THE THEORETICAL FOUNDATIONS OF CENTRAL BANK'S SEPARATION PRINCIPLE, THE RISING IMPORTANCE OF THE UNIT OF ACCOUNT AND THE NEED FOR A DYNAMIC MONETARY POLICY

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ABSTRACT

The separation principle guides central banks' mandates, giving priority to price over financial stability. The former requires specifying the conditions that make the monetary system determinate. Money must be above all a medium of exchange and monetary policy must be neutral with respect to distribution effects on income and expenditure, and on the holdings of financial assets. This implies that the inclusion of the financial sector is irrelevant or redundant to the aim of maintaining price stability. This view is exemplified by Neo-Walrasian monetary theory (NWMT) which is the basis of inflation targeting. Since the Global Financial Crisis (2008-2009), the growing recognition that monetary policy has major effects on financial conditions and the real economy has underscored the

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role of money as unit of account. This poses major challenges for the separation principle and its theoretical foundations. The paper proposes the adoption of a dynamic monetary policy framework as first step to address these limitations.
Keywords: Central bank, dollarization, medium of exchange, Neo-Walrasian monetary theory (NWMT), price stability, separation principle, unit of account.
JEL Classification: B22, B50, E12, E13, E42, E44, F41.

LOS FUNDAMENTOS TEÓRICOS DEL PRINCIPIO DE SEPARACIÓN DEL BANCO CENTRAL, LA CRECIENTE IMPORTANCIA DE LA UNIDAD DE CUENTA Y LA NECESIDAD DE UNA POLÍTICA MONETARIA DINÁMICA

RESUMEN

El principio de separación guía los mandatos de los bancos centrales, dando prioridad a la estabilidad de precios sobre la estabilidad financiera. El primero requiere especificar las condiciones que hacen que el sistema monetario sea determinado. El dinero debe ser sobre todo un medio de cambio y la política monetaria debe ser neutral respecto a los efectos de distribución sobre los ingresos y los gastos, y sobre las tenencias de activos financieros. Esto implica que la inclusión del sector financiero es irrelevante o redundante para el objetivo de mantener la estabilidad de precios. Este punto de vista se ejemplifica con la teoría monetaria neowalrasiana (NWMT), que es la base del esquema de metas de inflación. Desde la crisis financiera mundial de 2008-2009, el creciente reconocimiento de que la política monetaria tiene efectos importantes en las condiciones financieras y la economía real ha puesto en evidencia el papel del dinero como unidad de cuenta. Esto plantea grandes desafíos para el principio de separación y sus fundamentos teóricos. El documento propone la adopción de un marco dinámico de política monetaria como un primer paso para enfrentar estas limitantes.
Palabras clave: Banco central, dolarización, medio de cambio, teoría monetaria neowalrasiana (NWMT), estabilidad de precios, principio de separación, unidad de cuenta.
Clasificación JEL: B22, B50, E12, E13, E42, E44, F41.

1. INTRODUCTION

Central bank's monetary policy in most developed and developing economies is guided by the "separation principle." It postulates that monetary policy stance considerations can be separated from financial stability concerns, and each objective requires a different set of tools (see Schnabel, 2023; Shin, 2010). The separation principle underscores the hierarchical role given to price over financial stability.

Maintaining price stability requires specifying the conditions that make the monetary system determinate. These are that money be considered mainly or solely as medium of exchange placing this function above that of store of value and unit of account. In fact, a good part of the mainstream literature argues that the functions of unit of account, and store of value are, indeed, derived from that of medium of exchange. The unit of account property is the one that has attracted less attention (see Doepke and Schneider, 2017) and is generally viewed as the function that is the least important.

In addition, monetary policy must be neutral with respect to distribution effects on income and expenditure, and on the holdings of money or of other financial assets within an economy. This implies that the inclusion of the financial sector in monetary analysis is either irrelevant or redundant to the aim of maintaining price stability. This provides in part an explanation of why the other mandate of central banks, that of providing financial stability, is secondary in importance to that of maintaining price stability.

These two basic tenets of mainstream monetary theory and policy are most evident and are exemplified by the core principles of Neo-Walrasian monetary theory (NWMT) which is the foundation for inflation targeting. This framework has been adopted by the major central banks of the world (Bank of England, Bank of Japan, European Central Bank, and Federal Reserve Board) and by a number of developing countries.

Since the Global Financial Crisis there has been a growing recognition in the mainstream literature that monetary policy has major effects on financial and real conditions (Calvo, 2016). It also impacts on the distribution of households, firms and financial institutions' income and wealth. The interaction between monetary policy, distribution, finance and financial institutions highlights the relevance of money as a means

of recording assets and liabilities and of discharging debts, that is as a unit of account. This is due in part to the widespread use of long-term and forward contracts in capitalist economies.

Also, while trade can be undertaken by promissory notes or media of exchange, not all promissory notes or media of exchange have the same standing. This is most visible at the international level where the difference in the hierarchy of monies reflects the differences in the powers of central banks. The fact that the dollar is at center of the international financial architecture and it is the dominant international reserve currency reflects the power of the Federal Reserve to guide world monetary policy and set the terms upon which dollars are available in exchange for other currencies.

This context poses a major challenge to the separation principle and to its theoretical foundations. The NWMT faces severe limitations to include long-term contracts and an open economy context. The paper proposes moving towards a dynamic monetary framework contingent on time and historical context as a first step to address these limitations. This paper is divided into seven sections. The second section explains the separation principle and its relationship with the two mandates of central banks (price and financial stability). The third section focusses on the properties of money and the importance attributed to that of medium of exchange throughout some of the major contributions to mainstream monetary thought. The focus is placed on NWMT. The fourth section explains the relationship between the medium of exchange property and the absence of distribution. This fifth section argues that the NWMT for an open economy is simply an extension of the analysis for a closed economy. The sixth section addresses the increasing importance of the property of medium of account underscoring its implications for monetary policy. The last section provides arguments in favor of a dynamic monetary framework.

2. CENTRAL BANKS' DUAL MANDATE

The majority of central banks in the world has a dual mandate. They must maintain price and financial stability. Price stability can be defined as: "(…) an environment in which inflation is so low and stable over time that it does not materially enter into the decisions of households and firms." (Greenspan, 2001). Currently in most developed countries

price stability is equated with an inflation target of 2% annual inflation rate though this target does not have any theoretical underpinnings[2].

Maintaining financial stability is a broader mandate which includes securing the smooth and secure functioning of the interbank payment systems. It also involves the supervision and regulation of commercial banks and other financial institutions and acting as a lender of last resort during liquidity and financial crises. This function can also include dealing with financial risks related to climate change.

In practice, central banks play a key role in payments systems because they are generally settled in central bank money (BIS, 2003, p. 2). Also, central banks need to monitor the financial institutions that borrow from it and prevent contagious systemic crises (act as a lender of last resort) (Goodfriend and King, 1988; Goodhart, 1993, 1995).

Both mandates (price and financial stability) are not generally integrated or complementary and may pull in opposite directions. Complying with each one requires the use of different instruments[3]. Interest rates are used to maintain price stability by closing the gap between the excess of the level of aggregate demand over the long-run level of aggregate supply (*i.e.*, the full employment level of output) determined by non-monetary forces ["(…) the capacities of the people, their industry and ingenuity, the resources they command, their mode of economic and political organization." (Friedman and Schwartz, 1971 [1963], p. 696)].

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[2] The 2% target has its origins in the remarks provided by a New Zealand finance minister (Roger Douglas) in 1988 to a television interview.

[3] This is exemplified by Bernanke (2002): "(…) the Fed has two broad sets of responsibilities. First, the Fed has a mandate from the Congress to promote a healthy economy —specifically, maximum sustainable employment, stable prices, and moderate long-term interest rates. Second, since its founding the Fed has been entrusted with the responsibility of helping to ensure the stability of the financial system. The Fed likewise has two broad sets of policy tools: It makes monetary policy, which today we think of primarily in terms of the setting of the overnight interest rate, the federal funds rate. And, second, the Fed has a range of powers with respect to financial institutions, including rule-making powers, supervisory oversight, and a lender-of-last resort function made operational by the Fed's ability to lend through its discount window. By using the right tool for the job, I mean that, as a general rule, the Fed will do best by focusing its monetary policy instruments on achieving its macro goals —price stability and maximum sustainable employment— while using its regulatory, supervisory, and lender-of-last resort powers to help ensure financial stability. "(Cited in Shin, 2010, p. 173). See also Bernanke (2022, p. 321) for a similar statement.

The dual mandate of central banks is implemented following the logic of the Tinbergen separation principle leading to a narrow view of monetary policy by making the financial stability mandate subordinate to that of price stability (Shin, 2010, p. 173; Schnabel, 2023). The Tinbergen separation principle has a long-standing intellectual history. Rather than being founded upon practical and empirical evidence, it is grounded upon theoretical developments exemplified by the developments in Neo-Walrasian monetary theory. Maintaining price stability requires identifying the necessary conditions for rendering a monetary system determinate. These are that money should be regarded as a medium of exchange rather than a store of value or unit of account and that monetary policy has no distribution effect on income, output and financial holdings.

3. THE PRIMACY OF THE MEDIUM OF EXCHANGE ROLE OVER THE FUNCTIONS OF STORE OF VALUE AND UNIT OF ACCOUNT

In *Money and the Mechanism of Exchange*, the *locus classicus* on money, William Stanley Jevons (1896 [1875], pp. 13-18) attributed four functions to money: (*i*) a medium of exchange; (*ii*) a common measure of value; (*iii*) a standard of value, and (*iv*) a store of value. The ordering of the functions reflects the priority he assigned to each one. Jevons attributed a 'high importance' to the functions of medium of exchange and common measure of value.

The common measure of value, standard of value, and store of value functions are derived from the role of medium of exchange, which "subdivides and distributes property and *lubricates* the action of exchange." (p. 15). More specifically the medium of exchange function gives rise to the common measure of value and then afterwards to the standard of value. The need to hoard the media of exchange or to carry it "[…] on a long journey or transmit it to a friend in a distant country" conveys the store of value property. Jevons is careful to point out that while the medium of exchange can be a store of value, but the opposite does not necessarily hold.

The subsequent literature combined the common measure of value with the standard of value properties into the unit of account function. In this way money came to be defined as having three properties:

(*i*) unit of account; (*ii*) medium of exchange or means of payment, and (*iii*) store of value[4].

In line with Jevons, the mainstream approach to money has always emphasized the hierarchical role of media of exchange over the rest of the functions of money[5]. Even the Hicks-Patinkin view of introducing money in the utility function which is associated with giving priority to the store of value function, is in fact founded upon the media of exchange function as will be shown below. The unit of account function is the one that has received the least attention in the literature, and this function is often equated with that of a numeraire[6]. In mainstream

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4 This is the traditional textbook presentation of the properties of money. See for example McCallum (1989, p.18), Heijdra (2017, p. 329), Mankiw (2010, pp. 80-81) and Chugh (2015, p. 217) . While this is the general case not all mainstream authors have emphasized these three properties, but all include the media of exchange function. A few examples suffice to illustrate this point. Robertson (1922, pp. 1-4) and Hicks (1989, p. 43) attribute money the properties of media of exchange and standard of value. Samuelson's first edition of his *Introduction to Economics* (1948) and more recent textbook, Carlin and Soskice (2015, p.152) place the focus on medium of exchange and unit of account.

5 Probably the most quoted source on this issue is Menger (2008 [1871]; 1991 [1892]). In his *Principles of Economics* (1892 (1991), Menger (2008 [1871], p. 276) explains that the medium of exchange becomes the unit of account measure of value): "(…) the only commodity in which all others can be evaluated without roundabout procedures is money." And goes further to assert that money is not a store of value (p. 279): "But the notion that attributes to money as such the function of also transferring 'values' from the present into the future must be designated as erroneous (…)". Von Mises (1963 [1949], p. 401) provides a more categorical statement of this view: "Money is the medium of exchange (…). This is its only function. All other functions which people ascribe to money are merely particular aspects of its primary and sole function, that of a media of exchange." Monetarism (Friedman and Schwartz, 1971 [1963]) and NWMT Hicks (1979 [1939], p. 57), Clower (1984, pp. 86, 100, 107-109) also place the emphasis on money as a medium of exchange. The belief that money is essentially a means of exchange also shapes the understanding of monetary history exemplified by such important episodes as the interpretation of the establishment of central banks and high and 'hyperinflationary episodes.' Note that the existence of money as a medium of exchange has no rationale. As explained by Patinkin (1989 (1956, p. xxix)) "most discussions of monetary theory (…) simply assume (…) that money exists and serves as unique medium of exchange in the economy."

6 The unit of account property of money became prominent during the debate over the recoinage of silver that took place in England in the late 1690s and led to a famous debate between then Treasury Secretary William Lowndes and the philosopher, and also monetary theorist John Locke. The debate revolved around whether the value of coin reflected its metallic content (Locke) or by the units in which it was denominated (Lowndes) [Green, 1992]. The debate led to the division between those economists who emphasized the

theory, the role of money as a medium of exchange (or the transaction role of money), as a lubricant of the system, is intrinsically related to its function as a store of value, or to be more precise as a temporary abode for purchasing power (Ostroy and Starr, 1990, p. 4). It is furthermore thought that since money is an asset there is no useful distinction to be drawn between the medium of exchange and the store of value functions (Gale, 1982, p. 189; Borio, 2019)[7].

Yet a medium of exchange must be also a store of value, but a store of value is not necessarily a medium of exchange. Since money' is 'the common medium through which other commodities are exchanged and thus provides ready convertibility to other commodities' the transactions role of money is the most important one (Ostroy and Starr, *Ibid*).

The fact that NWMT has paid more attention to money as a store of value as argued by Ostroy and Starr results from the theoretical construction of intertemporal general equilibrium theory. In an exchange economy, as that which forms the basis of analysis of NWMT, agents are endowed with a basket of goods prior to the start of trading, say, at time *t*, but they carry from the preceding period money balances (Patinkin, 1989 [1956], p. 14). Money balances cannot perish between time periods. It is in this sense that money is a store of value and that it can be argued that the store of value function is a precondition for its role as a medium of exchange.

Obviously NWMT has more sophisticated approaches to analyze the role of store of value, and its relationship to that of medium of exchange. A common way to rationalize why agents demand money that is not for

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unit of account properties [chartalists such as for example Keynes (1930)] and those that focused on the medium of exchange (metallists and in general quantity theory adherents). The analyses on the unit of account property of money have centered on issues such as devaluation and money illusion (Fisher, 1928; Mundell, 1997).

[7] This also seems to be the case of Tobin (2010 [2008] p. 227): "A society's money is necessarily a store of value. Otherwise, it could not be an acceptable means of payments." See also Tobin (1989, p. 303). Also, Hicks (1967, p. 36) states: "Money is in the liquidity spectrum because it is a liquid asset -because it is a store of value. Money is a fully liquid asset, not because of the absence of interest on it, but because of the absence of a kink. And this arises out of (…) its function as a means of payment."

Note that the property of store of value in mainstream theory is very different than that of Keynes (1964 [1936]). As explained by Dow (2020, p. 369), in mainstream theory money "(…) conforms to the norm of general substitutability (…) is only one asset within a portfolio theory approach." There is no dividing line between money and all other assets as in Keynes.

immediate expenditure is the existence of some type of imperfection such as 'the cost of transferring assets from one form to another' (Hicks, 1967 [1935], pp. 67-70).

But because money is held temporarily to be spent on goods and services, the property that really matters is that of medium of exchange. Money has no utility per se. As explained by Hicks (1979 [1939], p. 57): "There is no demand for money for its own sake, but only as a means of making purchases in the future." Real balances can be introduced in the utility function of economic agents as Patinkin showed to solve the 'invalid dichotomy', but they provide utility, as long as these reflect the absence of money illusion and ultimately reflect the command in real terms over a basket of goods and services.

This is exemplified by Patinkin's (1989 [1956]), pp. 255-257) argument that the incorporation of money as a store of value for speculative purposes along with money in its role as medium of exchange does not invalidate in any way the quantity theory of money. The incorporation of the speculative motive is an inessential addition. It merely introduces (p. 257) "(…) another reason for the negative slope of the demand for money with respect to the interest rate; but since we have assumed such a negative slope to exist anyway within the classical model (for transactions purposes) this cannot affect the foregoing conclusion. This illustrates our general contention that no matter why individuals hold money, it can only be the real value of these holdings that concern them, and that the absence of money illusion which this reflects ensures the validity of the classical analysis"[8].

4. THE RELATION BETWEEN MONEY AS MEDIUM OF EXCHANGE AND THE ABSENCE OF DISTRIBUTION EFFECTS

Besides placing the focus on the medium of exchange property, maintaining price stability requires the absence of distribution effects on income

[8] Patinkin argues that the Keynesian demand for money is mis-specified ([1] $p.L_1(Y_o) + L_2(r)$) because changes in the price level (p) only affect the transactions demand for money ($L_1((Y_o)$) whereas they should also affect the speculative demand for money ($L_2(r)$). A doubling of the price level should lead agents to double both their transactions and speculative balances. Hence the correct specification of equation [1] is ([2] $p.L_1(Y_o) + p.L_2(r)$).

and output and on financial holdings[9]. This condition is illustrated with Patinkin (1989 [1956] and 1961) and Modigliani (1963) and with the more recent formulation of the inflation targeting core model by Calvo (2016). Patinkin (1989 [1956]) argues that once the supply is assumed exogenous ["(…) that is, one issued by some agency exogenous to the economic system itself" (p. 15)], if there is no money illusion ["(…) no matter why individuals hold money, it can only be the real value of these holdings that concern them (…)" (p. 257)], and there are no distribution effects in the revaluation of debt, an increase in the quantity of money which is introduced uniformly translates into an equiproportional increase in the level of prices (p. 75)[10].

According to Patinkin (p. 200) "(…) the (…) absence of distribution effects makes it unnecessary to consider the *arrays* of the individual incomes and asset holdings in the economy." As explained by Ingrao and Sardoni (2019), this amounts to erasing the patrimonial and financial structure of the economy as irrelevant for the macroeconomic picture. In addition, the absence of distribution is extended to include a uniform distribution of any monetary increase among agents (p. 285) and that any real-indebtedness effects are cancelled out ["Any say decrease in the price in the price level would generate a net positive real-balance effect for households and firms and an exactly offsetting negative one for the government." (p. 288)]. This rules out any type of criticism to the real balance effect based on the increased of the debt burden[11].

A further tacit and stronger assumption made by Patinkin which ensures stability is that (*i*) all agents in a given market are endowed with the same purchasing power and must spend the same fraction of wealth (real balances) on the available set of goods; and that (*ii*) the marginal propensity to spend out of wealth (real balances) and income on each

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9 Von Mises (1990, p. 73) argues that changes in money are not neutral. They alter the relation between creditors and debtors and provokes changes in wealth and income between different groups. On this issue see also Fisher (2009 [1932]).

10 This amounts to Hayek's (1933) concept of neutral money. Friedman's transmission mechanism based on the substitution of assets leads to a similar conclusion (See Bernanke, 2013).

11 The real balance effect was introduced by Pigou (1943) and refuted by Kalecki (1944) in the case of fall in the price level. Kalecki argued that a fall in the price level led to an increase in the debt burden and did not have the required expansionary effect.

good is the same for all individuals in the same market. In other words, Patinkin's solution assumed that agents had linear Engel curves passing through the origin and, thus, for all purposes this ensures the economy consists of a single agent (Benetti, 1990). Under these conditions, once the money supply is assumed to be exogenous, and the rate of interest is given, the system is determinate: any increase in the money supply must result in an equiproportional increase in the price level.

Patinkin (1961, p. 104) makes a similar point: "(…) the absence of distribution effects implies that at the level of aggregate behavior it is only the sum of total financial assets (net assets) that matter". In terms of balance sheets this means that one agent's debt is another agent's asset (in other words, the real effects of asset accumulation by lenders are neutralized by the real effects of debt accumulation by borrowers' (Gurley and Shaw, 1960, pp. 2 and 3) and that therefore the analysis can proceed simply by cancelling out assets and liabilities when the accounts are consolidated[12].

The irrelevance of the patrimonial and financial structure is also illustrated by Modigliani's (1963) use of Walras law to exclude the bond market out of the analysis ["While the bond market is given explicit treatment, it is still permissible to treat this market as the redundant one and we shall find it convenient to do so." (p. 81)]. This implied that the 'specification of the bond market is completely determined by the specification of the product and money markets' (McCaleb and Sellon, 1980, p. 404) and that the behavior of the bond market is completely subservient to that of the other two markets, and particularly to the money market.

Within this context, monetary policy can be controlled through a single variable like the interest rate and this interest rate has the same effects on all financial intermediaries (Kennedy, 1960, p. 568). The same logic is followed by the New Keynesian Dynamic Stochastic General Equilibrium model (DSGEM) which is the basis for inflation targeting. The canonical framework of the DSGEM consists of a model with four agents: Households (infinitely lived representative household), firms (a continuum of firms producing differentiated goods with identical

[12] Kennedy (1960) referred to this as the vice of consolidation.

technology), government (with a balanced budget rule) and a central bank (that pursues price stability as its hierarchical objective through its command over the short-term interest rate). On this basis, the framework consists of four equations: An aggregate demand equation, an inflation equation (a Phillips curve), the Fisher equation, and a rate of interest rule (Taylor rule). These relationships can be expressed formally for an infinitely lived representative agent as follows (Calvo, 2016):

$$c_t = i_t - E_t\pi_{t-1} - \varrho \ \text{(IS curve)} \qquad [1]$$

$$\pi_t = E(\pi_{t-1}) + c_t \ \text{(Phillips Curve)} \qquad [2]$$

$$i_t = r_t + \pi_t \ \text{(Fisher equation)} \qquad [3]$$

$$i_t = \varrho + (\pi_t - \overline{\pi}) + c_t \ \text{(Taylor rule)} \qquad [4]$$

Where, c_t is the deviation of consumption from the potential level of output and i_t, r_t, π_t, $\overline{\pi}$, and ϱ are, respectively, the nominal rate of interest, the real rate of interest, the actual inflation rate, the target inflation rate, and the subjective rate of discount. $E_t(.)$ is the mathematical expectation of variable formulated according to the rational expectations hypothesis at time *t*.

The financial sector is absent from the specification of the model. There are no banks, financial intermediaries or financial assets. However, the characterization of the financial sector which is implicit in the model is very much in line with the previous discussion. The central bank controls the money supply and, in general terms, the stock of liquid assets (including bonds), through the manipulation of the nominal short-term rate of interest (i_t) according to a 'lean against the wind' optimal policy rule. This consists in raising the interest rate to contract demand below capacity when the rate of inflation is above its target ($\pi_t > \overline{\pi}$) and *vice versa*. By the Fisher equation (equation [3]), variations in the nominal interest rate translate into changes in the real interest rate. For a given subjective rate of discount (which is assumed to be constant here), it determines the consumption of the representative household (that is, it determines demand). Debt nor any type of financial or liquidity restriction interferes with intertemporal trade of the representative

household. And, as required by the equilibrium conditions, there are no accumulation of assets/liabilities, hence no Ponzi situations or the existence of bubbles (see Calvo, 2016, pp. 54-58).

5. THE EXTENSION OF THE NWMT TO AN OPEN ECONOMY

The extension to an open economy of NWMT is simply an extension of the closed economy version of this approach. It does not change in any way its logic, analysis or conclusions. This can be shown by considering two countries with two different sets of endowments with one representative agent in each country (countries A and B)[13]. Assume both countries are small open economies (SOE) and that as result take the world interest rate and other international processes as given. This facilitates the exposition by allowing a direct analogy from a closed to open economy. As explained by Chugh (2015, p. 478): "You may already be recalling some similarities between the description of a SOE and the small (relative to the market) consumers that were the starting point of the representative-consumer frameworks (…). For the SOE we can think exactly in terms of the representative SOE-lens! Why? Because an SOE takes the real-world interest rate (…) as given."

Assume further that the endowments of both A and B representative agents are different. Following Patinkin's logic these are given from the start like manna from heaven. The endowment of agent B is greater than that of agent A. As a result agent B is 'richer' than agent A and has a slower future income stream and a lower demand for current consumption. Since agent B has a greater endowment than agent A, the marginal product of its endowment is less than that of A. Both representative agents can maximize their utility by trading. Through trading both have access to a preferred basket of goods leading to mutual beneficial gains.

Representative agent B can increase its current savings giving up some of its current consumption to representative agent A in return for greater future consumption. As a result, representative agent B increases

[13] As explained previously, the notion of representative agents in each country embody the supposition that agents within each country and among countries are assumed to have homothetic (*i.e.*, they have parallel income expansion paths) intertemporally separable utility functions.

its current consumption by borrowing from agent A backing the borrowing by greater future income. As the representative country agent A increases its endowments through trade, its marginal product declines and at the same time the marginal product of B's endowment increases until both tend to equality.

Outside money can be introduced in the analysis and made consistent with the analysis in real terms and the neutrality of money. Increases in money balances above their equilibrium level (given by some notion of permanent income), say in representative country agent B, results in increased spending and in the price level. The predominance of substitution effects lead B to curtail demand and profit from a lower price level in country A. In turn the increase in money balances for representative country agent A leads to greater spending and a rise in the price level. Eventually price levels are equalized, and their increase is in strictly proportion to the increase in money balances in each of the countries.

This is the logic underlying the argument for capital account liberalization. As explained by Henry (2007, pp. 887-888): "In the neoclassical model, liberalizing the capital account facilitates a more efficient allocation of resources and produces all kinds of salubrious effects. Resources flow from capital abundant developed countries, where the return to capital is high. The flow of resources in developing countries reduces their cost of capital, triggering a temporary increase in investment and growth that permanently raises their standard of living."

6. THE IMPORTANCE OF THE UNIT OF ACCOUNT PROPERTY OF MONEY AND ITS IMPLICATIONS

Since the Global Financial Crisis (2008-2009), monetary theory has paid more attention to the effects of monetary policy on financial conditions[14],

[14] See Calvo (2016, pp. 3-4): "It is fair to say, for instance, that the financial sector's potential dysfunction was largely kept out of the radar until the subprime crisis (…). In the midst of crises they (the IMF), of course, found problems of that sort, but little attention was paid to vulnerabilities associated with the financial sector —especially those stemming from the rest of the world. The subprime crisis has begun to change this, but as expected after years of neglecting the kinds of financial issues that have besieged developed and emerging market economies (DMs and EMs), the profession is still in the process of groping toward a consensus paradigm."

on the distribution of income and wealth of households, firms and financial institutions. There is also an increasing awareness that monetary policy has heterogeneous impacts on the balance sheets of financial institutions (Shin, 2010). This changing context has placed more emphasis on money as a means of recording assets and liabilities and of discharging debts, that is as a unit of account. This is especially the case for money denominated long-term and forward contracts including bonds and stocks, mortgages, leases, and investment contracts which are widespread[15].

In the United States 99 percent of families in 2022 owned at least one financial asset —which includes transaction accounts, certificates of deposit, savings bonds, other bonds, stocks, pooled investment funds, retirement accounts, cash value life insurance, and other managed assets (Board of Governors of the Federal Reserve System, 2023). Between 2019 and 2022 direct ownership of stocks increased from 15 percent of families to 21 percent, which is the largest change on record. More than half of households (51% on average) in the United States invest in stocks and investment.[16] In the case of the European Union this percentage is lower (33%) but is still significant. On average almost 70% of households own a home[17].

Corporations, especially in the United States and some countries in Europe, rely to a large extent on the stock market for funding. The available evidence shows that on average stock market capitalization provides 75% of funding for firms followed by the bond market (20%).

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15 Changes in the value of money or in the expected income flows or in the present value of assets have redistribution effects and this is one of the main channels through which monetary policy affects an economy. This can be shown with the following example. In general terms, the value of any asset (P_A) is equal to the expected net return flow (NR^e) capitalized by the discount rate (i = rate of interest and c = carrying costs), that is, equation [5]: $P_A = (NR)^e/(i + c)$. For any given set of expectations, the price of the asset (P_A) varies inversely with the discount rate ($i + c$). The key to understanding equation [5] is that the price of an asset (P_A) adapts to changes in the discount rate ($i + c$). Changes in asset prices align the net revenue streams with one another and with interest rates. This can be seen by re-arranging equation [5] as equation [6]: $i = (NR)^e/P_A - c$.

16 See EFAMA (2024).

17 The data corresponds to the third quarter of 2023. This hides disparities at the country level. At one end of the spectrum more than 70% of all households in Spain own a home. At the other end of the spectrum German households have a lower ownership rate (47%). See Caixa Bank Research (2025).

In market- based and bank-based European countries stock market capitalization accounts for 50% and 70% of firms' funding[18].

NWMT recognizes the importance of including long-term contracts markets ('contingent commodity trades'). However, the inclusion of long-term contracts requires stringent assumptions including complete markets for 'all possible desired contracts, including insurance contracts and investment contracts linking the present and the future, as well as markets for current goods and services, and labor.'[19] Many goods and services do not have markets. Also, outside the explicit assumption of perfect foresight (Debreu, 1959, Chapters 2 to 6) NWMT requires including trades conditional on the state of the world (Arrow y Hahn, 1991, p. 125) which agents must know when engaging in trades.

Following our line of argument the evidence shows that monetary policy can set the stage for changes in the institutional configuration of the financial sector and this in turn changes the interaction between monetary policy and finance. A recent example that exemplifies this point is the greater reliance on the international capital market as a source of finance which is a direct result of the impact of the Global Financial Crisis (2008-2009) on the international banking system.

The bond market has replaced in part the role played by cross-border banking loans. Between the fourth quarter of 2000 and 2007, the outstanding amounts of debt securities issuances increased from $3.4 to 7.7 trillion, jumping to 9.1 trillion in 2010, 16.1 trillion in 2020, and 18.5 trillion in 2025 (BIS, 2025).

As a result, the share of international debt securities in relation to total liquidity (bonds and cross-border bank lending) rose from roughly 45% between 2000 and 2007 to 55% in the post Global Crisis period to the current year. The government is the main borrower through the

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18 See Kalara and Zhang (2018). These authors distinguish market (Belgium, Denmark, Finland, France, the Netherlands, Sweden and the United Kingdom) and bank-based (Austria, Germany, Greece, Ireland, Italy, Portugal and Spain) financial systems according to the relative proportion of finance that is channeled through banks or markets. As they explain (p. 2) "In bank-based financial systems, monetary-financial institutions remain the main vehicle of capital allocation and investment while, for the latter group, securities markets are equally important as banks for transferring the necessary funding towards firms."

19 Turner (2012, p. 41).

international bond market, followed by the non-financial corporate sector. The latter has experienced the fastest growth in indebtedness in the international capital market (*ibid.*).

An empirical estimation for a set of 49 countries for the period 1995-2018 shows that the federal funds rate has an inverse relationship with credit flows and debt securities. However, the impact tends to be greater when considering only debt securities. Other variables that can hamper credit flows are the level of volatility, as measured by the Chicago Board Options Exchange (CBOE) Volatility Index (VIX), and sovereign risk. More specifically, a 25-basis-point rise in the rate results in an 80-basis-point reduction in credit flows to banking institutions. Furthermore, the impact is more significant for debt securities, which fall by 100 and 66 basis points in the cases of financial and non-financial corporations, respectively (Cerutti, Claessens and Laeven, 2018).

While the bond market is widely used by all institutional agents (government, financial sector and non-corporates), debt is mostly denominated in United States dollars (since 2010 the share of foreign currency debt denominated in dollars has remained at roughly 60%)[20], reflecting the existence of a currency hierarchy and dominance of the United States dollar. In its role as unit of account, besides being the global funding currency, the United States dollar is also the leverage and invoicing currency. At the general level, '88% of all foreign exchange transactions have the dollar on one side of them; whereas 31%, 17%, 13% and 7% have the euro, the yen, the pound sterling and the renminbi on one side respectively.' (See Alloway and Weisenthal, 2022; Hofmann, Mehrotra, and Sandri, 2022).

Over the period 1999-2019, the dollar accounted for 96% of trade invoicing in the Americas, 74% in Asia-Pacific, and 79% in the rest of the world. Also, 55% of international and foreign currency claims (primarily loans) and 60% of liabilities (primarily deposits) are denominated in dollars. The available information also indicates that half of the world's Gross Domestic Product (GDP) corresponds to countries that use the dollar as an anchor (unit of account) for their currencies. By comparison, just 5% of global GDP is generated by countries for which the euro acts

[20] The share of the Euro is 26%. See Bertaut, Von Beschwitz and Curcuru (2025).

as an anchor currency (unit of account). The existence of a currency hierarchy is the second important reason that lends credence to the importance of the unit of account property of money. This is an issue that was raised early on by Raúl Prebisch and John Williams in their critique of John Maynard Keynes and Dexter White's Bretton Woods plans for putting all the currencies on the same level[21].

At the international level the difference in the hierarchy of monies reflects the differences in the powers of central banks. The Federal Reserve sets the terms upon which dollars are available in exchange for other currencies at the global level and the valuation and re-evaluation of assets and liabilities. As explained by Minsky (1983, p. 2): "(…) the Federal Reserve is the essential operator in a system characterized by a vast structure of indebtedness denominated in dollars (…)".

Within this context, changes in the unit-of-account of the hierarchical currency can provoke significant monetary and financial effects at the global level that are independent of changes affecting its availability and use as medium of exchange and store of value. A revaluation of the global unit-of-account will have negative effects on the balance sheets of the institutional sectors that hold liabilities in United States dollars which can be aggravated for those sectors that operate with currency mismatches. Similarly changes in its availability and use as medium of exchange may not impinge on its role as a global unit-of- account. The significant increase in the balance sheet of the Federal Reserve after the Global Financial Crisis and during the Pandemic did not affect the dollars role as the global funding, invoicing and leverage currency[22].

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[21] According to both the Bretton Woods plans were based on the principle of the equality of currencies. The monetary plans viewed the post-war world order as symmetrical consisting in a set of national currencies operating on a plane of equality within a central coordination mechanism. In turn the principle of the equality of currencies "had its counterpart in the notion of the equality of countries" (Endres, 2005, p. 63). Economic size and economic structure were not relevant to the international monetary plans (Williams, 1943). Prebisch also brought this issue to the fore when coining the concept of cyclical center and center and periphery which had a monetary origin.

[22] In fact, the role of global anchor has been very resilient to monetary policy changes and economic and political uncertainty. Between 2009 and 2022 the balance sheet of the Federal Reserve expanded from 2 to 9 trillion dollars. During this time the index of dollar conditions trended upwards from 91 to 126 (January 2006 = 100) reflecting an appreciation of the dollar relative to a basket of global currencies. See FRED (2025).

7. CONCLUSION: THE NEED FOR A DYNAMIC MONETARY POLICY

This article questions the conceptual and empirical validity of the existing hierarchical ordering of money's functions and the theoretical foundations built on it which form the consensus on monetary policy. The separation principle is part and parcel of this consensus. The importance attributed to the roles of money in a given economy are time and context dependent. They are endogenous to the development and changes in the financial system including its institutions, instruments and level of development. The composition and heterogeneity of financial institutions matter for monetary policy. The roles of money also depend on the degree and type of interdependency of financial institutions. In addition, power relations among countries materialize in marked differences in the hierarchies of central banks and in their respective monies.

At one end of the spectrum, the United States dollar plays the role of global anchor, and the Federal Reserve acts as the world's central bank. At the other end central banks in the developing world have limited firing power and are market followers. The extent to which they can intervene is largely limited by the degree to which the local currency is expected to depreciate and by the floor set by the international interest rate (set by the Federal Reserve) and by the stock of their international reserves.

The growing importance of the property of unit of account, thought by some earlier mainstream monetary theorists to be merely limited to that of a *numeraire*, exemplifies this view[23]. The unit of account establishes the terms upon which a given currency can be exchanged for another currency and the basis for the evaluation and re-evaluation of assets and liabilities. Changes in the unit of account may occur independently of those regarding the use and acceptance of the medium of exchange and store of value. And changes in the terms upon which the global anchor is exchanged for other monies have significant effects for other currencies, especially on those whose central banks are market followers.

Incorporating the unit of account property in monetary analysis and into central bank's monetary policy frameworks implies finding a better

[23] This is an issue recognized by some mainstream economists. See Gopinath *et al.* (2020) and Alloway and Weisenthal (2022).

balance between the functions of unit of account medium of exchange and store of value. This will require a broader view of monetary policy and a time and context contingent understanding of its effects. This should include greater flexibility and discretionary powers for policy autonomy and intervention in financial and foreign exchange markets. A properly integrated monetary and financial structure at the national and global levels will also require financial cooperation beyond lender of last resort interventions and that benefits all countries involved. ◄

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