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Understanding bank money through a quantum macroeconomic theory of credit. Some theoretical considerations on microcredit

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Abstract

Reframing risk assessments of microcredit, this paper expands on quantum macroeconomic conceptions of money, output and income to argue that production is endogenously financed.

Building on the works of Schmitt, Cencini and Rossi, the conceptual logic of quantum monetary theory traces the origins of a (micro)firm's finances to its consequent production. Production is then a self-sustaining system, and (micro)firms should not, in fact, dependent on worthiness decision made by banks for credit and funding.

With especial focus on microfinance (and microcredit specifically), the socio-economic system requires restructuring to accommodate understandings of production as endogenous and microcredit as sustainable. This includes reforming national accounting practices to accurately represent possibilities of insolvency, themselves much reduced by the recognition of production as endogenous.

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financial intermediation; microcredit

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1. Introduction

This research addresses the shortcomings latent in present economic systems and their often-restrictive impact on potential adjustments and changes for such systems. Where these shortcomings are inherent to the socio-economic system, overcoming them requires returning to fundamentals of economic thought to understand how a transition from a conventional neoclassical foundation to a quantum macroeconomic one would remedy these issues.

Examining monetary theory, a comparative treatment of these theoretical frameworks reveals that logical inconsistencies inherent to the dominant view of such foundational concepts as money, output and production are absent from quantum macroeconomics. Building on the innovations of Schmitt, Cencini and Rossi, quantum macroeconomic theory demonstrates that production is endogenous and self-sustaining, its financing ensured in the instance of production and wage payment. The risks for financial intermediaries of (micro)financing are therefore manifestly reduced as the (micro)credit useful to a firm is generated by itself and independent from the initial capital available to it. Both these findings are confirmed by an alternative national accounting system that documents both the results of monetary flow as well as the flow itself, which would also alleviate insolvency fears that financial intermediaries might have (Desogus, 2013).

2. The science of quantum economics

By and large, the prevalent discourse around measures of economic value assigns money with a particular value and dimensional form.

Discussing the price volatility of goods, for instance, David Ricardo (1817/1915, p. 361) concludes that “The only qualities necessary to make a measure of value a perfect one are, that it should itself have value, and that value should be itself invariable.” This statement is made on the assumption of a perfectly dimensional unit of measure. Interpreting current economic exchanges of money and real goods as a form of barter trade, Ricardo then assumes money to be a physical commodity vested with the equivalent real value as the goods purchased.

The inherent volatility of products and markets means, however, that money cannot retain a physical and “invariable” value. Although foundational to orthodox economic theories and research, reasoning akin to Ricardo’s is also detrimental to their realization.

Addressing this fallacy, Bernard Schmitt draws on the key principles of Adam Smith and John Maynard Keynes to develop the field of quantum economics, which foregrounds money as a numerical concept that reflects the production of physical output.

To understand Schmitt’s theoretical proposition, we turn first to the “great wheel of circulation” envisioned by Smith to outline the role and meaning of money: “The great wheel of circulation is altogether different from the goods which are circulated by means of it. The revenue of the society consists altogether in those goods, and not in the wheel which circulates them.” (1776/1976, p. 74). According to Smith, while money represents the social value of a good, its physical signifiers neither attain equal value by consequence nor become commodities themselves. This sentiment is echoed by Léon Walras, who views money as a purely numerical and non-dimensional object (1952, p. 153).

Complementing Smith’s understanding of money is the Keynesian “monetary theory of production” (1973a, pp. 408-411), introduced as an alternate method of bookkeeping in the 1930s, which records transactions as simultaneous debits and credits. Using this principle, Keynes further posited that macro demand and supply and savings and investment are better understood as logical identities rather than equilibrium conditions. Connecting his monetary

theory to Smith's social valuation of money, Keynes considered wage payments to be the ideal measure of economic value for their appropriate reflection of simultaneous and logical identities:

The prevalence of the idea that savings and investment, taken in their straightforward sense, can differ from one another, is to be explained, I think, by an optical illusion due to regarding an individual depositor's relation to his bank as being a one-sided transaction, instead of seeing it as the two-sided transaction which it actually is. (1973b, p. 81)

Other contributions to the development of quantum economics include Böhm-Bawerk and his theory of capital relative to time, Knut Wicksell's (1903) proposition that banks could intervene to stimulate money supply and competing interpretations of Say's Law based on the Keynesian view of global demand and supply as logical identities.

3. Schmitt's theory of money emissions

Differentiating between the theoretical idea of money as a method of payment and its physical signifiers of transient purchasing power, Schmitt's theory of money emissions draws significantly on Smith's model of money as cyclical and facilitating the movement of goods.

Recall that Smith (1776/1976) recognized that "the great wheel of circulation is altogether different from the goods which are circulated" and does not determine the movement of the goods themselves. Instead, this wheel understands goods as an aggregate entity received by society. To apply Smith's definition of money as a means of circulation, Schmitt (1984) departed from the conventional understanding of money as a stagnant reserve of wealth—especially when passively held as bank deposits between payments—to posit money as representative of a transitional state.

Operating within a capitalist system, money is then a spontaneous flow instantiated only in the moment that a transaction between two parties is completed (Cencini, 2001, revisited by Rossi, 2006 and Pilkington, 2010). Where every transaction necessitates the creation and destruction of money for goods to circulate, money flow is also a cycle in which money returns to its initial state in the same moment that it is emitted. Entering the real world in that instance, money is used according to the logical rules governing modern banking. The numerical value assumed by money in these transactions is defined by its vehicle and intrinsic character.

The logical relationship between purchasing power and production can also be parsed from this conception of money. Real production begins the moment that the total costs of production translate to money income.

As Böhm-Bawerk noted, capital is related to but not technically a factor of production. This, in part, is because its value is determined according to its future production potential, rather than past output as is the case for land and labor.

Technically speaking, as money cannot exist outside of the action of a payment, money is by definition a payment. This is in contrast to bank deposits, which exist over time, whereas payments may be entered into digital bank systems instantaneously. When discussing bank deposits and payments of wage income, it is therefore pertinent to refer to these states as bank balances.

Before we discuss bank balances any further, we must first understand the crucial role of accounting procedures for keeping balances in check. As money becomes increasingly immaterial, banks have become the only institutions authorized to issue legally recognized payments. Where these transactions are recorded using double-entry bookkeeping, the balances, whether positive or negative, reflect the completion of payments. In other words, double-entry

bookkeeping registers the real circulation of goods and services within an economy to calculate the results of monetary flow but not the flow itself.

Exemplifying Smith's "great wheel of circulation," this concurrent manifestation of money and receipt of payments is in fact a fundamental law of bank money that stands unaffected by individual agentic behaviors.

Quantum economic analyses of the accounting logic underlying payments and production processes also produces alternate interpretations of Say's Law that illustrates that global supply and demand are invariably equal.

4. The quantum view of production

In addition to placing production within a continuous time frame, the theory of money emissions draws from wave-particle duality theory to posit a product as a quantum of time. Where these quanta refer to intervals of continuous time issued in indivisible segments, the culmination of economic production in the instantaneous manifestation of the physical product defines the entire period. In the moment that production is monetized as wages, the product then represents a concrete economic event.

In a succinct summary, Schmitt (1984) concludes that "on a quantum of time, production does not take place in time but it actually is time" (p. 54). Cencini (1985) supports this claim, asserting that recognizing products as quanta of time is crucial to the logic underlying economic theory. By reframing intervals of time as quanta, production "quantizes" time as each real and instant emission is defined as a quantum. At its most basic level, quantum macroeconomics therefore determines that physical output, including the time taken to physically produce it, is not substantiated until economic production occurs.

This temporal framework is foundational to two principles fundamental to quantum economics: first, wages paid in exchange for production are an economic unit of measurement, and second, production and consumption are instantaneous economic events.

Aligning with the Keynesian monetary theory of production (1933/1973a), whereby production as a primary economic activity necessarily presupposes any exchange, the quantum conception of production treats money according to its actual numerical form. Recognized as a homogenous measure of all goods and services produced, money thus gains a positive value and therefore positive purchasing power in processes of economic production.

5. Elements of theoretical explanations

As money is issued by the banking system to enable payments by economic agents, the prevailing assumption is that money carries an inherent positive value and purchasing power. To support such a premise, however, the banking system would have to procure from basic accounting processes *creatio ex nihilo* abilities for units of purchasing power. This would require a national payment system that operates with the intention of providing net worth to the economy, relative production notwithstanding.

In reality, double-entry bookkeeping requires logical equivalence across the balance sheet.

While gold is often held as a standard monetary unit in literature, such representations are outdated; total national production has since taken the place of gold as an asset on balance sheets and national currency is given as a liability, recorded as the contra account to gross domestic product (GDP).

As such, concepts that are similarly founded on such imperfect analyses of bank money are spurious.

It is therefore necessary to develop a bank money analysis that corresponds to Smith's "great wheel of circulation." As Smith conjectured, the great wheel of circulation distinguishes income, which is composed solely of the goods produced, from the wheel that facilitates the movement of these goods.

The complex relationship between money and domestic product further prevents the calculation of national quantitative wealth based on the ratio of money supply to GDP alone; doing so would necessitate rendering monetary instruments as valued intermediary goods that support economic exchanges of real products. Although everyday transactions would appear to confirm a barter economy, with money given, as any other good may be, for another item of equal value, in-depth analyses of monetary transaction can neither affirm the simultaneous existence of goods and money, nor that they retain the same nominal and/or real values.

Indeed, as such neoclassical marginalist models of the general equilibrium theory as Clower's (1977) and Starr's (1989) demonstrate, money is a mechanism for the movement of goods between parties. Where Marx (1939/1973) and Keynes (1930) likely recognized money as a numerical representation of units of purchasing power, modern monetary theory considers every monetary payment an exchange, providing a clear definition of the nature of goods. Moreover, where a circular flow of money is created whenever a payment is made, the transmission of funds required to move the products relies entirely on the banking system.

Financial intermediaries, banks indisputably control the dissemination and circulation of money in the economy. As the issuance of money encompasses a simultaneous creation and destruction of this numerical measure, the double-entry bookkeeping typically practiced by banks ensures the instant balancing of entries listed as assets with those entered as liabilities.

Involving the payer, the payee and the banking system, every transaction deals in numerical and real factors. The balance that the banking system loans to agent B to purchase goods from agent A, for instance, is denoted in numerical form in the accounts.

In the instant that this loan is given, a series of sub-actions are also performed: the bank grants agent B access to the money as a loan, agent B owes a debt to the bank, a record reflecting A's right to a bank deposit that corresponds in value to the price at which A sells B the goods is made, and agent A, by receiving agent B's payment, becomes a creditor of the same bank. The bank then owes agent A an amount equivalent to the purchasing power of the loan given to agent B (Graziani, 1989 and Rossi, 1998).

Taken together, bank deposits can therefore determine three trends: total domestic product (before final consumption), the good *par excellence* and the numerical expression of total gross product. It must be noted however, that these calculations are mutually exclusive:

1. although *sui generis*, if we take money to be a good, it cannot be used to measure real production as it would conflict in its need to measure itself;
2. inversely detached from any product groupings, money cannot be established as the counterpart of any exchange of goods or production factors.

Based on this logic, the nuances of general equilibrium models cannot account for a net income in a capitalist economic system.

To understand this shortcoming, we first address the dialectic gap that emerges in the neoclassical economic definition of income as the difference between sales and purchases in a goods market:

On a more sophisticated level, the logical flaw of received monetary theory can be best highlighted by referring to the conception of absolute exchange worked out by B. Schmitt over the last forty years. Starting from both the numerical and

vehicular nature of (bank) money and endorsing Keynes's still unorthodox analysis on wage-units, it is indeed possible to provide a rigorous and logical explanation of the production-consumption process occurring in contemporary national economies. (Rossi, 1998, p. 10)

In such monetary production economies, income is defined as the simultaneous exchange by a single agent of a monetary emission for a real one. Applicable to all exchanges and payments occurring in the goods and financial markets, this definition supports Schmitt's adoption of 'absolute exchange' in 1966 and posits the household as the only type of agent. Certainly, as Schumpeter (1934, p. 101) argues, firms are simply intermediaries.

Within the parameters of these economies, the complex procedures of production translate into money income. Streamed in two relative flows, this income then returns as the property of the same economic agent. Proposing that workers pay themselves, this structure contradicts conventionally accepted theories. Workers translate the heterogeneous real flow, resulting from their labor, into the equivalent, uniform monetary flow by depositing their received wage income at a banking intermediary. Money income then has concrete purchasing power.

Where money income is also homologous to total domestic product and organically results from production, this form of absolute exchange occurs on the macroeconomic level and generates a positive supply for the national economy. The distinction between the two forms of money is then that "Money-income denotes the national output, and is therefore a real commodity, while a sum of money, taken as such, is a purely numerical and immaterial form" (Schmitt, 1996, p. 86-87).

Occurring in the market of factors of production, absolute exchange means that as various goods continue to be produced, they are automatically assigned a standardized numerical form that allows for economically coherent measurements. The payment of wages is then the only method available to logically connect money to output.

As such, labor is arguably the only factor of production as total wage payments also relate collective income and the aggregate cost of current output. Moreover, where national income is calculated by the sum of wages received in the factors of production market, it is redistributed, in part, by the expenditure of this same income in the product market. These markets converge in the household as consumer price affects income distribution, which impacts profit creation.

6. Capital accumulation and monetary pathologies

Borrowing from Schmitt (1984) and Cencini (1985), let us consider the following assumption for a single firm: for every 100 (percent) of income spent, workers purchase only 80 (percent) of goods available at a given time.

Accounting for this is quite simple: with sales prices fixed at 125 (percent), the firm receives from the product market a profit whose purchasing power corresponds precisely with the value of unsold goods ($100 - 80 = 20$). A monetary profit and real flow of 20 come to existence in this moment. In the following period, the same firm invests this profit (20) and pays those workers producing the goods and the cycle continues.

Representative of money, the product is purchased by the firm, making the firm the owner of fixed capital. At the same time, the payment of wages to workers gives them the right to withdraw stock produced in the previous production cycle. The investment of profit therefore gives rise to the acquisition of fixed capital. Income already invested and transformed in this way into fixed capital is no longer available in the financial market.

In recognizing these dual processes, the logical purpose of mono-departmental banking registration systems then comes into question. Posing the firm as a depersonified entity that retains sole ownership over fixed capital, this model inevitably ascribes firms with a sovereign status that alienates their workers. This process of capital accumulation, however, produces such consequences as inflation and long-term deflation that propagate systemic socio-economic problems, especially unemployment.

A three-department accounting system is therefore ideal as it overcomes the problem created by the mono-departmental system and makes income available for both capital and loans. Resolved through adjustments to accounting mechanics, this restructuring would centralize three technical-accounting departments: monetary, financial and capital (Desogus and Casu, 2018).

Returning to the scenario discussed above, we begin by recording profit in the financial department:

Diagram 1. Accounting record of profit in the 2nd department (financial)

2nd Dept. (financial)		
Product 20	Firm	20

Recording profit (20) gained by the example firm as output, Diagram 1 reflects that the financial department of the firm has received a deposit of equal value. Where the stock of unsold goods listed as an asset on the balance sheet determines the real content of the firm’s income, the investment of profit—as a form of income—transforms the monetary flow into a capital one. For the record, figures must be moved from the second department to the third:

Diagram 2. Balance carried forward following investment of profit from 2nd department (financial) to 3rd (fixed capital)

2nd Dept. (financial)			3rd Dept. (fixed capital)		
Product 20	Firm	20	2nd Dept. 20	Firm	20
Firm 20	3rd Dept. 20				

Diagram 2 thus identifies the firm as the owner of property as fixed capital, which also crucially ‘personifies’ the firm by representing the sum total of all workers (units) working for the firm. Profit realized is then invested for the general improvement of capital in quantity, quality and cost efficiency.

To fully recognize the benefits of three-department accounting, Diagram 3 reflects the situation created under a mono-departmental system. Excluding the monetary department from its considerations, fixed capital of the firm is depersonalized. By mixing accounts and different forms of money, furthermore, the payment of wages is registered twice to overlap with the investment of profit.

Diagram 3. Mono-departmental accounting record

Single Dept.

Product 20	Firm 20
Firm 20	Workers 20

Confirming the natural economic connection between the ‘personified’ firm and its workers, the accurate notation of capital in the third department in Diagram 2 is essential for tying material capital assets accessible by the firm with the manifestation of monetary capital in the accounts. In the absence of this record, profit appears to go toward stock investments, effacing the role of workers in economic production.

Configuring Diagrams 4 and 5 to register the payment of wages, the first and second departments are balanced daily in closing reports that also set interest rates for the next day:

Diagram 4. Accounting records of the payment of wages in the 1st department (monetary)

1st Dept. (monetary)

Firm 20	2nd Dept. 20
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Diagram 5. Balance of wage payments carried forward to 2nd department (financial)

2nd Dept. (financial)

1st Dept. 20	Workers 20
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Every day, the first department carries all income forward to the second department to close with a balance of 0 (Diagram 6). Under the second department, workers then hold an income of (or deposit equal to) 20 and the firm is correspondingly indebted 20 to each (Diagram 7). Between the results received by the third department and the balanced sheet of the second, the three-department accounting system demonstrates the firm's economic contribution to general macroeconomic order through profit.

Diagram 6. Completed daily accounting records for the 1st department (monetary) and the transmission of income to the 2nd department (financial)

1st Dept. (monetary)		2nd Dept. (financial)	
Firm	20	2 nd Dept.	20
2 nd Dept.	20	Firm	20

Diagram 7. Complete daily accounting records at closing in the 2nd department (financial)

2nd Dept. (financial)	
Firm	Workers 20

7. Absolute exchange in the production-consumption process

Continuing from the premise that households are the only active economic entity, the payment of wages instantly relates households as the owners of all new products. Consumption is then the effect of spending income in the product market. Where consumption can be conceived as two parallel activities, they refer to the purchase of goods and services from the product market and the distribution of income resulting from it.

Removing goods from the monetary flow, this equivalence is possible because, as mentioned earlier, the payment of wages is *ipso facto* a creation. This is distinct from any concurring investments of profit, which, as expenditures in the market of factors of production, lead to the resultant current output.

The macroeconomic view of economic consumption relative to new output is then one of absolute exchange, as the physical manifestation of labor is transposed into a bank deposit of equivalent value by the intermediary banking system. This conversion ensures that the purchasing power of goods remains intact as money income, even as the good loses its physical form, and vests the income holder with the right to withdraw this same amount from the national product.

Wage payments and household consumption are therefore inseparable and simultaneous acts. Enacted by firms, the former transaction is registered in the market of factors of production as a creation of national income. The latter results from workers spending income to purchase current output and is mediated as a form of absolute exchange through the banking system. In this exchange of money income for real goods, the numerical measure of purchasing power dissipates and the real output is returned to the national product.

In this way, the absolute exchanges of income creation and distribution are inversions of each other. Where the first concerns the transition from current product to money income and may be considered an absolute positive exchange, the second is then an absolute negative exchange, tracking the transformation of income into physical output.

While the lack of proper systems of payment undeniably contributes to the perpetuation of inflation and unemployment, these macroeconomic problems are not, as neoclassical economists suggest, rooted in agentic behavior. Rather, they can be traced back to monetary and structural faults that are characteristic of capital accumulation processes.

Schmitt's key contribution to our understanding of capital accumulation then lies in his analysis of profits, which identifies the artificial duplication of profits through current accounting records of income creation to generate a deposit that will never run out.

8. Applying quantum and ordinary credit in microcredit

Where the payment of wages through real output is the macroeconomic action *par excellence*, its issuance in the numerical form of money income then increases the wealth of the economic system. Indeed, as Cencini and Borghi (2010) observe, economic production is grounded in monetary creation, with income acting as the bridge between money and output.

Where output is an instantaneous event occurring in tandem with the payment of wages in a quantum economic framework, income is considered macroeconomic because its contributions to the endogenous economic substance influence the evolution of the whole system.

The complex integration of income therefore means that it cannot be viewed in a purely numerical dimension.

Whether by an individual or systemic entity, it is generally given that production increases the wealth of an economy. In all cases, workers generate their own wages through the labor they provide; income is not externally sourced. The precise moment in which workers are compensated induces a simultaneous and instant *poiesis*.

The payment of wages through a banking intermediary clearly demonstrates the closed circuit of income, as credit conceded by the bank to the firm for wage payments is received from those workers whose productive labor provide the firm with its only source of income. Such operations are inherent to quantum credit.

As such, opening a line of credit through a three-departmental accounting registration system to pay wages involves no risk *a priori*, even for microcredit. Protective guarantees are then moot, with the relative wealth of the prospective entrepreneur a disinterested factor. Using bank notes seems to complicate – but only at a first impression – the relationship between borrower and lender as their conventional nature would require the lending institution to have or acquire a debit with the issuing central bank, or even on a secondary level, the clients holding them. In fact, the generation of income required to repay the assigned credit through the payment of wages renders upfront capital unnecessary. Created by output, income, in an economic view, also defines the product.

Where a loan of wage income translates into a company investment, output is then transformed into stock and the debt entry on the balance sheet corresponds to the asset gained as a stock of real goods. Since previously earned income is necessary to invest in plants and machinery, various fixed assets (patents, licenses, etc.) and raw materials for all scales of physical production, conceding credit to microenterprises is merely the purview of consumer financing and ordinary bank credit operations.

Revealing the precedence of quantum credit over ordinary bank credit according to their logical scaffolding, it is then the responsibility of banking intermediaries to adjust their double-entry bookkeeping systems in order to offer both ordinary and quantum credit.

It is important to note that wealth is neither created nor destroyed in the provision of credit to consumers—it is simply transferred from one economic agent to another. Yet, while these credit operations have only microeconomic implications, the consumption that they facilitate operates on the macroeconomic plane.

The typical money circuit, which begins with production, can be completed following considerations of consumption. In the exchange of a physical good for money income of equivalent value, consumption, Cencini and Borghi (2010) contend, is the moment in which the monetary form that a good assumes in production is destroyed.

This understanding of consumption means that, in situations of quantum credit, a firm's credit could be reduced by the purchase of the firm's goods by the workers who produced them. This is because the numerical expression and consequent purchasing power acquired by wage income in the moment of its payment is lost in the same instant that a purchase is made. The debit of the firm with its loaning institution would automatically reflect an equivalent decrease to balance the accounts.

In atypical cases where unsold stock remains, the correspondingly lower income received by firms directly diminishes their ability to repay credit owing to the bank. Although wages owed to workers can help maintain balanced accounts in the short run (the loaning institution should also be appeased if interest payments are regularly made), the risk and precarity of the business will increase if this condition is sustained.

Modelled with only a bank, a firm and its workers, the argument insofar is fairly generalized. Yet, even in light of the complex matrix of firms, workers and bankers interacting in the real system, it remains applicable on much larger scales as accounting practices ensure that balances are maintained. The same dynamic is identifiable in the books of the microentrepreneur who independently provides labor and produces output; in this structure, the objective (the firm) and the subjective (labor and production) simply take form in the same entity.

More importantly, this deliberation articulates a clear set of records that highlight interrelations and interbank relationships. Drawing from the given scenario, wherein stock remains unsold for a firm (or various firms), the interrelations and interdependence of the various components dictate the terms of debt. Significantly, any insolvency risk would not be dealt with by the firms and the workers financing them, but between banking institutions.

9. The socio-economic sustainability of microcredit

When providing credit to microentrepreneurs, the general consensus across literature encourages the use of strict resource procurement guidelines and risk assessment and mitigation strategies. However, as lending does not directly affect income creation, a monetary analysis of financing for commercial production resolves these concerns.

Where the microentrepreneur and/or their business partners are self-financing in that they provide the only labor that generates income, entities offering direct or indirect microfinancing services are engaged only to assist with the advanced payment of wages, which falls in line with the described model.

For ordinary crediting institutions, instances of unsold stock may constitute a threat. The incidence of such circumstances has, however, been reduced significantly by specialized microcredit agents who, through planning and sales mechanisms, have developed support and oversight strategies for contracted entities. The risk and burdens of liquidation are further mitigated by guarantee funds, reinsurance and portfolio protection investments. As funding these measures would productively reinvest income lent, finances may be accrued through the sale of company securities (stocks and bonds).

For ethical and sustainability microfinance projects especially, supply responds to less than 4% of demand for tools and special investment funds (Cencini and Borghi, 2010). With multiple areas in need of funding, it is in the best interests of microfinance institutions—particularly mutual organizations, cooperatives and consortia—to achieve operative and financial self-sufficiency and accumulate endogenous savings.

These potential threats, however, can be countered through guidelines on the oversight of creditors that enable firms to transfer resources sustainably and account for larger costs while deferring further risk. In addition to bolstering this quantum credit model, government intervention through stimulation and regulations on access to microcredit would raise such crediting practices to the standards of universal constitutional laws that protect Human dignity (Cencini and Borghi, 2010).

The implementation of such a system is then generally advantageous. With financial inclusion refined to minimize risk for supplying institutions, a streamlined monetary arrangement and positive macroeconomic outcomes, this framework would improve social utility on a systemic level and allow the government to redirect its current welfare funds to better address its constitutional mandate.

10. Conclusion

To minimize recurring inefficiencies produced by present economic systems, we must first remedy the faulty logic girding current production and accounting processes. This fundamental reconceptualization of economic principles along quantum macroeconomic lines is crucial for relieving the system of persistent socio-economic burdens imposed by current economic models. It begins with recognizing the worker (and, in a broader sense, the household) as the central agent that *independently* and *simultaneously* produces and consumes output. This understanding stems from the immaterial aspect of money that renders it a vehicle for the numerical value of output, itself commensurate with the amount received by workers as wage payments and later returned to the system through consumption. Reflected in a three-department accounting system, production is therefore self-sustaining and microfinance a stable business. The provision of credit to (micro)firms, moreover, constitutes a much smaller risk to financial intermediaries than conventionally conceived; a line of credit instead gives these entrepreneurs a chance to stabilize and grow.

A structured and profound project of reform for national accounting paradigms will be complex; invariably, it will encounter obstacles in achieving widespread approval, navigating technical transition and implementation, and, significantly, overcoming resistance from those stakeholders unwilling to change or relinquish their present advantage and privilege. Yet such a project is

necessary for increasing economic productivity and efficiency. The concurrent development of the microfinancing sector and oversight for it will also expand financial inclusivity and opportunity.

To continue with the current state of affairs is to otherwise implicitly accept, even support, the further entrenchment of capital accumulation, inflation and unemployment and their own associated ills. The constant threat and/or presence of these symptoms further deprioritizes large-scale structural reorganization to fully mitigate monetary pathologies in favor of short-term solutions for long-term inhibitors.

11. Managerial implications

This exploration of quantum macroeconomic theory is expected to contribute to the field of financial management within entities by increasing awareness of the nature and usability of (endogenous) financial resources.

- As a theoretical deliberation, the paper offers an alternate paradigm through which relations between money, income and production should be understood. This view negates inefficiencies and logical inconsistencies inherent in current economic systems. Such flaws promote poor socio-economic conditions that exacerbate inequalities.
- The study proposes a three-department accounting system to reflect economic flows more accurately. Documenting the movement of wealth between monetary, financial and capital cycles, the suggested framework confirms the availability of endogenous financial resources for any given production activity.
- Following from this, the study discourages the re-use of fixed capital in the financial market as 'empty entities' for speculative purposes as it engenders inflationary profits, which are symptomatic of monetary pathologies.

In recognizing that credit used for production is derived from production itself, this paper contributes to financial management between entities in reassessing the risks associated with microfinancing and microcredit.

- Due to the endogenous nature of funding for production, there is a need for credit intermediation systems to align themselves more consistently with the needs of the production sector and the real economy. It is therefore advised that financial management be rearranged around planning and procurement for a more solid system.
- Regulations and rigorous guidelines for oversight and accountability around microfinancing and offering institutions would put quantum credit and microcredit on comparable footing with ordinary credit. This would also reduce the risks related to unsustainable lending and insolvency. The development of such frameworks is thus recommended to generate further economic efficiency and production.

12. Limitations of the study and directions for future research

Where the proposed reform is largely theoretical, implementation on any scale would require a further focused study of the pre-existing systems, conditions and policies relating to the entity or region in question. Such analyses would determine more precisely the methodology, timeline and extent of restructuring that is necessary and feasible.

Depending on the relative influence of the research subject, whether individual firm or intergovernmental body, political stability, living conditions and environmental sustainability may also need to be considered. Additional studies may also consider whether separate criteria

should be followed when introducing changes to existing entities as opposed to newly established ones.

As an ambitious proposition, these changes would also take considerable time to implement. In addition to infrastructural and technical for all affected economic actors, a large-scale call to shift accounting paradigms would first require advocating to and gaining consensus from academic and industry professionals, policy makers and the public.

Should the reform be accepted in part or full, future research should also attend to transitional implications for all affected parties. As with the unprecedented global economic circumstances imposed by COVID-19, continued research could also suggest how best to bolster current, transitional or reformed economic systems against unforeseen economic turmoil.

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