" Texto para discussão

A simple multi-level analytical framework to assess economies under the dollar standard: a step towards solving socioecological problems in the Anthropocene

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1 Introduction

Central banks' efforts have been shown to be insufficient to solve the problems caused by the financial crisis of 2007 (Koo, 2015). In this context, on the one hand are economists and politicians seeking to find ways to ensure that the economies of their countries to resume economic growth (Duncan, 2012; Koo, 2015). On the other hand, there are economists who defend the idea that some countries, especially the more developed reach zero economic growth over time or economic degrowth (Jackson, 2009; Victor, 2008).

The fact is that humanity is facing serious problems such as global warming, social inequality and economic problems arising out of flaws (Duncan, 2005) of the current international monetary system, the dollar standard[3]. To find solutions to such problems we defend the idea that decision-makers need understand the functioning of the dollar standard (Duncan, 2005; Paiva Sobrinho & Romeiro, 2016) and they should have access to an analytical framework that enable them to analyze the problem of their economies under multiple levels and think outside the box (section 7), since the economic system is a complex flow system (Ulanowicz et al., 2009; Lietaer et al., 2010; Lietaer et al. 2012).

We present a framework that synthesizes contributions of several authors (Duncan, 2015, 2012; Werner, 1997; Koo, 2009; Milne, 2009; Lietaer et al. 2012; Ulanowicz et al. 2009). This framework (Figure 0) examines a
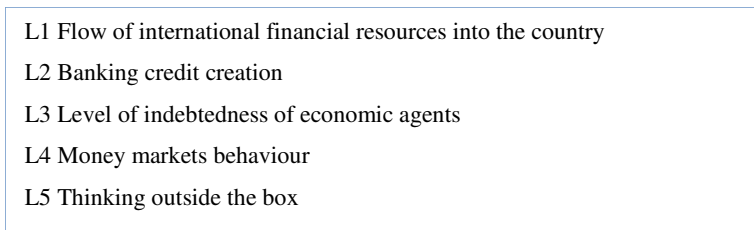
(3) We refer to 'dollar standard', the international monetary system that substituted the extinct Bretton Woods system. More details see Duncan (2005); Paiva Sobrinho e Romeiro (2016).

country's economic international connection through the analysis of the main accounts that compose its balance of payments seeking to identify the relationship of these with the expansion of credit in the economy analyzed via the quantity theory of credit (QTC) (Werner, 1997; Duncan, 2012). Through this analysis it is possible to understand the factors that have led some economies to experience period of economic growth, followed by a crisis. In addition, this framework shows the connection between the behavior of the balance of payments of the country with other key factors that influence banking credit expansion, as an example, the money market and the level of indebtedness of family and business sectors of an economy (section 6). In section 7, we present some ideas for solving the main challenges humanity is facing in the current geological era, Anthropocene.

Figure 0
Multi-level analytical framework

L1 Flow of international financial resources into the country

L2 Banking credit creation

L3 Level of indebtedness of economic agents

L4 Money markets behaviour

L5 Thinking outside the box

Understand the connections between the elements that compose this analytical framework allows decision-makers have a more pragmatic view on the state of its economy, as well as, potential actions that can be taken to resolve the problems.

As mentioned, this analytical framework incorporates the quantitative theory of credit 'QTC' (Werner, 1997; Duncan, 2012) as a partial explanatory model of the relationship between banking credit expansion, economic growth and economic bubbles. We are aware that the QTC is useful in situations where there is only one type of credit, which has been practiced by financial institutions such as commercial banks. This theory does not cover other types of credit as mutual credit clearing (Paiva Sobrinho, 2016; Stodder and Lietaer, 2012), as well as the multiplicity of types of money that exist beyond the commonly used by people (Kennedy et al., 2012). The theory that includes multiple types of money and credit is being developed by the first author of this paper.

The work is structured as follows. In section 2, we present the main differences between the extinct Bretton Woods international monetary system and the current dollar standard. Then we present briefly the quantity theory of money (section 3) and in sections 4 and 5 present the quantitative theory of credit proposals, respectively, by Duncan (2012) and Werner (1997). After the differentiation between both proposals of the quantity theory proposed by these authors credit, we present three considerations that help compose this analytical framework. To illustrate the applicability of the framework, we present data from Japan's economy.

2 Main differences between the Bretton Woods International Monetary System and Dollar Standard

In the Bretton Woods system (BWS) the reserve assets were composed mainly by gold and foreign currencies; during dollar standard most of reserve assets are created by government and private financial institutions. According Duncan (2005) this allowed several countries, such as US finance its current account deficit with dollar-denominated financial assets. In BWS there was a clear difference between money and credit: dollars were backed by gold (35 dollars were equal one ounce of gold). Credit was merely an obligation to repay certain amount of money. During the dollar standard, dollars no longer represent a claim on a real commodity; credit and money were almost indistinguishable, but they are different. The difference between money and credit is clarified by the IMF (2008).

The IMF states that money is composed of currency (cash) and coins; the central government most commonly issues the coins and the central bank issues the currency notes. This mean that other financial institutions, mainly commercial banks, 'shadow banks' (Luttrell et al. 2012), investment banks are allowed to expand credit and must acquire cash to finance its business activities (directly with central banks and/or money markets and/or interbank market and/or their clients).

In the dollar standard, the dollar is created every time the FED buys something (FED 1982), generally, United States government's debt securities, either directly from the primary dealers or, under certain conditions direct from the federal government. In addition, the FED also buys debt securities from financial institutions, primarily to bailout them (Bloomberg, 2011). In the

current international monetary system, all the central banks create the currency of their countries in the same way, buying something that they consider an asset.

Both the Bretton Woods system and the current dollar standard, the economic system continues to be a worldwide complex flow system of financial resources. The difference is that during the Bretton Woods system the flow of financial resources was limited both by the technological infrastructures, as well as the amount of gold inside the financial system. On the dollar standard, system infrastructure for transfers this flow of international resources was established in 1979, through the SWIFT (Society for Worldwide Interbank Financial Telecommunication) and the money is created according the decisions of central banks being to buy foreign exchanges, or, buy government and private securities.

The flow of financial resources in the dollar standard between countries depends on the action of financial institutions, such as, primary dealers, participating in the process of creating the money in conjunction with the government and the central bank. The primary dealers form the primary market of debt securities (bond markets) and influence the expansion of credit in the economy of a country, once they also operate in the retail segment expanding credit through their subsidiaries banks (Paiva Sobrinho & Romeiro, 2016).

The primary dealers have become more visible with the 2007 crisis, since one of the primary dealers of the United States, Lehman Brothers went bankrupt, see Valukas report (Valukas, 2011). In addition, through scandals involving other primary dealers involved since the beginning of this system, in 1960, as was the case with the JP Morgan who was fined for manipulating the money market interest rate LIBOR (Bloomberg, 2013).

All the mentioned facts clarify the difference between the extinct Bretton Woods system and the current international monetary system. Before introducing the Quantity Theory of Credit (QTC) we present briefly the Quantity Theory of Money (QTM).

3 Quantity Theory of Money (QTM)

Although the quantity theory of money is old centuries, it was formalized through the work of Fisher (1911), which stated that the theory would be better understood via the exchange equation of all transactions during a period of time.

Fisher clarifies the exchange equation for all transactions:

> The equation thus has a money side and a goods side. The money side is the total money paid, and may be considered as the product of the quantity of money multiplied by its rapidity of circulation. The goods side is made up of the products of quantities of goods exchanged multiplied by their respective prices.

Regarding this description it is important understand the meaning of some terms used by the author, such as 'goods'. Fisher defined 'goods' as:

> The term 'goods' is a collective term comprising all wealth, property, and services, these being the magnitudes designated in sales. The chief subclasses under these three groups, which occur in actual sales, may be indicated as follows: (a) wealth (real estate, commodities); (b) property (stocks, bonds, mortgages, private notes, time bills of exchange); (c) services (of rented real estate, of rented commodities, of hired workers, of some or all these agencies combined).

As can be seen, the Fisher's definition of 'goods' incorporates items that are part of GDP and other that are not part of GDP. In other words, the exchange equation of all transactions incorporates transactions that are part of the GDP and those that are not part of GDP.

Fisher (1911) formalized the QTM through the following equation:

(1) $MV = PT$

Where:

M = Money (the average amount of money in circulation in the community during the year)

V = Velocity (the average rate of turnover of money)

P = Price level (the weighted average of all prices)

T = Trade (the volume of trade)

According Fisher quoted in Duncan (2012), the equation (1) means the amount spent (MV) is always equal to price of all the things bought (PT) for any particular community during a given period of time. MV is the quantity of money (M) multiplied by the number of times that money is used during the period (V). PT represents the price (P) of each product multiplied by the quantity purchased or the volume of trade (T).

Fisher' theory distinguished money in two classes: primary money and fiduciary money. The author point out that in the US gold coins was primary money and fiduciary money the following items: (1) token coins, viz. silver dollars, fractional silver, and minor coins ('nickels' and cents); (2) paper money, viz. (a) certificates for gold and silver, and (b) promissory notes, whether of the United States government ("greenbacks"), or of the National banks.

Once money is not backed by gold anymore, and now money is synonymous of credit the equation (1) must be changed to adapt to this new context. As mentioned before, Werner (1997) and Duncan (2012) developed the quantity theory of credit and the differences between their proposals are presented in the next two sections.

Fisher considered exchanges only the exchange of money against goods, or purchase and sale and he called this type of exchange the 'circulation' of money. He wrote:

> The circulation of money signifies, therefore, the aggregate amount of its transfers against goods. All money held for circulation, i.e. all money, except what is in the banks and the United States government's vaults, is called 'money in circulation.

Taking into account this information it matters which variable one choose to represent the money in circulation. As pointed out by Werner (2009) until about the mid-1980s several economists (monetarists among others) included a monetary aggregate that was linked to nominal GDP through the equation:

(2) $MV = PY$

Whereby M stands for the money supply (measured and defined variously as M0, M1, M2, M3 or M4), V denotes the velocity of money, which has to be stable for a reliable relationship between money and the economy, P the GDP deflator (the appropriate price level) and Y symbolizes the real GDP (PY represents the nominal GDP).

Werner pointed out two problems with this reasoning being the first, the use of monetary aggregates as a measure of money in circulation. These M-aggregate measuring money supply mainly consist of money deposited with banks or the central bank. They are not money used for transactions; they represent money out of circulation.

Werner (1997) substituted the monetary aggregates as a measure of money supply by the total bank credit arguing that there are several advantages, such as: (a) credit always represents effective purchasing power, as no borrower will take out a loan if there is no plan to use the money for transactions; (b) it becomes possible to define effective purchasing power clearly – namely not bank liabilities, but bank assets or private sector liabilities to the bank sector; and (c) credit aggregates are available by economic sector and hence provide us with additional information about the direction of purchasing power – something deposit aggregates cannot tell us.

Duncan (2012) mentioned the monetarist's should have included all dollar-denominated credit instruments in their definition of money, or, they should have replaced money with credit in the equation of exchange.

According Werner (2009) the second problem is to assume PT = PY. Fisher formulated the exchange equation for all transactions including the ones that are part of GDP and those that are not part of GDP. To solve this problem Werner disaggregated the exchange equation for all transactions as will be show in section 5.

4 Quantity Theory of Credit (QTC) according Duncan

According to Duncan (2012) the QTC is represented by the following equation:

(3) CV = PT = GDP

Where:

C = Total credit market debt

V = Velocity (the average rate of turnover of credit)

P = Price level (the weighted average of all prices)

T = Trade (the volume of trade)

Duncan states that the right side of equation 3, PT, is equal to GDP (gross domestic product), which is driven by credit. According to him credit growth pushes up nominal GDP in the same way that an increase in the quantity of money did in the past, by causing an increase in the price level. He points out once fiat money allows unlimited credit creation, credit growth can also push up the volume of trade (T) and, therefore, real GDP, for a very long period

of time, producing a much larger economic boom than was possible within a commodity-money based system that Fisher understood (Duncan, 2012).

Duncan points out the QTC differ from the quantity theory of money in only one important respect. He wrote:

> It contends that, under the current system of fiat money, the boom and bust cycle is much longer because now credit can expand for far longer than the money supply could within in the commodity money based system of the past. The transition period of the boom is far longer, but it is not infinite. It ends when credit ceases to expand. Ultimately, every credit-induced economic boom ends when asset prices become too inflated and industrial production becomes too excessive relative to the income of the public. The boom can only last if wages keep pace with asset prices and industrial output. When they don't, the public becomes incapable of servicing its debt. Then the transition period ends, the boom goes into reverse and the depression begins.

Once that economic growth depends on the credit it is needed to understand which are the factors, in addition to those mentioned by Duncan, that affect credit expansion within the context of the dollar standard (see section 6).

Regarding equation (3), Duncan uses C = 'total credit market debt' as measurement of credit in equation (3); doing this it seems he does not distinguish between the credit issued by financial sectors to transactions that contribute to the economic growth and those transactions that does not make part of the GDP. Although he does not make the mentioned differentiation, he clearly understands the systemic relationship between both and economic growth. Duncan wrote:

> When credit expands, it causes asset prices to rise. For instance, when home prices are rising, homeowners can refinance and extract equity from their homes, and, therefore, spend more. Higher spending boosts the economy, creating jobs, profits, and tax revenues. When credit stops expanding, home prices stop rising and additional equity extraction becomes impossible. At that point, homeowners have to spend less than before. Reduced spending causes the economy to contract, and jobs, profits, and tax revenues are lost.

This systemic view is essential to analyze a complex system such as the dollar standard. Equally, it is also important to differentiate the credit allocated to transactions that contribute directly to the GDP, of those who do not contribute.

5 Quantity Theory of Credit (QTC) according Werner (1997)

Werner (1997, 2009) decomposed the general equation of exchange of all transactions into two flows – those for GDP ('real', hence subscript R) and those for non-GDP transactions ('financial', subscript F). As already mentioned Werner (1997) substituted the monetary aggregates as a measure of money supply by the total bank credit (C), see equation (4). He used the letter 'Q' to refer the quantity of transactions.

The quantity theory of credit is given by the following equations:

(4) $CV = PQ$

The left side of equation (4), CV, represents the total credit used for all transactions, i.e., those that are part of GDP (called $C_R V_R$) in addition to those that are not (called $C_F V_F$), see equation (5). The right side of equation (4), PQ, represents the value of all transactions including those that are part of GDP (called $P_R Q_R$) in addition to those that are not (called $P_F Q_F$), see equation (6).

(5) $CV = C_R V_R + C_F V_F$

(6) $PQ = P_R Q_R + P_F Q_F$

The relationship between credit and economic growth (GDP) is given by:

(7) $C_R V_R = P_R Q_R$

According Werner, $P_R Q_R$ represents all GDP based transactions and with a stable 'real' velocity of credit, V_R, the effective amount of credit used for GDP transactions during a period of time ($C_R V_R$) must be equal to nominal GDP, $P_R Y$, where P_R is GDP deflator and 'Y' stands for real GDP:

(7') $C_R V_R = P_R Y =$ nominal GDP

Equation (8) represents the exchange equation for transactions that are not part of GDP:

(8) $C_F V_F = P_F Q_F$

With a stable 'financial' velocity of credit, V_F, the amount of credit used for non-GDP transactions during a period of time ($C_F V_F$) will be equal to the value of these non-GDP transactions ($P_F Q_F$). That means an increase of amount of credit destined to non-GDP transactions should increase the value of these non-GDP transactions.

The variability between two periods of time of the amount of credit and transactions that are part of the GDP and those that are not can be represented, respectively, by equations (10) and (11):

(10) $\Delta(C_R)V_R = \Delta(P_R\ Y)$

(11) $\Delta(C_F)V_F = \Delta(P_F\ Q_F)$

As can be seen from equation (10) the growth of nominal GDP ($P_R\ Y$) this year means more transactions (that are part of GDP) have taken place this year than last year. Regarding the equation (11) an increase of credit for non-GDP transactions will increase the volume of transactions of financial assets and depending the level of the credit expansion an economic bubble can be developed. Empirical evidence is presented in Werner (1997; 2009).

Werner (2009) asks: how can the amount of money used for transactions increase in our modern financial system? How is money created and injected in our present-day system? He wrote:

> The particular type of fiat money system that is currently employed worldwide is one in which 97% of the money supply is create and allocated largely by private profit-oriented enterprises, namely the banks. How do banks create money? ... Banks create money out of nothing when they extend bank credit (or purchase other assets, or pay their staff). This is why the process of granting bank loans is better described by the expression *credit creation*.

Regarding the process of credit creation, Werner did not mention three important factors that influence the credit creation by the banks, which will be explored in section 6.

6 Considerations to compose the analytical framework

As mentioned in the introduction, this framework aims at analyzing the complex flow system, which is the economy of a country, via multiple levels. The QTC is related to credit expansion with economic growth at a level that covers the banking system and the sectors of the economy. In this framework we add three more levels that we consider important to analyze an economy under the dollar standard. They are: (1) the entry of international financial

resources in the financial system of the receiving country; (2) the level of indebtedness of sectors of the economy of country; (3) the money markets.

We present data from the Japan economy to exemplify our statements, although the following considerations can be applied to other countries.

6.1 Entry of international financial resources in a country

Since 1973 almost all countries in the world are connected to the international dollar standard monetary system and are subject to negative consequences arising from their flaws. One of those flaws was pointed to by Duncan (2005) as growing surplus/deficit of the current account of some countries along time. The author shows how the current account deficit of the United States has contributed to triggering in some periods the economic growth and the expansion of economic bubbles both within the country itself, as well as in countries that are trading partners, for example, Japan. Through the analysis of data from the Japanese economy in the decades of 1980 to 1990, the author shows how the Japanese current account surplus triggered the expansion of credit causing both economic growth, as well as the expansion of the bubble in real estate and stocks burst in 1990. The increase in Japan's current account surplus was due to the increasing current account deficit of the United States during the decade of 1980. Figure 1 shows the relationship between the current account deficit of the United States and the amount of trade deficit this country had with Japan.

Figure 1
US trade deficit with Japan and US current account deficit (billions of dollars)
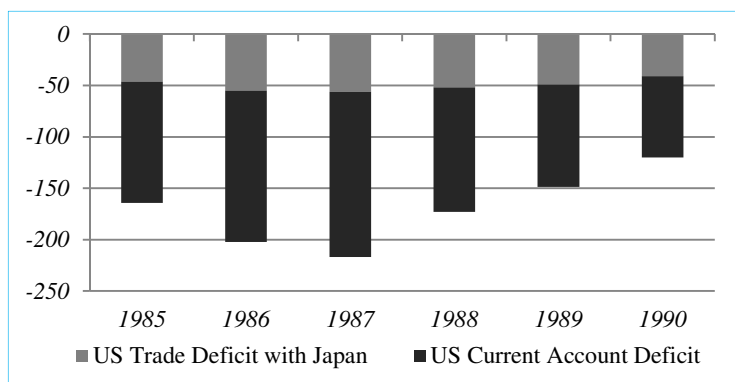

Source: U.S. Bureau of Economic Analysis.

Figure 2 shows the behavior of the major accounts that make up the balance of payments of Japan. Observe the increase of overall balance from 1980 and especially after 1985. Duncan explains that when the overall balance is greater than zero, there is greater financial resources entry in the country, implying that its central bank of the country, in this case the Japan, should buy additional dollars to a desirable exchange rate. This purchase is made with newly-created yens which are transferred to its owners (exporting firms, for example) through the banking system. The author explains that once inside the banking system is the expansion of credit and triggering economic bubble. At the time that Duncan made the analysis he had not published his version of the QTC. As will be shown at section 6.3, part of the money that enters in the country enters in the money market. Once in the money market that money helps the banks to fund the loans granted to their clients.

Werner (1997) analyzing data from Japan in this period shows through the QTC as credit allocated by the banking system both for activities that have an impact on GDP, as well as for purchase of real estate assets and actions triggered as much economic growth as the bubble. However, the author does not list this expansion to the dollar standard, as does Duncan (2005).

Figure 2
Japan current and financial account and overall balance
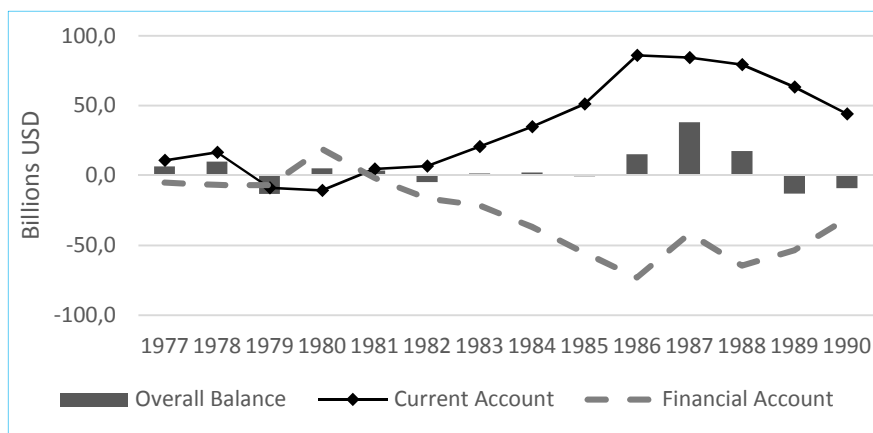
Source: IFS-IMF.

Therefore, in order to enhance the analytical framework of economies under the dollar standard it is essential to consider the behavior of its balance of payments, noting the result of overall balance, once under some conditions, the growth of this variable can indicate credit expansion in the country. These

conditions are related to the level of indebtedness of family, business and financial sectors of the country.

6.2 Level of debt of sectors of the economy

It worth mention that in the dollar standard, prevails one type of credit, the one where an agent (individual, firms, government) with deficit of cash signs a loan contract with a bank, where it is obliged to pay for the bank the amount borrowed plus the interest. But in order to be able to sign a loan contract, the agent needs to comply certain criteria established by the banks, such as have good collateral (real estate property, land property, for example). Besides, the economic agent must demand for loans, otherwise, the banking credit creation will not occur. As will be shown in this section, there are circumstances where the economic agents are not in conditions to demand loans, because they are with high levels of indebtedness.

Still considering Japan's economy it can be seen in Figure 3 the stock of debt contracted by the private non-financial corporate sector. Note that its debt level increased from approximately 200 trillion yen in 1980 to more than 500 trillion yen in 1990. After that, during the 8 years the level of indebtedness has fluctuated around 300 trillion to decrease drastically until it reaches the level of 300 trillion in 2004, approximately. From 1994 to 2004 the private non-financial corporate sector payed their debt instead of acquiring more even when borrowing interest rates were near zero, see Figure 4.

Figure 3
Level of indebtedness of the private non-financial corporate sector
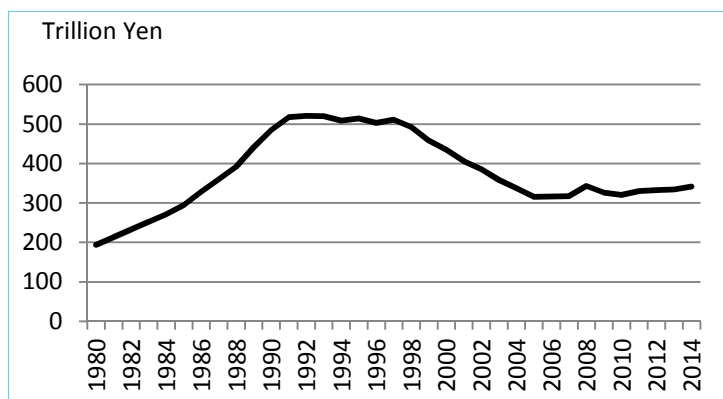
Source: Government of Japan, Cabinet Government.

According to Koo (2009) when Japan's economic bubble burst in 1990, primarily, the private non-financial corporate sector was heavily indebted and with serious problems in its balance sheet, because several companies in this sector have acquired debt to invest in real estate and stock purchase. With the bursting of the bubble, the prices of the mentioned assets decreased, causing serious balance sheet problems, once the level of asset side has decreased and the level of liabilities remained the same. In this context, the main goal of these companies was no longer maximizing profit, but, yes, minimizes the level of indebtedness. This type of recession was named by Koo (2009; 2015) to balance sheet recession. Koo (2015) says balance sheet recession occur only when the nationwide asset bubble financed by debt bursts.
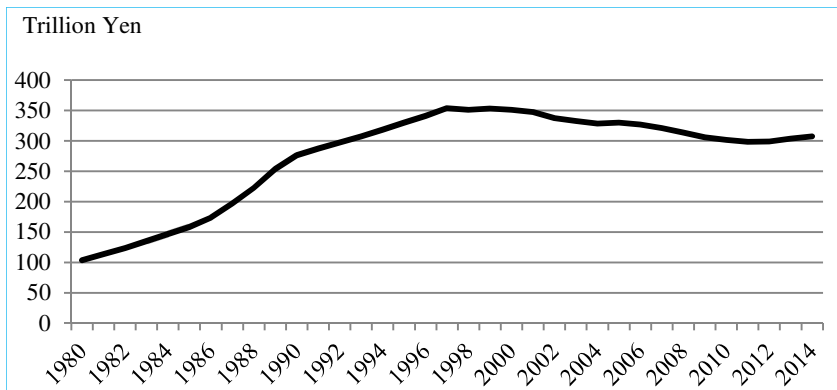
Figure 4
Flow of indebtedness of the private non-financial corporate sector
(positive sign means acquire debt; negative sign means paying debt)
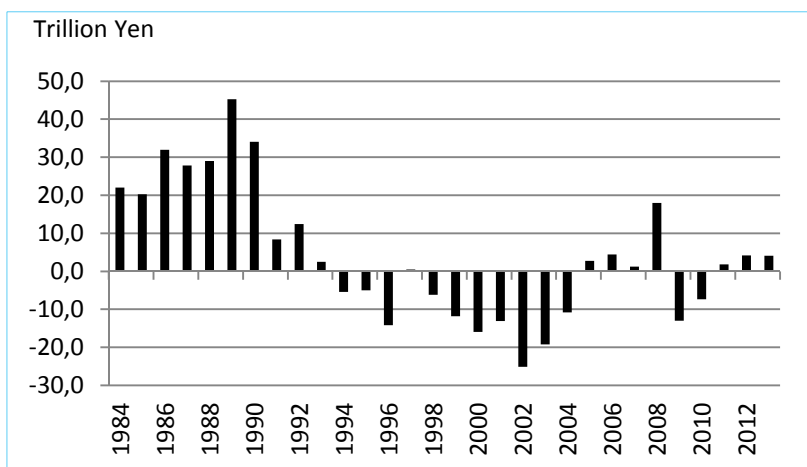
Source: Bank of Japan, Flow of Funds Accounts.

The household sector also increased its indebtedness during the decade of 1980, however, continued increasing until the mid-1990s from which began the process of debt reduction, Figure 5.

Figure 5
Level of indebtedness of the household sector in Japan

Source: Cabinet Government.

As you can see in Figure 6 during the period that the private non-financial corporate sector was in the process of payment of debts, the behavior of the balance of payments maintained a similar pattern to the decade of 1980. That is, growing current account surpluses over time and with moments in which the overall balance was greater than zero. In these moments, unlike what occurred in the decade of 1980, the expansion of the credit to family, corporate sectors did not occur as before due to the level of indebtedness of such sectors.

Figure 6
Japan's balance of payment (billions dollars)
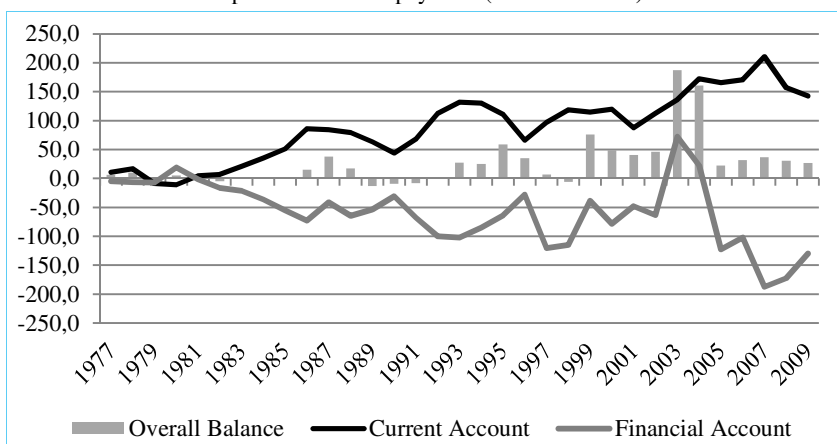
Source: IMF.

The next section will show the behavior of the Japanese money market, an essential element in the financial system that influences the banking credit expansion.

According to Koo (2015) several countries are experiencing similar problems to that of Japan after the bursting of the economic bubble in 1990, that is, family and private no-corporate financial sectors heavily indebted. This causes a reduction in the demand for new loans and generating a series of negative consequences that occur before this economic structure broke.

Several solutions have been proposed to fix the problems, such as, quantitative easing (QE), NIRP (Negative interest rate policy), ZIRP (Zero Interest Rate Policy), all of them seem insufficient to solve the problems that society faces (high unemployment rates, climate change negative effects, among others).

We believe that these solutions are palliative measures, however, to resolve the problems it is essential to replace the current structure by one in which the household and business sectors does not depend only in the banking system as the source of credit and the central bank as the only source of money creation. See section 6.3 for more details.

6.3 Money markets

As already mentioned, IMF (2008) states that in the current international monetary system the currency (cash) is issued by the central banks. The banks can expand credit in quantities several times higher than the amount of currency issued by the central bank, once they can settle most of their transactions in an intra-day clearing system reducing the need for central bank reserves (Ryan-Collins et al., 2011). But despite the intra-day clearing, they continue depending of cash to funding some of their activities.

The money markets are essential for the funding activities of the banks. They help the banks to overcome a key constraint on lending, as pointed out by Milne (2009):

> A bank will only offer a loan, …, if it is confident that it can also 'fund' the loan – that is, keep enough money on deposit in the bank throughout the life of the loan at a cost that justifies making the loan in the first place.

Most banks obtain the cash in the money markets negotiating assets with money markets players. If they do not have the means to acquire the cash

they can become illiquid. The lack of liquidity was one of the main causes of financial crisis in 2007 (Milne, 2009).

Money markets are wholesale markets for low-risk, highly liquid, short-term IOUs (Stigum; Crescenzi, 2007). According Milne (2009) money markets is where the banks borrow cash to fund their long-term loans. The money markets are composed of financial institutions with surplus cash and are willing to lend it for a short period of time (a day, one-two months or even more, but less than a year). Some examples of cash surplus institutions that participate in the money markets are: pension funds, mutual funds, sovereign funds, international banks with extra cash, etc.

In this section we present two facts that help us understand the dynamics of the money markets under the dollar standard. The first is related to the case study of Japan (a current account surplus country) and the second is related to the countries that present current account deficit, such as the US and several European countries, which after 1980s began to become more dependent on short-term wholesale money market (Milne, 2009).

In the first case, we show how the entry of international financial resources in Japan increases the dynamism in the money market, providing favorable conditions for the expansion of credit by the banking sectors. Also, we present the behavior of the money market after the level of indebtedness of household and private non-financial corporations achieve their peak. In the second case, we synthesize the main findings of the work of Milne (2009). Paiva Sobrinho & Romeiro (2016) present more details about the connection between the expansion of credit and the money market during the dollar standard.

It is important to take into account the analysis of this level depends the existence of data. Some central banks present these data publicly.
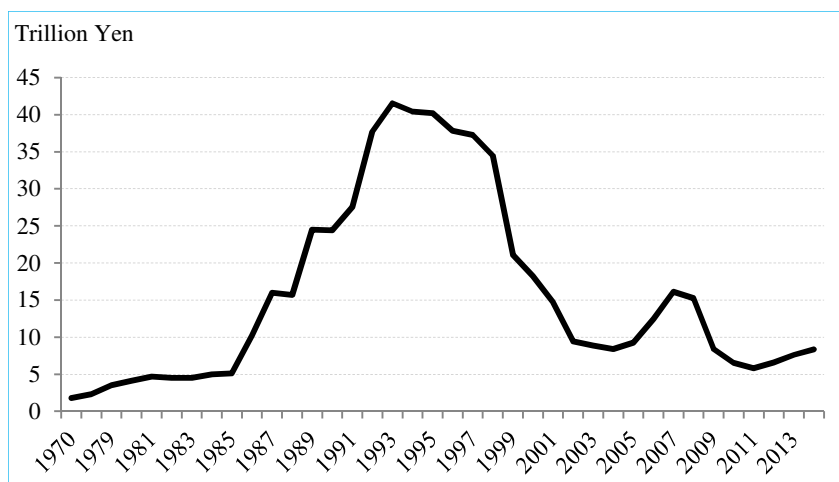
Japanese money market

According Royama (1995) money markets in Japan are composed in: (1) the interbank money markets, whose only participants are financial institutions, and (2) the open markets, in which there are no restrictions on participation. The interbank money market is divided in two groups: the call money market and the bills market. The author pointed out the importance of call money to the expansion of credit in the Japanese economy in the 1980s.

Figure 7 shows the development the outstanding of call money market since 1970 to 2014. As can be seen during the 1980s, especially, after 1985 the call market grown substantially until 1993 to shrink after that point. Although during the first five years of 1980s the current account of Japan increased at the same time most financial resources were reinvested abroad, as can be seen, in the financial account (Figure 6). Part of the money that entered into the banking system was allocated in the money market which increased and helped the banking sector to expand credit to private corporate non-financial sectors (Figure 3), household (Figure 5) among others sectors. The credit expansion intensified after 1985 when the overall balance increased more than 150% that means the excess of cash was not exported instead was allocated into money market, such as call money market.

As shown by Werner (1997) the credit was allocated for activities that contributed for the economic growth as well as for the increase of prices of financial assets. After the private corporate non-financial sector began to deleverage in 1994 (Figure 4) the call market shrank reaching the lowest level in 2004 (Figure 7). The call market increased in 2005 and 2006 when the private corporate non-financial sector began to borrowing again (Figure 4). This process was interrupted during the 2007 and 2008 due to international financial crisis.

Finally we present some considerations regarding money markets in countries with deficit current account.

Figure 7
Development of call money market in Japan

Source: Bank of Japan.

Deficit current account country's money markets

Milne (2009) mentions after 1970s banks from several countries (mainly the ones with current account deficit) turned more dependent from short-term wholesale markets[4] (money markets) and less dependent of retail funding[5]. He shows that several commercial banks from U.S. and Europe adopted the practice to commercialize their client loans in the money markets through securitization in order to obtain cash in the short-term wholesale money markets. In other words, in order to obtain cash to fund their activities the banks sold their mortgage or asset-backed securities to wholesale funders and repurchase them with a slightly high cost after a short period of time. In this way, banks could attract and keep wholesale funds by selling or lending these loan-backed securities.

Meanwhile the banker's clients keep paying the interest as well as the principal of their debts in time, both the mortgage and asset-backed securities were liquid in the money markets. The problem was the following: with increasing consumption patterns, high level of debt and limited income most clients or became unable to pay the debt interests or paid them delayed. This affected negatively the value of mortgage and asset-backed securities provoking a negative reaction on the wholesale funders against the mentioned securities. Consequently, banks had no longer access for funding (Milne, 2009) causing a series of negative consequences for the worldwide economy.

Due to the high level of indebtedness of household and private sector from the most important economies in the world, U.S. and Europe (Koo, 2015), the bank sector does not have good collateral to commercialize in the money markets (Milne, 2009; Gordon, 2012). Consequently, the credit expansion is lower than before the crisis and the economic growth of countries like U.S., European countries, as well as, from the Asian economies do not perform well as before the crisis.

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(4) In this context, short-term wholesale funding means the banks obtain cash to fund its activities selling 'something' to the participants of money markets through the practice of sale and repurchase agreement (repo). More detail see (Milne, 2009; Beau, 2014)

(5) Retail funding refers to the various types of deposits that households and small companies keep with a bank (Beau, 2014). In other words, the banks use the cash deposited by their clients to fund its activities.

Figure 8 shows the growth of the practice of securitization in U.S. The expansion phase occurred almost exponentially from 1980s to 2008 followed by decline after 2008 partly due the reasons mentioned above.

Figure 8
US asset-backed securities outstanding
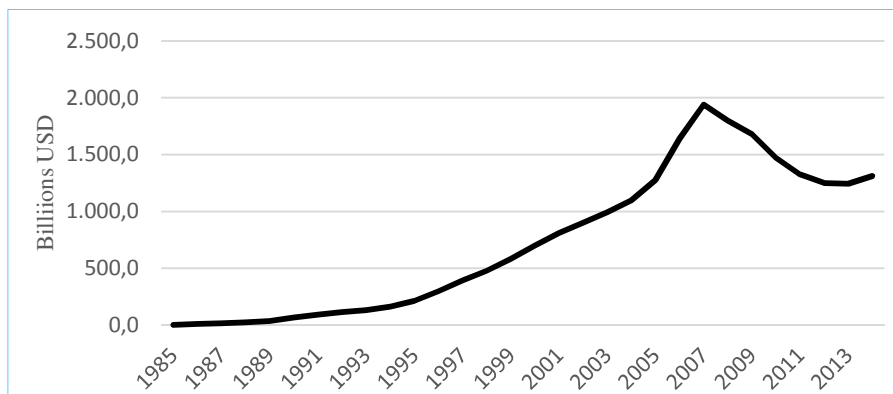
Source: SIFMA.

Through the three considerations presented in section 6, in addition to quantitative theory of credit, we have shown the connection between the international flow of financial resources, the money market, credit expansion, the level of indebtedness of the sectors that make up the economy of a country and its economic growth.

Understanding this complex relationship is required to get to outline solutions to the economic, social and environmental problems. However, we caution you that if we continue to seek solutions considering the structure of the dollar standard, we run the risk of failing to address them, because we are keeping the same structure that has flaws as pointed out by Duncan (2005). We argue it is imperative to think solutions outside the box.

7 Final considerations: thinking outside the box

As mentioned, the economic system is a complex flow system (Goerner et al., 2009; Ulanowicz et al. 2009; Lietaer et al.; 2009; Lietaer et al. 2010), where the flow of money, credit, goods, and services occurs. The flow of cash, credit in the current international monetary system, dollar standard, is strongly dependent of only one type of money (fiat money) and one type of credit. This

means the economic sectors such household, non-financial corporations, small-medium firms, governments are dependent of a system that has several flaws, as pointed by Duncan (2005) and, consequently, they are subject to suffering the negative consequences (economic recession,) of these flaws, such as the current global economic recession triggered by the financial crisis of 2007 in the US.

Werner (2009) shows the banks expand credit for both activities that are part of the GDP and others that are not. Regarding the last one, depending the level of credit created to financial activities it can cause economic bubbles that will burst in future causing serious problems for people and economy (Duncan, 2005).

As mentioned before several solutions have been proposed to fix the problems, such as, quantitative easing (QE), NIRP (Negative interest rate policy), ZIRP (Zero Interest Rate Policy), all of them seem insufficient to solve the problems that society faces (high unemployment rates, climate change negative effects, among others).

It is imperative to try new solutions, specifically, with the use of new types of money and new sources of credit, such as, mutual credit clearing system (Paiva Sobrinho, 2016; Stodder & Lietaer, 2012). During this text we presented several data regarding the Japan economy and we present a new one.

Since the burst of economic bubble in 1990, the Japanese government and society began to look at less conventional solutions. According (Lietaer and Belgin. 2011) from 1995 onwards, the Japanese government began to experiment with complementary currencies innovations. At the same time, a number of nongovernmental initiatives also began at the grassroots level. The authors mention these experiments tried to solve ecological, health and other problems Japanese society were facing. Currently the Japanese financial regulators (Financial Services Agency) have proposed handling virtual currencies, such as Bitcoin and other cryptocurrencies, as fulfilling the functions of currency (Asia Nikkei, 2016).

Other initiatives are being developed in several countries (D-cent, 2016). Stodder and Lietaer (2012) analyzed the role of this system in the Swiss economic mutual credit clearing system and found it serves as a counter-cyclical measure in economic downtown and it contributes to increase the economic resilience of the mentioned economy.

These types of initiatives can help to create a new economic structure where the power of money and credit creation is not under the monopoly few financial corporations. Also these initiatives can help to solve the socioecological problems that humanity faces in this century once it is possible to create money without the need to get indebtedness to fund activities such as recovery of watersheds, clean up soils and aquatic ecosystems, incentivize ecological practices in both rural and urban areas, incentivize entrepreneurs with business model sharing economy, among other activities necessary to solve the problems people are interested.

People can design types of money to solve social, environmental, economic problems at several scales (Paiva Sobrinho et al. 2015) using the most advanced knowledge that comes from areas of research for example, social physics (Pentland, 2014), cryptocurrencies (Chuen, 2015), ecology (Ulanowicz et al. 2009).

It is time to try solve the most urgent problems humanity is facing (climate change, social inequality, biodiversity loss, food security, among others) with new types of money and credit.

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