A proposal for harmonising current disparate (scientific and legal) definitions of money towards greater decidability in the provision of Justice according to universal principles of contract law.

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Abstract

Historically, the notion of 'money' has been inherited in what appears to be an ad hoc adoption of a conflation of mostly rhetorical metaphors arriving to the current definition published by most Central Banks where money is said to be all of a "store of value, medium of exchange and a unit of account" without any particular specialisation or qualification of the terms "store", "medium" and "unit of account" nor any formal technical rationale supporting such a contention. Similarly in law, there is no explicit unequivocal logical universal definition of money.

Moreover, on the basis of formal mathematical analyses, relatively recent academic literature shows that even at expert levels, not only is no rationale been offered to support the current published definition but no consensus on the true nature and function of money or the "how of money", has been arrived at. However, without formally redefining money itself, recent academic and industry peer reviewed research, forwards mathematical analyses and proofs that demonstrate that the current definition of money is empty of meaning. Yet the same analyses, prove that money's technological function is that of a rudimentary mnemonic or social memory, that adds no value nor in any way facilitates the transfer of resources in ways that cannot otherwise be achieved without money.

In this paper, we show that unlike other fields of cultural import and significance, little if any evolution in the conceptual framework underlying money has taken place in history. Nor has any theorem been enunciated, illustrating exactly how money actually performs the functions attributed to it. Only descriptions are offered, as if speculating over an unknown phenomenon. This in spite of Aristotle's affirmation that "...it (money) exists not by nature but by law (nomos) and it is in our power to change it...", that undoubtedly is true to this day.

Confirming that money is essentially a mnemonic and constitutes a peculiar rudimentary information system, we realise an exhaustive formal semantic analysis for decidability of both, the literal current definition as well as the *de facto* definition everyday users can be reasonably expected to assume and related ontology. Further to the semantic analysis we propose a set of formal requirements for system stability as defined in dynamic systems theory applied to money systems.

Next, we inform current legal practices about the immediate consequences of not elucidating the true formal semantics of a common definition of money and the resultant scope of decidability, particularly the threat to general principles of contract law as well as fundamental rights and freedoms.

Finally, we propose the harmonisation between technical/scientific and legal semantics with the aim of establishing an unequivocal standard definition of money comprehensible to most in the fairest and most equitable application of general principles of international law.

Brief Review of the History of Money's Definition:

The purpose of this section is to illustrate how definitions of money have been founded on the quest to measure a generic "value" in a standard and universal fashion and how those attempts share a common ontological flaw that has persisted to this day.

Essentially and over millennia, the same notion of money's technological function has persisted as if on faith, without at any point in time having rationally or scientifically determined it according to any clear logical proposal, as for example is commonly the case with information technology solutions developed today. This may be understandable for early history, however one would expect as with the history of science, to be able to map a concrete progression in reasoning and proofs as for example was the case with the motion of bodies from Aristotle to Newton, each interim step illuminating the path to the next, such as Galileo's observation of the uniform motion of gravity put to rest Aristotle's view based on the "nature of objects" and thus lead to Newton's formulation which has remained useful to this day.

Throughout most recorded history, notions of money have all revolved around a single intuitive association of countable units in the form of coins and sometimes also in terms of quantities of standard commodities.

In Ancient Babylon, "money" (shekel) was a measure of quantities of barley and silver. According to "The Code of Hammurabi"[1] "payment" was to be made according to both "money" and "grain"/"corn" depending on the type of transaction. In this light, it would seem that the underlying link to a generic notion of value was to both food staples ("grain"/"corn") and "money" (coins). As the vast majority were not literate, and therefore were unable to either maintain or produce written records, the use of coins also most certainly served as a rudimentary counting device for a minimal notion of record keeping.

In ancient Greece, money also took the form of measures of silver and gold minted into coins by city states but without the parallel formal reference to any other measure or staple production. With regards to money, Aristotle wrote:

"There must, then, be a unit, and that fixed by agreement (for which reason it is called money); for it is this that makes all things commensurate, since all things are measured by money. Let A be a house, B ten minae, C a bed. A is half of B, if the house is worth five minae or equal to them; the bed, C, is a tenth of B; it is plain, then, how many beds are equal to a house, viz. five. That exchange took place thus before there was money is plain; for it makes no difference whether it is five beds that exchange for a house, or the money value of five beds." [2]

Here and absent the use of less exclusive staple commodities as a parallel reference of value as was the case in Babylon, the proposition was to represent ***"the value of all things"*** in terms of coins of a standard measure of value and as a rudimentary accounting mechanism. Similarly, in the Indo-Greek Kingdom, China and later in Rome, coins were used as a common reference of generic value.

At the time of Adam Smith's Wealth of Nations (1776), the nature of money was not re-defined and it is to be assumed that historic notions were simply intuitively subsumed. It is worth noting that, Adam Smith [3], refers to labour as the underlying value of all things that money ***"more or less"*** attempts to represent.

Thus and irrespective of the question of an exact definition or the format of money, the motivation is to achieve a fair representation (measure) of a common universal notion of value in the form of ***"human labour"***. Yet, still no formal mathematical or other logical proof of how money, without loss of generality and however manifested, can rationally represent that generic or universal value. All Smith provides is a speculation that silver appears to maintain a constant ratio with respect to other things and that all things in the market are due to an investment in labour the "original purchase-money".

Similarly with David Ricardo[4] the motivation is that of seeking a true measure of value in terms of the value of labour but extended and modified by the value of a community of the land owners, providers of stock or capital and labourers, all of which according to Adam Smith, reduce to the common denominator of labour. But again, Ricardo does not question how this universal value can have its proper and indeed equitable representation in the form of money.

William Stanley Jevons [5] defined money as all of four distinct functions a "store of value", a "medium of exchange", a "standard of value" and a "common measure of value".

This definition *minus* the mention of "standard of value" and modifying "measure of value" to "unit of account" is what has become today's *de facto* definition. But, once again, no formal or logical proof is provided as a rationale for exactly how money whether commodity based or fiat actually performs these functions, nor are any logical and temporal dependencies between the different objects and functions defined and no *sine-qua-non* proof of how money represents any universal notion of value without loss of generality is provided.

Similarly with Karl Marx, Keynes, Fisher, Samuelson and so on, with regards to both money as a commodity (gold and silver) or fiat money, apparently none establish any objective proof of how money is purported to be. In all cases, Money's definition as a universal representation of value is never formally proven but is determined by appeal to circumstance such as with Fisher's note [6].

"Any commodity to be called "money" must be generally acceptable in exchange, and any commodity generally acceptable in exchange should be called money."

This says nothing about how and on what basis money performs its functions, but simply affirms that it must be a commodity to do so.

According to Keynes [7], Money cannot be "produced by labour" but, if it could be manufactured depressions would be avoided. This is a powerful testament attesting to the notion that money does not represent the value of other things but rather is itself some sort of pseudo commodity vying for its own independent demand like any other commodity.

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He later rather sarcastically writes:

"Unemployment develops, that is to say, because people want the moon;—men cannot be employed when the object of desire (i.e. money) is something which cannot be produced and the demand for which cannot be readily choked off. There is no remedy but to persuade the public that green cheese is practically the same thing and to have a green cheese factory (i.e. a central bank) under public control."

From all the above, it is evident that, throughout history, money has been intuitively defined and apparently *a posteriori* to its use. That is, there is no point where money's function has been rationally determined on the basis of any provable axioms and *a priori* to its use.

The singular recurrent claim, documented throughout history and to this very day, is that Money is somehow simultaneously both a unit of measure of some universal value common to all things, as well as a tradeable artefact of independent value. Yet, nowhere in history has this notion been proven to be rational irrespective of it having been adopted over and over again.

However, what history does show, without dispute, is that money in all its forms has been a medium not so much of value, but of information about value and a very imperfect one at that, as explained by Narayana Kocherlakota [8], in querying the technological role of money:

"My argument demonstrates the vacuity of the three standard explanations of the role of fiat money in an economy: money acts as a store of value, a medium of exchange, and a unit of account. From a technological point of view, we can see that none of these functions really require money. Money does not represent a new way for society to accumulate wealth. Money does not reduce the costs of transferring resources from one person to another.

There is no immediate technological reason that money should be a better numeraire than other goods. The traditional explanations for the presence of money in an economy are more descriptive of its functions than explanatory. The true explanation for money's presence is that money is a record-keeping device."

He then concludes:

"Monetary economics has traditionally been dominated by the question of how the quantity of money, or the growth rate of that quantity, affects prices and quantities of goods. My reasoning here suggests that this focus is misplaced. Money is a record-keeping device; hence, monetary policy should be designed so that record-keeping is performed in the most efficient way possible. How do we do that? Currently, we do not know. But searching for the answers should lead to a more satisfactory (and robust) understanding of optimal monetary policy."

So, at least in formal mathematical terms, Kocherlakota makes it clear that the only certain and persistent purpose and function is to record/measure consumption, i.e. it is information about value in so much as what is consumed can be considered "value".

How to Define Money? An exercise in First Order Logic and Decidability

"I reject the contention that an important theoretical difference exists between formal and natural language". Richard Montague [9]

Information science is concerned with organising and operating on data to provide useful i.e. meaningful information, which in turn requires the use of Formal Semantic analysis to unambiguously define a given domain of discourse. The most common type of Formal Semantics requires the mapping of terms to a concrete universe of individuals and mapping of propositions to the truth values "true" and "false". Some basic notions follow:

A **"class"** defines a set of individual objects or concepts ALL of which share ALL of a distinct set of one or more properties. Therefore, one class cannot be an **"individual"** of another because it itself is a collection of individuals; however, providing its individuals possess ALL the properties of the first class, it can be a **sub-class**. Thus, other classes that do not share ALL "**Parent Class"** properties cannot be sub-classes of that class.

"Properties" are distinct features or attributes that define both a class and its individuals, and therefore cannot themselves be individuals of the class. For example, you can say that a car has the property of "having wheel", but that fact doesn't imply that "wheel" is an individual of the class "car" i.e. an instance of "wheel" has none of the properties of the class "car". So, while "having wheel" is a property of "car", "wheel" cannot be classified as a type of "car".

The same basic notions must apply to the definition of "Money" and then at a deeper level, we must ask, what logically forces any conflation in the first place? If as Kocherlakota contends, money in reality is only a mnemonic device, do we need to conflate the notions of "store", "medium" and "unit of account"? Particularly considering that while money so defined, **"*does not reduce the costs of transferring resources*"** as Kocherlakota asserts, it certainly does increase them!

Dissection of the current definition of money as all of a "store of value", a "medium of exchange" and a "unit of account".

The first question is whether or not "money" is a class in its own right or a subclass of something else. From the definition it seems to be a subclass of three different classes, so right from the start, we have a serious ontological question that implies profound consequences on how money can be rationally interpreted and used.

If we say that money defines a class of its own, then we have the problem of what is called horizontal or "multiple inheritance", that is money would have to inherit properties from "store", "medium", "unit", "account" etc., without being either an individual nor a subclass of either of these. In this case, all the inherited properties would require specialising existing property subclasses or introduce completely new

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property classes in the parent. It is for this reason that multiple inheritance has always proven problematic when not outright excluded.

The use of the key terms "store", "medium", "unit", "account" in defining money is intensional as opposed to extensional[1] i.e. it is connotative of money, not an enumerated list of examples of what has been used as money e.g. notes, metals, shells, grain... As such, we approach our analysis of the validity of the current definition, by defining the underlying terms, i.e. what are the minimum and sufficient properties of "store of value", "medium of exchange", "unit of account".

From Oxford Dictionaries [10]:

"**Store of Value**":

Store$_1$: "A quantity or supply of something kept for use as needed."

Value$_1$: "The regard that something is held to deserve; the importance, worth, or usefulness of something"

Value$_3$: "The numerical amount denoted by an algebraic term; a magnitude, quantity, or number.

Quantity$_1$: The amount or number of a material or abstract thing not usually estimated by spatial measurement.

Interpretations, money is either;

Case a. A quantity of the regard of importance, worth or usefulness of something";

Case b. A quantity of a quantity or number.

"Medium of Exchange":

Medium$_1$: An agency or means of doing something:

Agency$_{3.1}$: A thing or person that acts to produce a particular result.
Means$_1$: An action or system by which a result is achieved; a method.

Exchange$_1$: An act of giving one thing and receiving another (especially of the same kind) in return.

Interpretation: Money is: a means of exchanging things.

"**Unit of Account**":

Unit$_1$: An individual thing or person regarded as single and complete but which can also form an individual component of a larger or more complex whole:

Unit$_3$: A quantity chosen as a standard in terms of which other quantities may be expressed (measure).

[1] In logic, "intension" not to be confused with "intentional" refers to the content of concepts as opposed to the extension which refers to the range of a term or concept as measured by the objects that it denotes or contains.

Account$_2$: A record or statement of financial expenditure and receipts relating to a particular period or purpose:

Interpretation (Unit of Account): Money is:

Case c. A standard quantity of a record or statement.

Case d. A single and complete component (unit) of a record or statement.

Therefore, the standard definition of money can be interpreted as either of:

A. Quantity of the regard of importance, worth or usefulness of something" (store of value $_{\text{Case a}}$), standard quantity of record or statement (unit of account $_{\text{Case c}}$) and a "means or method" of exchange of things" (medium).

Simplified: **A quantity of the regard of importance worth or usefulness of something, standard quantity of record or statement, a means of exchange of things.**

B. Quantity of the regard of importance, worth or usefulness of something" (store of value $_{\text{Case a}}$), single complete component of a record or statement, (unit of account $_{\text{Case d}}$) and a "means or method" of exchange of things" (medium).

Simplified: **A quantity of the regard of importance, worth or usefulness of something, single component of a record or statement, a means of exchange of things.**

C. Quantity of a quantity (store of value $_{\text{case b}}$), standard quantity of record or statement (unit of account $_{\text{Case c}}$) and a "means or method" of exchange of things" (medium).

Simplified: **A quantity of a quantity, standard quantity of record or statement, a means of exchange of things.**

D. Quantity of a quantity ("store of value "$_{\text{Case b}}$), single complete component of a record or statement, (unit of account $_{\text{Case d}}$) and a "means or method" of exchange of things" (medium).

Simplified: **A quantity of a quantity, single component of a record or statement, a means of exchange of things.**

We can safely eliminate both C and D as "Quantity of a quantity" is redundant, which leaves us with only:

A. A quantity of the regard of importance, worth or usefulness of something, standard quantity of a record or statement, a means of exchange of things.

B. A quantity of the regard of importance, worth or usefulness of something, single component of a record or statement, a means of exchange of things.

The only difference being whether or not "**unit**" of "**unit of account**" refers to "**standard quantity"** or **"single component of a record or statement".**

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But! In both cases "**store of value**" stipulates a "**quantity**" for which "**standard"** would serve to qualify "**quantity"**, given that in financial statements the key components of these are sums of "**standard**" units of one or other "currency" or "money" denomination, the qualification proves wholly consistent. While "**single component of a record or statement"** introduces ambiguity as to which of any of the components that make up a financial statement such as Account Number, Account Holder, Date, Debit and Credit Column...etc is to be considered. Thus, this last case is inconclusive, for which it must be discarded. This then leaves us with only one viable option of the four possibilities:

A quantity of regard of importance, worth or usefulness of something, standard quantity of a record or statement, a means of exchange of things.

Simplifying further by replacing the equivalence "or" statements with statements containing only "**usefulness**" and "**record**" and taking "**standard quantity"** as a qualifier of "**quantity**" in the definition of "**store of value**", we get:

A standard quantity of the regard of usefulness of something, a standard quantity of a record, a means of exchange of things.

Note, in this case money is not a physical object, then a record is the only means of "**storing**" it, which implies that in this case, "**store**" and "**record**" are synonyms! So we can substitute "**store**" for "**record**":

A record of the regard of usefulness of something, a standard quantity of a record, a means of exchange of things.

Substituting "**the regard of usefulness of something"** with its label **"value"** we get:

A record of value, a standard quantity of a record, a means of exchange of things.

Now, a "**standard quantity**" by definition is "**a measure**" once again from oxford dictionaries we have:

Measure: A standard unit used to express the size, amount (quantity), or degree of something.

Therefore we can safely re-write the definition as:

A record of value, a measure, a means of exchange of things.

We have thus harmonised the notion "**store**" and "**unit of account**" ("**record**" of "**units**") synonymous with "**store**" by virtue of the fact that fiat money can only be "**stored**" as a "**record**". The only other possibility is that "**store**" is not a "**standard**

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quantity" of "**units**" of "**value**" in which case neither can "**unit of account"** be a "**standard quantity**" which introduces a contradiction in the definition.

The final question is money a "**means of exchange**"? For such a proposition to be true, money must perform actions and according to the definition, money is a mere "**record**" not an apparatus or system in and of itself as required by the definition of "**means**"! Therefore, it is inanimate and at most only a component of a "**means of exchange**" without constituting such on its own. Thus, the only wholly consistent interpretation of the definition that can be derived is:

Money: A record of a measure of value.

That is, money is a record of a specialisation of the class "**Measure**" and therefore must inherit all the properties of its parent class.

Money, a record of a measure of value vs a commodity and Stability

If money is generated by transactions as a record (annotation) OF the value of goods/services being transacted as described by the Bank of England [11] [12], then that record cannot be assigned INDEPENDENT value in and of itself. This can be shown by an elementary proof illustrating that no matter the independent value of an annotation, that value cannot be considered if the purpose is to represent the value of other things:

Definitions

Let $A \geq 0$ (annotated value of goods/services transacted)
Let $B \geq 0$ (independent value attributed to the record of value i.e. "money")
Let $C = A+B$ (Total value of any record)

Proof

If $A > 0$ and $B > 0$, then $A+B \neq A$ and $C \neq A$.
If $B = A$ then $A+B = A$ if and only if $A = 0$ and $B = 0$.
Therefore for any A, $C = A$ if and only if $B = 0$!

End of Proof.

In colloquial terms, the value of any annotation C of the value of some object or thing A cannot have attributed any independent value B other than zero, because otherwise, the annotation C would no longer be of A but rather of A+B. That is to say that money cannot both represent the value of goods and services as well as having ascribed any independent value of its own.[13]

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Unit Cost and Destabilization:

Another approach is to consider how any systematic unit cost or value attributed to money explicit or implicit (e.g. any direct or indirect cost per unit such as a lag between unit access and realisation of transactions) will necessarily destabilise the value of the unit of account as follows:

Let $\boldsymbol{a}$ be the initial value of any good or service $\boldsymbol{G}$ and $\boldsymbol{h}$ be the cost (in currency) of each currency unit used to represent $\boldsymbol{a}$, in subsequent $\boldsymbol{T}_i$ transfers of $\boldsymbol{G}$, then,

$$v_i = a\,(1+\boldsymbol{h})^i,\; v_{i-1} = a\,(1+\boldsymbol{h})^{i-1} \text{ and } v_i > v_{i-1} \text{ for any } \boldsymbol{h} > 0 \; [13]$$

Therefore,

Since increase in value attributed to *G* requires the arbitrary summation of units independent or exogenous of the measure of value of *G*, then it can be affirmed that any such exogenous "interference" is the sole cause of instability of value measure in the system because in the absence of such interference, the system is stable [14][15][16] by default!

We know that in today's world and in all instances, money consists of mere annotations of multiples of monetary symbols (€, $, £, ¥, etc.) and ALL Euros are issued as such against either public debt or public or private assets as collateral, the latter traditionally representing the vast majority of money in "circulation". All such "money" is created through loan contracts and all bear some or other interest charges proportional to both the initial sums and time i.e., all subsume the notion of money as a commercial object of trade. However, as shown above, money is in reality nothing more than a record of the measure of value, this logically precludes that it itself be subject to any change in value in terms of itself. Similarly, money as a measure of value is not susceptible to any limit of supply, as being a measure of the value of goods and services transacted, it necessarily must be *a posteriori* to these and must arise as abundantly and readily as do any quantity of goods and services that are required to be transacted.

Therefore and as a measure, there can be no so called variable "Time Value of Money" as money must be the constant against which all other value is measured. So that:

Potential consumption cannot logically be limited by availability of units of value measure, but only by availability of goods and services themselves. Moreover, neither can money be the object of lending; at most it can only record the value of the goods and services that are themselves the only true objects of loans and payment and indeed of value in the system.

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A legal Proposal for judicial correction of public and private money contracts as a matter of legal first impression.

It is odd to see, how in spite of our technological prowess and advances in information technology, money has escaped rigorous formal logical definition.

Thus, it is imperative that the issue of determining the true logical nature and definition of money be raised in the context of public and private contracts, for which we must ask the following questions, particularly with regards to the chronic failure of "Constitutional Contract" i.e. Fundamental Rights and Freedoms[2] dictated by monetary criteria but in the absence of any unequivocal standard technical and legal definition of money:

a. Does the absence of a definition somehow limit the application of principles of law or provide otherwise unwarranted credence to "customary practices"?

b. Pursuant to the principle of validity "***quae ab initio non valent, ex post facto convalescere non possunt***" (What is invalid at the beginning cannot be made valid by subsequent acts) and in the case current assumptions as to what money is are proven invalid or mutually exclusive, are current contracts rendered impossible?

Thus, we cannot afford that logical inconsistencies become the basis of righteous rules of law, nor can we permit to wittingly or unwittingly become accomplices of a psychological conditioning that constitutes a veritable Psychological Operation as has been coined in "The Money PSYOP".[17] We believe that none of this is necessary and that an orderly resolution can be arrived at on the basis of weighing the tremendous advantages of resolving this issue outside of partisan dogma and beliefs in terms of immediate relief from the unfounded instability inherent in current common practices.

The only place that a definition of money is implied is in Portuguese and other European legislations[3] and upon defining loan agreements for transactions of "fungible objects" as indicated by Article 1142 of the Portuguese Civil Code that reads:

"Mútuo é o contrato pelo qual uma das partes empresta à outra dinheiro ou outra coisa fungível, ficando a segunda obrigada a restituir outro tanto do mesmo género e qualidade." (*Through mutual agreement whereby one of the parties gives the other money or some other fungible thing, obliges or requires that the second restore a quantity to the lender of the same species and quality.*)

However and under the current paradigm, money cannot be considered a fungible object due to the fact that its purported "exchange value" the only attribute that confers any notion of "quality" to money is, under current assumptions, a variable as

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[2] For example the right to work and the right to job security provided in the articles 53 and 58 of the Portuguese Constitution. The first one says that it is guaranteed to the workers stability in their jobs and it is forbidden the unfair dismissal due to political or ideological reasons. The second expresses the idea that everybody has the right to have a job.

[3] Similarly and in a Comparative Law perspective, the definition of loan agreement versed in the article 1753.º of the Spanish Civil Code says the same thing.

opposed to a constant, as attested by the existence of inflation and sometimes deflation, that is well documented in absolute terms not just relative to foreign exchange.

In so far as general principles of international and national law require the drafting of contracts on the basis of valid premises, the lack of a clear, unequivocal and universal legal definition of money, clearly indicates that money as one of the key elements of the legal scope of such contracts, renders these contracts at best indeterminable and at worst legally impossible. In any case, they are contrary to the principles and values expressed in the most important treaties of international law and according to article 280.º of the Portuguese Civil Code and article 1272.º of the Spanish Civil Code, not to mention articles 2 to 10 of the Lisbon Treaty, should be rendered null and void.

Therefore all current public and private contracts should be object of judicial correction pursuant the general principle of validity in law "***Quae ab initio non valent, ex post facto convalescere non possunt"*** and the legal foundations to invoke such a principle, lie in recognising how the absence of a consistent definition of money demonstrably results in unfounded notions that as shown above result in an unstable money system that fuels greater and greater systematic overall inequality and social injustice.

The assumption of the existence of a practical definition of money on the part of society and in the eyes of the judiciary supports only a belief in the existence of a valid raison d´être of current public and private financial contracts not any demonstrable principle.

As long as this belief remains unchallenged by society, judges can legitimately act under the assumption that somewhere and somehow, there exists a definition of money that is indeed sound. However, should this assumption be questioned in light of the inconsistencies brought forward here, then the judiciary can no longer continue under the *prima facie* assumption of validity. The judiciary is thus required to provide for a resolution of all inconsistencies as on the one hand, it cannot permit either an irrational definition nor one that contravenes demonstrable natural law and on the other hand, it cannot accept to have its own credibility undermined by acquiescing to an ambiguous industry *de facto* definition.

According to article 281, paragraph n.º1 of the Portuguese Constitution, the Portuguese Constitutional Court has the competence to evaluate and declare, with binding force:

a. The unconstitutionality of any standards;
b. The illegality of any requirements of legislative acts on grounds of infringement of laws including foundational law. According to paragraph n.º 2 of the referred article, the European or Member State Ombudsman is required to represent causes of public interest to the Portuguese Constitutional Court, the European Court of Justice or the European Court of Human Rights. Thus the Ombudsman can with binding force, challenge the legality and constitutionality of article 101 "Financial System" of the Portuguese Constitution and Articles 119 to 132 of the Lisbon Treaty[4] "Monetary and Economic Policy" can be challenged in their

[4] We would like to emphasize the content of Article 126 of the Lisbon Treaty, which clearly takes the inevitability of budget deficits, affirming that the "Member States shall avoid excessive government deficits".

current form by raising the issue of the absence of an unequivocal legal definition of Money, in light of the demonstrable inability to guarantee full application of Constitutional and fundamental Rights and general principles of law in a question of legal first impression[5].

Portuguese author Nuno Manuel Pinto de Oliveira *et. al.* contends that the problem of admissibility or inadmissibility of contracts, arises when the content of contracts confuses, or at least confronts the principles that prevent the application of unfair laws. The control of the imbalance and unfairness of money contracts directly corresponds to the lack of application of particular rules of law via the non application of general rules of law as stipulated by article 406 of the Portuguese Civil Code.

The criteria for resolving the eternal problem of unfair application of the law is the so called Radbruch Formula: "***Whenever the application of positive law, results in such a high degree of injustice as to put into question its legality, then there can be no doubt that the unfairness of the positive law must yield to a higher justice.***" [18] Nuno Pinto de Oliveira says that the non application criteria of unfair laws as described by Radbruch must be adapted to Contract Law, but only limited to the judicial control of the correctness or incorrectness of the content of contracts in the case of disproportions or imbalances – more succinctly: in cases where injustice is evident and blatant. [19] Similarly, James Gordley advocates judicial correction of all contracts in which one party is enriched at the expense of another. The judicial control over the content of contracts corresponds, in first instance, to the application of legal rational and reasonable criteria preferred by the law and only in the last instance to the criteria as agreed by the contracting parties. [20]

Our response is based on the continued relevance of Irving Fisher´s admonition in "The Money Illusion" where he concludes: "***In this and the previous chapter we have seen that unstable money robs sometimes one class and sometimes another; that it upsets all sorts of calculations and economic relationships and adjustments; that it causes harmful fluctuations in trade and employment, and produces discontent, labor troubles, class hatred and violence; and that in the end it represents a general economic loss. These evils of unstable money may be reduced to three: social injustice, social discontent and social inefficiency.***" [21]

It is the instability of such a system without proper rigorous definition of its key component i.e. money, that is at the heart of most if not all the problems the Eurozone is facing right now, i.e. the European depression and the measures emerging from a financial advisory class that is adversely affecting all aspects of society today.

[5] A case in which a question of interpretation of law is presented which has never arisen before in any reported case. Sometimes, it is only of first impression in the particular state or jurisdiction, so decisions from other states or the federal courts may be examined as a guideline. http://dictionary.law.com/Default.aspx?selected=149

Thus:

The current monetary and financial system operates on the following false premises:

1. **That there exists a valid common definition of money that can be expressed in valid formal objective logic, obeys natural law that is wholly consistent with the assumptions, terms and conditions of current money contracts;**
2. **That the parties to current money contracts are fully aware of all aspects such a formal definition;**
3. **That the validity of the contracts is determined solely by mutual agreement of the parties.[22]**

The Constitutions of European Member States cede to their respective Constitutional Courts, European Court of Justice and European Court of Human Rights, the unique prerogative to amend their terms and effects, in order to guarantee the enforcement of the principle of separation of powers and ultimately of democratic rule of law. However, only for issues of legal certainty, equity, or public interest of exceptional importance [23] and in accordance with Article 282, paragraph 4 of the Portuguese Constitution when justified.

In this sense, all that needs to be ascertained, before or during any legal action, is whether or not there exists a logically valid common definition of money that is both universally recognized and understood by all parties to all financial and money contracts. It is clear that absence of such is proof of the invalidity of current contracts. Similarly, if any such definition does not support the logical assumptions, terms and conditions of current contracts and common practices, the contracts would also prove to be invalid. Thus, if ever there was, this is a matter of exceptional and urgent public interest.

Are the parties capable of immediately providing or accessing such formal and logically valid definitions of money? Will all or the majority of proposed definitions be both logically sound and equivalent?

Recently, the European Court of Human Rights has included the notion of substantive equality in determining Justice. This, in contrast to simply formalising equality, the Court adopts a substantive conception that takes into account all facets relevant to how rights are violated. The central question in the case at hand, is not whether the law makes distinctions, nor whether or not the state is motivated by prejudice, but whether or not the effect of the law takes into account the substantive organic effect of an ill defined and unstable money system, showing how that instability translates into systematic effects that perpetuate inequality, disadvantage, discrimination, exclusion, involuntary unemployment, etc., impeding the optimal exercise of fundamental rights. [24] It is for this reason that this issue warrants being presented to the Judiciary on a first impression basis.

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Concretely and as an example of a matter of first impression, on June 16th 2015, the Grand Chamber of the European Court of Human Rights (ECHR) issued its final decision regarding the liability of a news portal for offensive comments made by its users. In the case Delfi AS v. Estonia (application no. 64569/09, the "Case"), [25] the ECHR decided that holding an internet news portal liable for comments made by a third-party commentator to the portal's site, is not in breach of the portal's freedom to impart information. A brief background of the case follows:

In January 2006, the applicant Delfi AS, the owner of one of the biggest commercial internet news portals in Estonia, published an article on its webpage about a local ferry company. Thereafter, some of the site's users wrote highly offensive and threatening comments about the ferry company and its owner. While Delfi AS deleted the comments about 6 weeks after publishing the article, the owner of the ferry company nevertheless successfully sued the news portal. The Estonian Courts decided that the limitation of liability for service providers for the distributed content by third parties (stipulated in Directive 2000/31/EC transposed to internal national law) was not applicable in this case. Therefore, they found Delfi AS liable for the comments and awarded compensation to the owner of the ferry company in the amount of approx. €320 for non - pecuniary damages.

In 2009, Delfi AS filed an application to the ECHR, complaining that it had been found liable for comments made by third parties. With its judgement of the 10th of October 2013, the Chamber of the ECHR decided that there had been no violation of article 10 (freedom of expression) of the European Convention of Human Rights. In response, at the beginning of 2014, Delfi AS requested the case be reviewed by the Grand Chamber of the ECHR.

The Grand Chamber of the ECHR narrowed its assessment to determining the duties and responsibilities, under Article 10 § 2 of the European Convention of Human Rights, of commercially run internet news portals that provide users the option of generating comments on published content where those comments could include unlawful speech. Finding that there had not been unjustified and disproportional restriction on Delfi AS´s freedom of expression, the decisive jury considered the following main aspects of the case:

a) Although Delfi AS had not been the actual writer of the unlawful comments, it had full control over its internet platform;
b) Delfi AS had not ensured a realistic possibility for any affected party to hold the actual authors of the unlawful comments liable;
c) Delfi AS´s efforts in preventing and removing the unlawful comments without delay had been insufficient.
d) The awarded compensation (approx. EUR 320) was not only not excessive, but actually modest.

Similarly, and referring to the above quote of Fisher from "The Money Illusion" [21], and the current severe impact of unfounded standard beliefs and notions about money, the question of broad social and third party liability as a question of first impression needs to be brought forward. That is to say, the fact that the financial system has not

taken all necessary and possible positive econometric, scientific or legal measures to guarantee full compliance of the European Constitutional Contract and the Universal Declaration of Human Rights makes them particularly liable for all consequences.

The duty to clarify the definition of money producing a univocal, technical and legal definition of money is directly related to the obligation to mediate unequivocal communication between all direct or indirect participants of public and private contracts. This is a fundamental principle of procedural equality and transparency with respect to determining the true will of all parties to the contract as well as to other affected parties.

Once again we invoke the wise lessons of Nuno Manuel Pinto de Oliveira [26] regarding the duty to clarify according to the following *sine-qua-non* presumptions: symmetry of information; relevance of information; and, finally, full disclosure.

Asymmetric information is a common problem in legal transactions in the way that at least one of the contractual parties – whether public or private – knows or should know determined circumstances that the target group or co-contractor does not or cannot know. Thus, it is imperative that all parties to money contracts use a valid common definition of money not only in order to guarantee the principles of symmetry, relevance and full disclosure of information, but also to determine the validity and scope of the contracts. This is particularly essential when any lack of information significantly benefits certain parties to the detriment of other parties.

Full disclosure of information regarding the exact nature of money is vital with regards to the correct formation, execution and interpretation of current public and private contracts, in order to determine accurate and equitable consideration of all circumstances.

At the same time, the duty of the parties to cooperate in obtaining symmetry of information is a pre-contractual obligation that all parties must assume in order to safeguard just common human ends inherent to contracts.

Finally, the violation of – either – symmetry, relevance or full disclosure is sufficient to render a contract invalid. The same is true with regard to the duty of information in the cases where contract parties don´t furnish fundamental dates to the just evaluation of the contract's ends or legal scope. Therefore, the mere lack of a clear, unambiguous definition of money is sufficient to render all current contracts null and void.

The importance of a universal and Constitutional definition of money to fundamental human rights

It is worth repeating the wise words of Narayana R. Kocherlakota[8]:

"***Monetary economics has traditionally been dominated by the question of how the quantity of money, or the growth rate of that quantity, affects prices and quantities of goods. My reasoning here suggests that this focus is misplaced. Money is a record-keeping device; hence, monetary policy should be designed so that record-keeping is performed in the most efficient way possible. How do we do that?***"

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All citizens should have the right to see enshrined in the European Constitution or in the Universal Declaration of Human Rights, in a clear and unambiguous manner, a logically consistent legal definition of money. Otherwise, we run the risk of perpetuating unsound economic principles that undermine the Democratic Rule of Law and a dubious tax and legal system. [27]

Establishing a clear, unequivocal legal definition of money in so far as currently, money represents a universal requirement for the effective and equitable exercise of all other rights, particularly the right to self determination, is indeed of the highest order to be cited in the Universal Declaration of Human Rights in order to promote optimal conditions for stability and well-being, peaceful and amicable relations among all nations and maximum respect for the dignity of all citizens. It is also the first minimum and necessary step towards resolving many economic, social, legal, cultural, educational and health problems affecting the globe as required by Article 55 of the United Nations Charter that strives towards universal respect and observance of all fundamental human rights and freedoms.

Currently, access to money is not in tandem with the ability for people to mutually reciprocate goods and services but, rather access is dominated by what are called "financial" assets ($600T) vs. true assets ("accumulated tangible and non tangible assets" i.e. real goods and services ($210T)[28], such that currently, money predominately represents its own value beyond representing the value of goods and services that are the true foundation of the economy.

Therefore, we need to redefine a new ethic in money by adopting Kelsen´s lesson: "***The statement that an individual "ought to" behave in a certain way implies neither that some other individual "wills" or "commands" so, nor that the individual who ought to behave in a certain way actually behaves in this way. The norm is the expression of the idea that something ought to occur, especially that an individual ought to behave in a certain way. By the norm, nothing is said about the actual behaviour of the individual concerned. The statement that an individual "ought to" behave in a certain way means that this behaviour is prescribed by a norm – it may be a moral or a legal norm or some other norm. The "ought" simply expresses the specific sense in which human behaviour is determined by a norm. All we can do to describe this sense is to state that it is different from the sense in which we say that an individual actually behaves in a certain way, that something actually occurs or exists. A statement to the effect that something ought to occur is a statement about the existence and the contents of a norm, not a statement about natural reality, i.e. actual events in nature. (...) The efficacy of law, understood in the last - mentioned way, consists in the fact that men are led to observe the conduct required by a norm by their idea of this norm. A statement concerning the efficacy of law so understood is a statement about actual behaviour. To designate both the valid norm and the idea of the norm, which is a psychological fact, by the same word "norm" is to commit an equivocation which may give rise to grave fallacies.*** "[29]

The Kelsen vision does not state that (in)valid standards of positive law may be subject to the standards of justice, but recognizes that these standards of justice determine the conduct of those – e.g. legislators, administrators, entrepreneurs, bankers – whose acts

create the need for Law. And those acts are naturally subject to the rule of justice and to the values and general principles of international law.

The fact that in the present financial, monetary and legal system, money discharges social and economic power requires that fairness in terms of money be safeguarded. However, the adoption a clear objective common understanding of the true nature of money, liberates all to act in direct consequence of that understanding, thus supporting the independence of the Judiciary and therefore the principle of separation of powers.

When it becomes clear that currency has never had intrinsic value - but such as with Law, defined as a tool, to better organizing human activity - we will then be able to look with greater certainty towards restructuring the poorest nations and overcoming challenges without the need to resort to international disputes and conflicts that in any case do not successfully resolve such issues. This, in light of Recent studies that demonstrate, that for the first time in history, it is possible to eradicate poverty globally. [30]

Thus, we propose a new financial system that recognises the fact that for there to be Justice in public and private financial matters, a sound "measure of value" is *sine-qua-non* and precludes that the unit of measure be itself a commodity of variable and negotiable value, built on the idea of money as nothing more than a record - keeping device as Kocherlakota suggests. Moreover, this proposal should be communicated to and overseen by, the public at large.

Discussion and Conclusion

We have established that to date and throughout history there exists no formal logically valid definition or theorem defining money, although it is made evident that the attempt has always been to seek a universal representation of value. We show via formal semantic analysis how, in order to be consistent with itself, the current de facto intensional definition of money as a "store of value", "medium of exchange" and "unit of account", must reduce to:

Money: A record of a measure of value.

In as much as the notion of a record of a measure of value is consistent with the notion of "mnemonic tool", this finding corroborates Kocherlakota's results regarding money's technological function as "social memory", with the distinction of requiring measure explicitly while in Kocherlakota's findings, such is only implicit i.e. there can only be "memory of transactions" if and only if there is measure. In any case, both findings serve to dismiss the validity of the currently commonly assumed definition of money.

We then show that if money is generated by transactions as a record (annotation) OF the value of goods/services being transacted as described by the Bank of England [11] [12], then that record cannot be assigned INDEPENDENT value in and of itself. We also demonstrate for the transaction of any good or service $\boldsymbol{G}$:

Since increase in value attributed to *G* requires the arbitrary summation of units independent or exogenous of the measure of value of *G*, then it can be affirmed that any such exogenous "interference" is the sole cause of instability of value measure in the system, as in the absence of such interference the system is stable by default.

This further discredits the notion that money be more than a measure of value because any independent value of money necessarily becomes exogenous to the value measure function. Finally, we conclude on the basis of all the above that:

Potential consumption cannot logically be limited by availability of units of value measure, but only by availability of goods and services themselves. Moreover, neither can money be the object of lending; at most it can only record the value of the goods and services that are themselves the only true objects of loans and payment and indeed of value in the system.

Having established technically through various means that the common notion of money is logically inconsistent in its own definition as well as in practice. We proceed to show that the current definition is also inconsistent in terms of the legal requirement for money to be fungible. Again, this is consistent with money as a unit of measure, but inconsistent with the notion of money having a variable value as documented by the existence of inflation and at times deflation, in that division of a variable unit is not interchangeable over time.

On the basis of the principle of validity in law ***"Quae ab initio no valent, ex post facto convalescere non possunt"***, we establish that the inherent validity of contracts supersedes traditional practice such that once the doubt is raised as to the validity of the definition of money, the Judiciary is required as a matter of first impression to resolve all inconsistencies or declare all money contracts as at best indeterminable or at worst null and void.

We demonstrate that this anomalous situation has severe systemic impact on society and the viable exercise of fundamental rights and we establish the responsibility for safeguarding the principles that are fundamental to contract law, particularly symmetry of information, relevance of information and full disclosure between parties.

Having identified the legal imperative to deal with the issue of lack of definition, we identify how through the concept of substantive equality where all aspects of cases are evaluated to guaranty that the application of particular rules of law must include the application of general rules of law.

All this establishes a firm case for dealing with the incongruence between money contracts and what we denote as the three fundamental false assumptions currently underlying money contracts:

The current monetary and financial system operates on the following false premises:

1. **That there exists a valid common definition of money that can be expressed in valid formal objective logic, obeys natural law that is wholly consistent with the assumptions, terms and conditions of current money contracts;**
2. **That the parties to current money contracts are fully aware of all aspects of such a formal definition;**
3. **That the validity of the contracts is determined solely by mutual agreement of the parties.**

Finally, we review the constitutional importance and indeed urgency of this issue and point out that both, the incongruence in definition of money and the manifest technical instability of money's function, stem from the same conceptual or ontological flaw of defining money as both an article of commercial value as well as unit of measure. As we clearly establish that the function of measure is *sine-qua-non* to the application of justice in such matters, we suggest bringing this issue to the public at large in support of a constitutionally based judicial review leading to the establishment of a universal formal logical definition of money as a stable unit of value measure.

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