to the role of mark-ups in the money supply process.[4] Commercial banks set the interest rate on loans as a mark-up on the short-run nominal interest rate set by the central bank. Therefore, the mark-up plays an important role in transmitting the interest rate policy changes of the central bank to the economy (Lavoie, 1984, 2014; Moore, 1988; Fontana, 2009a). For instance, if the central bank reduces the short-run nominal interest rate with the purpose of stimulating bank lending and hence interest rate sensitive components of aggregate demand, commercial banks may respond to this policy by increasing the mark-up, and in this way they may thwart the efforts of the central bank. The mark-up thus performs a strategic function in the transmission mechanism of monetary policy (Fontana and Setterfield, 2009). Importantly, the mark-up depends on the credit risks, namely the insolvency and liquidity risks. Discretionary government spending policies financed by borrowing from the central bank in conjunction with an accommodative monetary policy can contribute to reduce those risks. In order to reduce the credit risks, in fact, the central bank can exchange relatively liquid assets (represented by government bonds) with comparatively illiquid assets (private debt held by banks as

[4] Alternatively, the focus could be on the creditworthiness status of borrowers (Wolfson, 1996). Lavoie (2004, pp. 143-144) analyses the role of the creditworthiness status of borrowers in a stock-flow consistent representation of MTP. In this paper, the creditworthiness status of borrowers is represented by the parameter γ, which represents the proportion of desired loans that are deemed creditworthy by banks, and it is left into the background of the analysis.

result of their lending activity). By doing this, the central bank helps to make the portfolio of commercial banks more liquid, and hence ceteris paribus this encourages banks to increase the supply of loans in order to accommodate any unsatisfied demand for loans. However, this policy on its own may not produce the expected results, as long as the demand for loans is not stimulated. In addition to provide government bonds to the central bank, which can then be exchanged for private assets held by banks, discretionary government spending policies are an important tool in influencing the demand for loans. A discretionary fiscal policy is likely to increase aggregate demand and income, and hence it stimulates the demand for loans and the amount of private resources that borrowers can devote to the reimbursement of their debts.

3. An MTP-inspired Model

3.1 Main Features and Assumptions

The model presented in this paper includes a private sector and a government sector. The private sector comprises workers, firms and commercial banks (banks, for short). The government sector is made of the treasury and the central bank. The economy is closed and produces one commodity, which is used both as a consumption and investment good. Government bonds B and private bank debts D of firms are the only financial assets traded in the economy.

Firms finance the production process by borrowing from banks. The total amount of bank loans L is negotiated between banks and firms, and is influenced by the expected level of aggregate demand AD^e and the loans rate i. Firms fix the price p of the only commodity produced as a mark-up on the unit labour cost. Furthermore, firms use a portion τ of their profits Π_F to fund their investments I.

On their part, banks set the interest rate on loans (the loans rate, for short) i as a mark-up on the short-run nominal interest rate i_{CB} set by the central bank. This means that the loans rate increases when the short-run nominal interest rate i_{CB} increases, and/or when the mark-up set by banks increases. The mark-up depends positively on the credit risks σ_{CR}, which in turn depend positively on the liquidity risk σ_L and the insolvency risk σ_I. The liquidity risk is the risk that banks may not be able to meet their obligations as they become due. The insolvency risk is a measure of bad loans. It concerns the possibility that firms do not reimburse, totally or partially, their bank debts.

In line with Graziani's theory and his interpretation of the role of money in the General Theory of Keynes (Keynes, 1936), it is also assumed that in normal circumstances firms are indebted to banks (Graziani, 2003a, 69-71). In analytical terms, this means that the equilibrium condition of firms in a monetary economy in stationary conditions is associated with the existence of a constant amount of bank debt. Therefore, the analysis below starts with a cumulated amount of private bank debts D of firms.

The treasury is in charge of government expenditure, while for the sake of simplicity taxes are ignored.[5] The treasury finances government expenditure G by borrowing from the central bank. The treasury obtains high powered money H from the central bank in

[5] More realistically, the treasury could either change government purchases (for consumption or investment purposes) and/or change taxes (lump sum or distortionary taxes like labour, corporate and value-added taxes) net of transfer. The NCM literature focuses on government purchases for the simple reason that modern Inflation Targeting (IT) central banks have historically changed their policy rate, namely the short-run nominal interest rate, when fiscal policy is accomplished mainly through changes in government purchases rather than changes in taxes. The main reason for this preference is that central banks interpret the former as a signal of a stronger commitment to fiscal (in)discipline (see, for instance, IMF 2010, pp. 102-105). Consistently with the NCM literature, this paper focuses on government purchases rather than taxes.

exchange for government bonds B. In turn, with the purpose of increasing the liquidity portfolio of banks, the central bank transfers part of the government bonds to banks in exchange for some of their accumulated stock of private bank debts D of firms. For the sake of simplicity the interest rate on government bonds is nil.

Finally, the model operates within a Hicksian single period analysis (Fontana, 2004), i.e. it is based on the simplifying assumption that within the period considered all macroeconomics agents hold constant expectations. This assumption helps to interpret real causal structures as temporally stable, though not inherently predictable, and in this way it aids to detect the mechanisms and tendencies regulating actual events. For the purpose of this paper, this means that the single period analysis of the co-ordinated effects of an accommodative monetary policy and discretionary fiscal policy will continue for a sufficiently long period of time for the outcome of the lending process of banks triggered by the production decisions of firms to become apparent, or, what is the same thing, for the effects of the creation of money on aggregate demand, and income to be revealed (Fontana, 2009a, pp.78-84).

3.2 A Formal Analysis of the Loans Market

The core of the model is represented by the loans market, its role in the transmission mechanism of monetary policy, and the way discretionary fiscal policy can purposefully interact with it, in order to achieve high levels of aggregate demand, income, and employment. The rest of this section presents a formal analysis of the loans market, starting with the set of equations for the loans rate, the demand for and the supply of loans.

The loans rate i is set by banks as a mark-up on the central bank rate i_{CB}, with the mark-up being determined among other things by the credit risks σ_{CR}, namely the weighted mean between the liquidity risk σ_L and the insolvency risk σ_I:

$$i = i_{CB}\,(1 + \mu_0 + \mu_1\sigma_{CR}) = i_{CB}\{1 + \mu_0 + \mu_1[\phi\,\sigma_L + (1 - \phi)\sigma_I]\} \qquad [1]$$

where μ_0 is the mark-up depending on the degree of concentration of the banking sector, μ_1 is the marginal mark-up on the credit risks, ϕ and (1-ϕ) are the weights assigned by banks to the liquidity risk and the insolvency risk, respectively.

Equations [2] and [3] below define the liquidity risk and the insolvency risk, respectively. The liquidity risk σ_L is measured by the illiquid assets D to the own funds OF (equity capital of banks) ratio (Lavoie, 2014, p. 198). The insolvency risk σ_I is determined by the bank debts D to the income Y ratio of firms.

$$\sigma_L^{DEF} \equiv \frac{D}{OF} \qquad [2]$$

$$\sigma_I^{DEF} \equiv \frac{D}{Y} \qquad [3]$$

The coordinated effects of the discretionary fiscal policy and accommodative monetary policy described above has the potential of lowering both the liquidity risk and the insolvency risk.

Equation [2a] and Equation [3a] below shows the effects on the liquidity risk and the insolvency risk of the coordinated discretionary fiscal policy and accommodative monetary policy:

$$\sigma_L = \frac{D-\omega_1 B}{OF} \qquad [2a]$$

$$\sigma_I = \frac{D+L}{Y^e} \qquad [3a]$$

Since discretionary fiscal policy has a direct and immediate effect on aggregate demand, an increase in government expenditure G has a positive effect on the income of

firms. In addition to this, an increase in government expenditure G has a dual positive effect in the credit market, encouraging both the demand for and the supply of loans. Starting with the former, at the beginning of the period when the treasury increases government expenditure G by exchanging government bonds B for high powered money H with the central bank, firms expect an increase in the sales of their commodity. As a result, firms increase the demand for loans, since they need to pay workers before the production process can start. In the described circumstances, banks are more likely to satisfy this increasing demand for loans: as long as the value of the new expected income Y^e lower the insolvency risk more than the new cost of loans L increase it, the capacity of firms to reimburse banks debts improves. The formal condition for this outcome can be derived from Equation [3a] as follows:

$$d\sigma_I = \frac{\partial \sigma_I}{\partial Y^e} dY^e + \frac{\partial \sigma_I}{\partial L} dL = -\frac{D+L}{(Y^e)^2} dY^e + \frac{dL}{Y^e} < 0$$

$$\frac{dY^e}{dL} > \frac{Y^e}{D+L} \qquad [3b]$$

Equation [3b] above derives the formal condition for a reduction in the insolvency risk ratio expected by banks to hold true in Equation [3a].

Furthermore, when the central bank transfers a portion ω_1 of B to banks in exchange for ω_2 of their accumulated stock of private debt D, banks are more likely to increase the supply of loans: as long as government bonds are deemed to be more liquid than private bank debts, the accommodative policy of the central bank raises the liquidity portfolio of banks. In other words, banks face a lower liquidity risk when making new loans.

Substituting Equation [2a] and Equation [3a] into Equation [1], the loan rate is defined as follows:

$$i = i_{CB}\left[1 + \mu_0 + \mu_1\left(\phi\,\frac{D-\omega_1 B}{OF} + (1-\phi)\,\frac{D+L}{Y^e}\right)\right] \qquad [4]$$

Equation [4] shows that the loans rate decreases if ceteris paribus the credit risks faced by banks decrease.

Equation [5] below shows that the notional or desired demand for loans at the beginning of the period depends positively on the expected aggregate demand AD^e and negatively on the loans rate i:

$$L^d = a + bAD^e - ci \qquad [5]$$

where $a > 0$ is the autonomous component of the demand for loans, and b > 0, and $c > 0$.

However banks are only concerned with creditworthy borrowers. Then, Equation [5a] below shows the effective or actual demand for loans, where γ represent the proportion of notional loans that are deemed creditworthy by banks.

$$L^d = \gamma\,(a + bAD^e - ci) \qquad [5a]$$

where $0<\gamma\leq 1$.

The supply of loans L^s is a perfectly elastic line at the loans rate fixed by banks at the beginning of the period (Moore, 1988; Fontana, 2009, Ch. 5). Given the demand for and the supply of loans, the total amount of loans actually created is equal to the wage bill wN, which is necessary in order to hire workers and make effective the production plans of creditworthy firms:

$$wN = \gamma(a + AD^e) - \gamma ci_{CB}\left[1 + \mu_0 + \mu_1\left(\phi\,\frac{D-\omega_1 B}{OF} + (1-\phi)\,\frac{D+L}{Y^e}\right)\right] \qquad [6]$$

Equation [6] shows that the wage bill is influenced among other things by the expected aggregate demand, the proportion of loans that are deemed creditworthy, the short-run nominal interest rate set by the central bank, and the liquidity and insolvency risks.

4. Loans Market, Good Market and the Super Multiplier

The loans market presented in the previous Section is intimately connected to the goods market via the effects of the loans rate, and the liquidity and insolvency risks on aggregate demand and income.[6] Coordinated fiscal and monetary policies can purposely interact in order to influence these variables, and achieve high levels of aggregate demand and income. This Section derives the income and related expenditures of workers, banks and firms, together with the equilibrium in the good market between aggregate demand and aggregate supply, before exploring through a graphical analysis the coordinated effects of the discretionary fiscal policy and accommodative monetary policy.

The total level of output produced is equal to $p\pi N$, where p, π, and N indicate the price of the commodity, the productivity of workers and the level of employment, respectively. Firms set p as a mark-up ε on the unit labour costs, namely $p = \frac{w}{\pi}(1+\varepsilon)$, where w is the nominal wage. Therefore, the total level of output produced is as follows:

$$Y = wN(1+\epsilon) \qquad [7]$$

Equation [8] below shows the wage bill, i.e. the income of workers:

$$wN = \frac{Y}{1+\varepsilon} \qquad [8]$$

The profits of banks are determined by the difference between revenues and costs. For simplicity, it is assumed that banks do not have costs, i.e. there are no costs for equipment and for paying wages and salaries to their employees, and the interest rate on bank

[6] The parameter γ representing the proportion of notional loans that are deemed creditworthy by banks is another key variable linking the loans market to the goods market. The analysis of the effects of the parameter γ on aggregate demand and income is not pursued in this paper, and left to future studies.

deposits is nil.[7] It follows that the profits of banks correspond to the repayments of the interest rate on the loans L and on the accumulated private debts D by firms:

$$\Pi_B = iD + iL = i\left(D + \frac{Y}{1+\varepsilon}\right) \quad [9]$$

The profits of firms are again determined by the difference between revenues and costs. In the simple model presented here, the costs of firms are equal to the wage bill $\left(\frac{Y}{1+\varepsilon}\right)$, and the interests paid on both the initial stock of debt outstanding D, and the new loans L. The revenues are represented by the consumption of workers C, the expenditure of banks R, the government expenditure G, and the investments of firms I. It follows that the profits of firms are as follows:

$$\Pi_F = C + R + G + I - \frac{Y}{1+\varepsilon} - i\left(D + \frac{Y}{1+\varepsilon}\right) \quad [10]$$

From equation [8], the consumption of workers C is derived as follows:

$$C = \alpha_W wN \quad [11]$$

where α_W is the marginal propensity to consume of workers, with $0 < \alpha_W \leq 1$.

Similarly, from equation [9] the expenditure of banks in the current period is equal to:

$$R = \alpha_B(iD) \quad [12]$$

Equation [12] shows that the expenditure of banks depends on the marginal propensity to consume of banks α_B, with $0 < \alpha_B \leq 1$, and the repayment of interest rates on the accumulated private debts. The repayment of the interest rate on loans L by firms accrues

[7] In order to keep the model as simple as possible, when calculating the equilibrium in the good market (Equation [16]), it is assumed that in the current period workers spend all of their income, which amounts to say that there are no additional bank deposits, and therefore the interest rate on additional deposits is redundant once the production process is completed.

to the income of banks in the current period, but it is assumed they are not spent, and increase the own funds of banks. This is consistent with the definition of the monetary circuit offered by Graziani: "once the initial bank debt is repaid and the money is destroyed, the monetary circuit is closed" (Graziani, 2003a, p. 30; see, Zezza (2012), for a different interpretation[8]).

Equations [13a]-[13b] shows that firms plan to invest a portion τ of their expected profits (Π_F^e)[9] and use the excess of realised profits (Π) over investment in order to pay back a share β_1 of their accumulated private debts D, with $0 < \tau < 1$ and $0 \leq \beta_1 < 1$:[10]

$$I = (\tau)\Pi_F^e \qquad [13a]$$

$$\beta_1 D = \Pi_F - I \qquad [13b]$$

In the rest of the paper, it is assumed that expected profits Π_F^e are equal to realised profits Π_F. Given the above relationships, Equation [14] and Equation [15] below shows

[8] Zezza (2012, p. 164) argues that interest payments on loans constitute a source of income for banks, and hence an additional source of either the demand for goods or for financial assets. This is undeniable. But, consistently with the monetary circuit theory, this papers maintains that the repayment of the interest rate on loans is an additional source of the demand for goods (financial assets are ignored in this paper) for the next monetary circuit, rather than the current monetary circuit. By contrast, the repayment of the interests on the accumulated private debts D is a source of additional demand for goods in the current period.

[9] Monetary circuit theorists distinguish the financing of the entire production plans for both consumption and capital goods, the so-called initial finance, from the purchase of capital goods, the so-called final finance or funding of investment (Graziani, 2003, p. 56, pp. 69-74; see, also on this distinction, Chick, 1995, pp. 30-31; Davidson, 1982, p. 49; Godley and Lavoie, 2007, p. 50): i.e. monetary circuit theorists related the funding of gross investment to realised corporate profits (Graziani, 2003, p. 71-74), what are also labelled the retained earnings of corporations.

[10] The paper assumes that $0 \leq \beta_1 < 1$. This is consistent with the standard circuitist proposition that in normal circumstances firms are indebted to banks (Graziani, 2003, 69-71; see, also, discussion in Section 3.1).

the equation for the aggregate demand, and the equilibrium in the good market, respectively:

$$AD = C + I + R + G = \frac{Y[\alpha_W - \tau(1+i)]}{(1+\varepsilon)(1-\tau)} + \frac{G - Di(\tau - \alpha_B)}{1-\tau} \quad [14]$$

$$Y^E = \frac{1+\varepsilon}{(1+\varepsilon)(1-\tau) - \alpha_W + \tau(1+i)}[G - iD(\tau - \alpha_B)] \quad [15]$$

Equation [16] below shows the equilibrium in the good market. It is derived under few simplifying assumptions. First, it is assumed that firms plan to invest the full amount of their expected profits, i.e. $\tau = 1$. As a result, $\beta_1 D = 0$, i.e. the repayment of previously accumulated private debts D is postponed to future periods. Furthermore, for simplicity it is also assumed that the marginal propensity to consume of workers and of banks are all equal to one ($\alpha_W = 1;\ \alpha_B = 1$):

$$Y^E = \frac{1+\varepsilon}{i}(G) \quad [16]$$

Among other things, Equation [16] indicates that there is a direct relationship between government expenditure, and the equilibrium level of income in the good market. Furthermore, the loans rate affects the value of the multiplier: the higher the loans rate, the lower is the multiplier.

Equation [17] below is derived by substituting Equation [4] into Equation [16]. Among other things, and under the few simplifying assumptions discussed above, it makes explicit that the equilibrium in the good market is also affected by the short-run nominal interest rate set by the central bank, and the liquidity risk and the insolvency risk faced by banks.

$$Y_1^E = \frac{1+\varepsilon}{i_{CB}\left[1 + \mu_0 + \mu_1\left(\phi\frac{D - \omega_1 B}{OF} + (1-\phi)\frac{D+L}{Y^e}\right)\right]}(G) \quad [17]$$

Equation [17] confirms that an accommodative monetary policy – as defended in the NCM theory and supported by current practice around the world – has the maximum

effect in stimulating aggregate demand and income, when it is implemented with a discretionary fiscal policy that boosts the demand for and the supply of loans, through the reduction of the liquidity risk and the insolvency risk. As a result of it, the potentially beneficial effects of the traditional Keynesian fiscal multiplier are significantly amplified, potentially giving rise to a super multiplier of government expenditure.

Figure 1 below is a two-panel diagram representing the loans market and the good market. It shows the coordinated effects of the expansionary fiscal policy and the accommodative monetary policy.

PLEASE INSERT FIGURE 1

The upper panel portrays the loans market. The supply of loans is represented by a perfectly elastic line at the loans rate set by banks. The effective demand for loans is represented by a decreasing linear function of the loans rate. It shifts in response to change in the expected aggregate demand AD^e, and in the parameter γ representing the proportion of notional loans that are deemed creditworthy by banks. The effective demand for and the supply of loans determine the total volume of credit, which allows firms to secure the labour services from workers and to produce the only commodity, which is used both as a consumption and investment good. The lower panel portrays the level of income as a function of bank loans.

The initial level of income is supposed to be Y_1. This level of output is financed by the volume of loans L_1 (point A). An increase in government expenditure G has a positive effect on the expected aggregate demand, and hence the demand for loans shifts rightwards. Furthermore, when the treasury increases government expenditure, firms expect an increase in the sales of their good. Since firms need loans in order to pay workers before the production of the good can start, they increase the demand for loans.

Given the circumstances, banks are likely to satisfy the rising demand, i.e. banks revise downwards their assessment of the insolvency risk of firms. The demand for loans shifts further rightwards. Figure 1 shows the final effect of these shifts: the demand for loans moves from L_1^d to L_2^d.

Furthermore, the coordinated accommodative monetary policy has a positive effect on the liquidity risk, and, ceteris paribus, on the supply of loans. The treasury finances government expenditure by exchanging government bonds for high powered money with the central bank, which in turn, then swaps government bonds for some of the initial accumulated stock of private debt held by banks. As a result, banks revise downwards their assessment of the liquidity risk, and the loans rate is reduced from i_1 to i_2. Figure 1 shows that the supply of credit shifts downwards from L_1^S to L_2^S, and the new volume of loans is L_2 (point B). The new and higher level of output in the good market is Y_2.

5. A Stock-Flow Consistent Representation of the Model

This section presents the transaction flow matrices of the analysis proposed above together with a simplified sectoral balance sheet matrix. Transaction flow matrices are the backbone of the increasingly popular stock-flow consistent (SFC) approach to macroeconomics (Lavoie, 2004; Godley and Lavoie, 2007). Transaction flow matrices tie together real decisions with monetary and financial consequences, providing a comprehensive and coherent account of the model.

The golden rule of the transaction flow matrices is that all the rows and all the columns must sum to zero. Rows represent the flows of transactions for each asset or activity, whereas columns represent the budget constraint of each sector, namely workers, firms, banks, the central bank and the treasury. For each sector, sources of funds take a positive

sign, and uses of funds take a negative sign. For instance, the proceeds of a sale or the receipts of a monetary flow are an inflow, hence they take a positive sign. By contrast, the purchase of a commodity or the acquisition of high-powered money or bank deposits are an outflow, and they take a minus sign.

PLEASE INSERT TABLES 1-2

Tables 1-2 describe the coordinated effects of the discretionary fiscal policy and the accommodative monetary policy, respectively. In Table 1, the treasury sells bonds to the central bank (+ΔB) in exchange for high-powered money (-ΔH). Then, Table 2 above shows that the central bank exchanges ω_1 amount of government bonds B for ω_2 amount of accumulated private debts D with banks.

PLEASE INSERT TABLES 3-4

Table 3 above represents the first step of the money creation process in the loans market, as in the traditional monetary theory of production (e.g. Godley and Lavoie, 2007, pp. 47-49). Firms borrow (L)[11] from banks, and as a result an equivalent amount of deposits ($-\Delta M_L$) are created. Table 3 clearly illustrates what in the SFC approach is labelled a quadruple-entry system. Since the golden rule of the transaction flow matrix holds all the time, a change in one component of the table entails a change in other three components.

Table 4 shows the second step of the traditional money creation process. Firms pay the wage fund (-wN) to workers in exchanges for their labour services, and as a result firms

[11] In the SFC modelling literature, flow variables are indicated with the sign Δ. However, consistently with the use in previous sections of the paper, *L* indicates the flow of bank loans and no use of the sign Δ is made for this variable.

transfer the ownership of their bank deposits ($+\Delta M_L$) to workers. The production process is then realised. However, at this stage the produced good is still unsold, hence for firms it appears as both an increase in the inventories (+I in the current account) and an acquisition of capital (-I in the capital account).

PLEASE INSERT TABLE 5

Tables 5 and 6 represent the final steps of the analysis. Table 5 above shows what happens to the total amount of output produced. Workers spend their wages to buy the commodity (-C), and as a result they transfer the ownership of bank deposits ($+\Delta M_C$) to firms. The treasury executes the government expenditure G. It pays firms by drawing cheques on its account, which once cashed at the banks ($+\Delta M_G$ and $-\Delta H$), they create an equal amount of bank deposits ($-\Delta M_G$) for firms. Firms repay β_1 amount of accumulated private debts D ($-\beta_1 D$) and interest rates iD ($-INT_B$) to banks, and accordingly there is a corresponding change in the ownership of bank deposits ($+\Delta M_D$). Banks spend the earned interest rates to buy the commodity (-R), with a consequent transfer the ownership of bank deposits ($+\Delta M_R$) to firms.

PLEASE INSERT TABLE 6

Table 6 above represents the closure of the single period monetary circuit analysis. Firms repay loans (-L) and related interest rates ($-INT_L$) to banks, and as a result the ownership of an equivalent amount of deposits ($+\Delta M_{LL}$) is transferred to banks.

Finally, Table 7 below presents a simplified sectoral balance sheet matrix (Godley and Lavoie, 2007, pp. 31-32).

PLEASE INSERT TABLE 7

The simplified sectoral balance sheet matrix follows the same golden rule of the transaction flow matrices, namely that all the rows and all the columns must sum to zero, with the exception of the first row dealing with tangible capital. The actual stock of machines and inventories accumulated in the economy K_F appears in a single entry of the sectoral balance sheet of their owners, i.e. firms. Similarly, the net worth of the economy as represented by the penultimate row is equal to the value of tangible capital K_F,

6. Conclusions

The NCM theory maintains that monetary policy, namely changes in the short-run nominal interest rate set by the central bank, affects aggregate demand and income in the short run. Drawing on the contributions of Augusto Graziani to the so-called monetary theory of production (MTP), this paper has argued that monetary policy does not affect significantly aggregate demand as long as the demand for loans and the supply of loans do not change. Therefore, the factors influencing the loans market play an important role in the transmission mechanism of monetary policy.

Commercial banks set the loans rate as a mark-up on the short-run nominal interest rate set by the central bank. This mark-up is a measure of the credit risks, namely the insolvency risk and the liquidity risk faced by banks for their lending activities to firms. The paper has shown that a deficit spending policy by the government financed by borrowing from the central bank contribute to reduce the credit risks, and hence the mark-up on the short-run nominal interest rate. In this way, the treasury and the central bank help to increase both the demand for and the supply of loans. As a result of this mix of expansionary fiscal policy and accommodative monetary policy, the traditional Keynesian deficit spending multiplier is significantly amplified, potentially giving rise to

a super multiplier of government expenditure, with high levels of aggregate demand and income.

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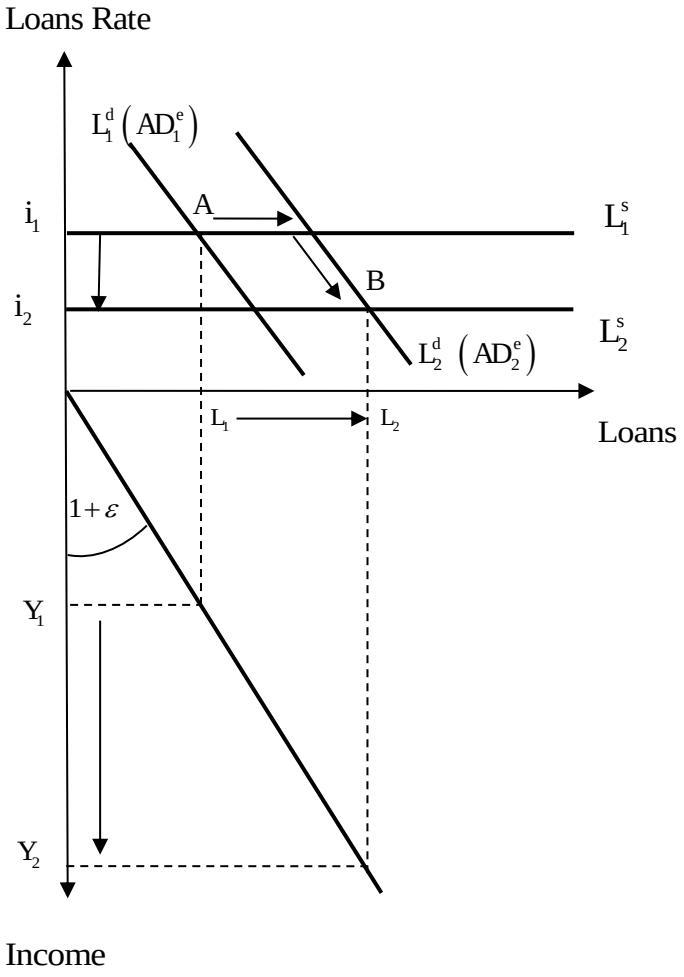

Figure 1: The Coordinated Effects of the Expansionary Fiscal Policy and Accommodative Monetary Policy

List of Tables

	Workers	Firms	Banks	Central Bank	Treasury	∑
Consumption						
Investment						
Banks expend.						
Gov. expend.						
Wages						
Δ Loans						
Loans inter.						
Δ Deposits						
Δ H				+ΔH	-ΔH	0
Δ Gov. Bonds				-ΔB	+ΔB	0
Δ AccPrivDeb						
AccPrivDeb inter.						
∑				0	0	0

Table 1: Government expenditure financed by the central bank

	Workers	Firms	Banks	Central Bank	Treasury	∑
Consumption						
Investment						
Banks expend.						
Gov. expend.						
Wages						
Δ Loans						
Loans inter.						
Δ Deposits						
Δ H				+ΔH	-ΔH	0
Δ Gov. Bonds			$-\omega_1 B$	$-\Delta B + \omega_1 B$	+ΔB	0
Δ AccPrivDeb			$+\omega_2 D$	$-\omega_2 D$		0
AccPrivDeb inter.						
∑			0	0	0	0

Table 2: Discretionary fiscal policy and accommodative monetary policy

	Workers	Firms	Banks	Central Bank	Treasury	∑
Consumption						
Investment						
Banks expend.						
Gov. expend.						
Wages						
Δ Loans		+L	-L			0
Loans inter.						
Δ Deposits		$-\Delta M_L$	$+\Delta M_L$			0
Δ H				+ΔH	-ΔH	0
Δ Gov. Bonds			$-\omega_1 B$	$-\Delta B + \omega_1 B$	+ΔB	0
Δ AccPrivDeb			$+\omega_2 D$	$-\omega_2 D$		0
AccPrivDeb inter.						
∑		0	0	0	0	0

Table 3: Firms negotiate and receive loans from banks

	Workers	Firms	Banks	Central Bank	Treasury	∑
Consumption						
Investment		+I -I				0
Banks expend.						
Gov. expend.						
Wages	+wN	-wN				0
Δ Loans		+L	-L			0
Loans inter.						
Δ Deposits	$-\Delta M_L$	$-\Delta M_L + \Delta M_L$	$+\Delta M_L$			0
Δ H				+ΔH	-ΔH	0
Δ Gov. Bonds			$-\omega_1 B$	$-\Delta B + \omega_1 B$	+ΔB	0
Δ AccPrivDeb			$+\omega_2 D$	$-\omega_2 D$		0
AccPrivDeb inter.						
∑	0	0	0	0	0	0

Table 4: Firms hires workers and start production process

	Workers	Firms	Banks	Central Bank	Treasury	∑
Consumption	-C	+C				0
Investment						
Banks expend.		+R	-R			0
Gov. expend.		+G			-G	0
Wages	+wN	-wN				0
Δ Loans		+L	-L			0
Loans inter.						
Δ Deposits	$-\Delta M_L + \Delta M_C$	$-\Delta M_G - \Delta M_C + \Delta M_D - \Delta M_R$	$+\Delta M_G + \Delta M_L - \Delta M_D + \Delta M_R$			0
Δ H			-ΔH	+ΔH	-ΔH +ΔH	0
Δ Gov. Bonds			$-\omega_1 B$	$-\Delta B + \omega_1 B$	+ΔB	0
Δ AccPrivDeb		$-\beta_1 D$	$+\omega_2 D + \beta_1 D$	$-\omega_2 D$		0
AccPrivDeb inter.		$-INT_B$	$+INT_B$			0
∑	0	0	0	0	0	0

Table 5: The commodity is sold

	Workers	Firms	Banks	Central Bank	Treasury	∑
Consumption	-C	+C				0
Investment		+I -I				0
Banks expend.		+R	-R			0
Gov. expend.		+G			-G	0
Wages	+wN	-wN				0
Firms Net Profits		$+\Pi_{UN}$ $-\Pi_{UN}$				0
Δ Loans		+L -L	-L +L			0
Loans inter.		$-INT_L$	$+INT_L$			0
Δ Deposits	$-\Delta M_L$ $+\Delta M_C$	$-\Delta M_G$ $-\Delta M_C$ $+\Delta M_D$ $-\Delta M_R$ $+\Delta M_{LL}$	$+\Delta M_G+\Delta M_L$ $-\Delta M_D+\Delta M_R$ $-\Delta M_{LL}$			0
Δ H			-ΔH	+ΔH		0
Δ Gov. Bonds			$-\omega_1 B$	$-\Delta B$ $+\omega_1 B$	+ΔB	0
Δ AccPrivDeb		$-\beta_1 D$	$+\omega_2 D$ $+\beta_1 D$	$-\omega_2 D$		0
AccPrivDeb inter.		$-INT_B$	$+INT_B$			0
∑	0	0	0	0	0	0

Table 6: The closure of the single period monetary analysis

	Workers	Firms	Banks	Central Bank	Treasury	∑
Tangible Capital		$+K_F$				$+K_F$
Firms debt		-D	$+D_B$	$+D_{CB}$		0
Reserves			+H	-H		0
Deposits	$+M_D$		$-M_D$			0
Gov. bonds			$+B_B$	$+B_{CB}$	-B	0
Banks own funds	+OF		-OF			0
Net worth	$-NW_W$	$-NW_F$	$-NW_B$	0	$-NW_T$	$-K_F$
∑	0	0	0	0	0	0

Table 7: A simplified sectoral balance sheet matrix