

# Fair Value, Capital Accumulation and Financial Instability: A Macrodynamic Model

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## Abstract

This article examines the relationship between fair value accounting and ambivalences of the modern finance. The subprime crisis has opened the debate. Much empirical work at the micro level has developed to study the financial and economic impacts of this tool. The accelerator and amplificatory effect of this tool and its role and the cyclical transmission of contagion, remain ambiguous. In this regard, two points of view have proved controversial. We identify its shortcomings by a macro dynamic model for the purpose of stimulating financial stability. The interest rate is set by banks according to a weighting that varies with capacity utilization and capital accumulation. System stability is studied according to the Minsky's regime which recognizes the role of interest rates as a source of crisis.

**Keywords:** financial instability, fair value, capital accumulation, contagion

## 1. Introduction

The insertion of finance in the economy and the abandonment of the Keynesian's concept "veil of money" by relaxation in the regulatory (Note 1) process were accompanied with a constitutive change in the design of the accounting discipline like a normative tool to a source of information and evaluation (positive theory). This was accompanied with the increase of the weight of finance in the eightie's years and the development "financialization process" (USA, UK), which coincided with the emergence of post Keynesians models (stock-flow models) based on an integration of the financial sector in the study of macrodynamic model (Minsky, 1978-86). In this regard, in an economy without financial contingencies and complete markets, the flow of funds to the most productive agents is constrained and therefore the distribution of wealth is irrelevant. In the presence of uncertainty, the distribution of wealth can change depending on the situation.

## 2. Theoretical Evidence

From the nineties, a wave of financial crises had bounced and spread in time and space. This behavior leads regulators and supervisors (IMF, BIS) to set new prudential measures for performance reasons: the fair value tool and agreements Bale 1 and 2. This was to mitigate the risks and ambivalences of modern finance. At this stage, the study of the impact of the fair value tool in the recent crisis, based on a macrodynamic model combined with Minsky's Financial Instability Hypothesis, is original. With historical cost valuation methodology, the phenomenon of panic generates downward revision of asset values in the financial markets. In addition to the fair value tool falling asset values causes immediate panic in the market. In addition to the fair value tool falling asset values causes immediate panic in the market. These two findings add to Minskyan perspective, which states that the market conditions of the products of goods and services and the financial, finance and internal structure of liabilities, influence the price of capital. This price, according to Minsky, has two different values: offering price and demand price. Thus, investment is induced by the difference between the estimated cost of capital on the stock market and the property on the real market. This is similar to the Tobin's Q analysis who presents the ratio between the market value and the replacement value of fixed capital. These findings form the basis of our analysis by providing how valuation in the fair value accounting may cause destruction to the financial system stability.

In his theory of financial instability, Minsky (1982) argues that wealth is macroeconomically determined in isolation from the conjunctural cycle. The choice of assets by economic agents is arbitrary (Note 2). Firms build

their physical capital; require funding by issuing asset or directly from the financial intermediaries (banks). Households, when to them, choose the most profitable distribution by buying assets or savings. In the absence of coordination and sometimes divergent interests, we are witnessing the rise of increased volatility related to interest gap between the value of the asset and the market. A second argument presented by Minsky and adopted by Taylor and O'Connell (1985), resulted from the strong substitutability portfolio choice for households.

Brunnemeier (2011) develops a model to analyze the effects of nonlinear amplification of debt on financial instability and concludes that when the net production of agents becomes depressed, the allocation of resources (capital) in the economy becomes less efficient and could reduce asset prices. Acharya (2009), advance a common model in which banks manage simple debt contracts give risky assets and no risk to specific industries determining the correlation of their portfolio. In addition, banks prefer to lend to similar industries (banking specialization). In this context, the central bank plays a regulatory role whose purpose is to maximize the welfare of the owners (Note 3) of the banks and depositors by integrating social and environmental costs of financial distress.

Bankruptcy leads to a reduction in the overall supply of capital (deposits) in the economy, causing the recession of investment activity (negative externality). In contrast a positive externality, resulting in a scaling or migration of depositors, occurs. A preference for a high correlation arises as a consequence expressed by the limited liability of the bank despite shareholders equity and the nature of externalities. This situation represents a systemic risk of default as described in the work of Jensen and Meckling (1976) and Stiglitz and Weiss (1981). And appropriate intervention by the central bank to mitigate individual risk and systemic shifting incentives of bank owners with a policy of satisfaction capital requirements. Acharya (2009) shows that under a certain structure, each bank can reduce optimally the individual risk of failure. Despite the systemic risk arising from the correlation remains unchanged. This point of view suggests the examination of the complementarities of individual behavior and of the underlying problems of agency. Those mechanisms can be fruitful direction to explain the collective behavior of agents and their reaction against the balance. Externality failure of an operator acts negatively on the profitability of others.

Fazzari et al. (2008) analyzes the dynamic cyclical short-term and medium-term simulation, rather than the asymptotic instability. Cash flow relative to income are mainly governed by the debt service, income distribution remains constant. To do so, the authors have developed a function that links the level of real investment (which depends on the available internal cash flow (Note 4)) to the changes in real output via an accelerator. Lima and Meirelles (2007) develops a post Keynesian macro dynamic model on growth and operating capacity (Note 5) that credit demand is endogenous. The debt situation of firms is explicitly modeled taking into account the Minsky's hypothesis of financial fragility. The interest rate is set by banks as a markup over a base rate determined exogenously (Note 6) by the monetary authorities. This increase varies with the operating capabilities while the debt ratio varies depending on the interest rate of capital accumulation and growth. To the system dynamics, Lima and Meirelles (2007), to establish the properties stability of the system, include the interest rate and the ratio of debt related to the capital as state (Note 7) variables representing the HIF. In this context the movement of capital in the market is designed as a currency exchange; ie one actual currency against future payment. Lima and Meirelles (2007), lead to results that the increase in real wages leaves profit rates unchanged and increases the degree of exploitation, thus creating a positive feedback on consumption, which in turn increases the rate of exploitation. Another result is that the impact of short-term bank markup or a change in the debt/equity ratio remains ambiguous. However, the increase in the level of real wages despite awareness of exploitation, leave the growth rate unchanged.

The reason is that this increase leaves the general rate of profit unchanged. In turn, an interest rate or higher debt, lowering the general rate of profit, reduces the rate of growth when the capitalists, financial capitalists deducted productive - show a higher proportion of income than the rate of profit. The impact of changes in interest rates on growth seems ambiguous when productive capitalists have a propensity savings higher than those of financial capitalists. In fact, a high level of debt, by increasing the rate of expected profit, will raise the growth rate. The equilibrium solution in the long term will necessarily be stable when the markup is procyclical and the interest rate is lower than the growth rate. In turn countercyclical bank policy to support the long-term equilibrium in dependence of the relative size of the interest rate and growth will be ineffective. Indeed, procyclical banking markup, given a procyclical interest base rate, implies a procyclical rate. Therefore, monetary policy conducted by a procyclical base rate in hedge financing scheme, can contribute to dynamic stability provided that the interest rate is lower than the growth rate. Consequently, an equilibrium solution in the long term, in a speculative area, the stability properties depend not only on the cyclical behavior of the markup bank but on the savings rate of capitalists. Therefore, as in the hedge regime, monetary policy conducted by a procyclical base

rate could contribute to dynamic stability in a speculative regime. Finally, Lima and Meirelles (2007), show that the equilibrium solution in the long term within the Ponzi area will be unstable dependence of the propensity to save by the capitalists or the cyclical behavior of bank markup. A general implication of the model, therefore, is that the system is more prone to instability, but becomes more financially fragile.

Asada (2004), studying the impact of price flexibility of macroeconomic instability using the Fisher effect debt with a macrodynamic model, introducing the Phillips curve and the assumption of adaptive expectations. An analytical demonstration was conducted when the contribution of the increase in the speed of price adjustment and adaptation of expectations to the destabilization of the economy. An analysis of intermediate values of the parameters shows that cyclical fluctuations occur through the Hopf bifurcation theorem. Asada (2004), made from the criticism of Keynesian models, post Keynesian IS-LM and its traditional interpretations microeconomic rigidity of wages and prices. This standard states that the vision of full employment equilibrium is reached automatically if wages and prices are flexible. Thereby reducing the level of nominal wage and price levels, contributes to increased production and job if the economy is depressed. And the persistence of unemployment is called the rigidity of wages and prices. Asada (2004), provides that this classical interpretation finds no basis in the Asian economies and Japan (1990). In contrast, this «conventional» view contributes to the worsening of depression and destabilizes the economy. This vision of a deflationary spiral is ignored in the orthodox literature that challenges the stabilizing effect of price flexibility. Asada (2004), built a model similar to Chiarella, Semmler and Flaschel (2000, 2001).

A model consists with five-dimensional system with linear differential equations. The introduction of price flexibility in the model gives them more dimensions, increasing the speed of price adjustment and the adaptive expectations, to destabilize the economy rather than stabilizing. The profit rate of risk-free assets, the interest rate on the interbank market and the share of profits in national income are constant. This implies that the monetary authorities (the central bank), slightly involved in the credit market (in terms of post Keynesian horizontalists; Moore (1988)). An investment function, the Irving Fisher effect debt, microeconomic foundation of the behavior of profit maximization in net cash flow is developed in this model using the assumption of adjustment costs increasing Uzawa (1969) and the assumption of increasing risk of investment Kalecki (1937).

Asada (2004) shows the existence of a negative feedback mechanism to target instability, made by the increase in the real debt of the firm, explained by the collapse in price levels during the depression, and implies an increase in the real wealth of creditors. This has not only a negative effect on the capital expenditures of the firm, but also induces an increase in spending of income. The stabilizing effect of wealth is ambiguous compared to destabilizing debt. Another neglected dimension in this model is the effect of the nominal interest rate. This is considering a monetary policy that seeks to hold the interest rate constant to maintain constant a real exchange rate demand. In this case the Keynesian effect no longer works.

Palley (1996) combined Minsky's approach with demand theory of Kaldor (1956). As a first step, this allows to analyze the effect of increases in debt on aggregate demand, in the second step, study the process of debt repayment and its effect when the reduction in aggregate demand. Skott (1995) modified the model of Kaldor (1940) to develop this dynamic relationship. Minsky and al (1994) argue that the behavior of the economy depend not only in endogenous dynamic process, the structure of institutions and the intervention of the authorities but also in the conductor pattern of the economy. So the initial conditions are not defined beforehand, but taxed at short time by the use institutional or reactions of the authorities. *"A ruling conjecture... is that the aptness of institutions and interventions will largely determine the extent of which the path of economy through time is tranquil or turbulent: progressive, stagnant or deteriorating"*, Gatti, Gallegati and Minsky (1994).

Minsky et al (1994) studied the case of a closed economy with four types of agents: households, firms, banks and government. Households represent the workforce, consumers and depositors (hold liabilities of banks). Firms provide consumer goods, demands goods and equipment investment, bank lending and lead productive force (work). Banks provide passive and require financial assets (household credit). Tax authorities and the central bank engaged in the provision of goods and non-market services, accepting a minimum level of life and guaranteeing, explicitly or implicitly, the selection of private contracts. Public expenditure subscription or warranty shall be paid by the collection of taxes, the sale of treasury bills or by the insurance liabilities of the central bank. Three markets are included in this analysis: the credit market, goods market and labor (Note 8) market. The capital investment grows through retained earnings. Credit level and interest rate are determined by the lending market and the price level is constant, normalized to unity (Note 9). Minsky et al (1994), lead to results that whenever the value-institutionally determined endogenously decided that dominates, which refers to the current economy, is broken, a new interactive process is triggered with new conditions that generate the future value. Leverage, which plays a role similar to the accelerator coefficient, is an endogenous variable whose

oscillations are called preferences of firms with liquidity. Requirements businessmen liquidity will require external parallel the donor to become less liquid. Cash flows in the form of increased gross profits are integrated into business as increased investment and financing for firms. These overall profits decrease when some real or financial assets fail to realize capital gains which lead bankers, portfolio managers and businessmen to an increase in liquidity supply.

Taylor-O'Connell (1985) and Lavoie (1986-87), have formalized the HIF Minsky whose financial fragility and instability are endogenous and inherent to the market economy. Foley (1987) developed a model dealing with financial fragility based on the interaction between debt accumulation by businesses and capital expenditures, but with the extension of credit led to mitigate cumulative future needs corporate liquidity through inter-firm credit. Quality assessments of firms and the terms of credit availability are also key indicators to explain investment behavior as suggested in the work of Bernanke and Gertler (1989), Blinder and Stiglitz (1983), Kiyotaki and Moore (1997) among others. Jarsulic (1996) developed a growth model with debt accumulation is advanced inspired from Keynes-Kalecki models (Note 10).

Another area of research, often considered from the neo-Keynesian literature, consists in the models with financial accelerator. Although the foundations of these models are varied (see the summary of Bernanke and Gertler 1995) most of these models (formal and detailed) work through the supply in the economy, as Bernanke and Gertler (1989) and Bernanke et al. (1999). Models, focusing on cycle Goodwin, studied the evolution of the debt in interaction with changes in income distribution. Keen (1995, 1999) present a model in which endogenous cycles of debt and income can lead to an "explosion" of the standard reports debt relative to production. Asada (1989) also develops a model of Goodwin, but adds the effects of Keynesian aggregate demand.

Recently, multiple works at the micro scale treat the role of the tool in the fair value impact of financial crises are advanced. The results are sometimes contradictory between two opposing ways. O'Hara (1993) put the point on the effects of this technique on the accounting term borrowing, and discovered that the accounting system increases interest rates for long-term loans, thus inducing a change at court term borrowings. This reduces the volume of liquidity by banks and borrowers exposed to excessive liquidation. In a similar vein, Burkhardt and Strausz (2006) suggest that accounting market prices reduce information asymmetry, thereby increasing liquidity and intensify the problems of exchange rate risk. Finally, Freixas and Tsomocos (2004) put the focus on the role of banks as institutions that smooth intertemporal shocks. Allen and Carletti (2006) analyze how financial innovation can create contagion across sectors and lowers welfare relative to autarky solution. However, while Allen and Carletti (2006), focused their research on the structure of liquidity shocks that shook the banking sector as the main mechanism by which the contagion, the authors converge on the impact of different accounting methods showing this technical guide to the contagion. The holding period of the financial assets and the contact with the market, are crucial factors of contagion and amplification due to the cycle of crisis.

Our model is based on a coherent theory and inspired from the stock-flow approach as advanced in the work of Minsky and Delligatti Gallegati (1996), and Delligatti Gallegati (1994a, 1994b), Bernanke et al (1998), Asada (2001, 2004), Lima and Meirelles (2007). Three sectors are explicitly present (market, credit market of goods and services and financial markets) and five types of economic agents are introduced into the analysis. The financial sector is introduced into the analysis by the interest rate defined by the markup of the interbank market and the monetary authorities; the debt service is treated in long term. The risk is endogenous in a macroprudential analysis and markets are incomplete (Note 11). All relevant variables are endogenous, GDP, debt service, wealth, supply and demand of the currency, current account capital. The renewal of the debt is allowed for payment of some money. This is to analyze the relationship between debt and economic behavior capital in temporal dimension.

Liabilities in the balance sheet structure show a series of future payments and are maintained in the evaluation of companies. We deal with dynamic stochastic disturbances appropriate depending on the configuration parameters of endogenous derived from a dynamic periodic financial instability and weather fluctuations. Added to this, is the behavior of firms, households, and financial institutions, the structural characteristics of the economy, the status parameters, the institutional system and political intervention of regulatory authorities. Households are distinguished into two classes whose behaviors are economically different (Note 12). In this economy: workers demand excessive volume of work from receiving a salary they gave out again between consumption and savings. The capitalist class (productive and financial) receives income from profit as entrepreneurs and profits due to the holding of shares. This profit is considered as a deduction from general flow of monetary benefits generated by the stock of physical capital. Firms respond to consumer demand, require capital goods, labor, and debt. Banks agree debt (firms) and demand deposits (capitalists). The central bank plays the role of regulator and prudential supervision through monetary policy. The government manages public

spending and tax revenues.

### 3. Empirical Modeling

We limited the sample to five areas that the model is more rudimentary. The temporal dimension is taken into account and our analysis extends over the long term. Our model moves from the mainstream economic models that reflect the microstructural (Note 13) analysis by introducing the financial dimension into macrodynamic models. Traditional models do not refer to financial market data, in addition to monetary policy matches different interest rates for different assets (treasury bills, bonds, money ...). Therefore, the resolution of this model is based on internal systems. However, the logical structure of the transactions matrix provides two main features: the sum of any column is equal to zero (all variables are determined in a column), and the last variable is logically implied. In this way, we can say that the sum of the sector activities do not have a causal involvement on the other. However, it is possible, with all decisions should be made in an uncertain environment, for each sector, some components are arbitrarily character residual value and can't be controlled. For the two groups of households, the residual process is mainly how their holdings of deposits currents change. Firms, the monitoring of loans from the banking system and they (the banks), assets and treasury bills, are their main dilemmas. The government, the issuance of new Treasury bonds is the main constraint delivered from the economic situation and that is a challenge. Indeed, banks must two deposit kinds: term deposit and treasury bills which can bring profits (interest rate). Arbitrarily, banks earn a profit margin, which shows the excess of receipts of interest and then are distributed to households (Interest on deposits). Firms have the opportunity to finance their investments by recourse to bank loans. We assume the existence of two types of households as advanced by Marx, Kalecki (1971), Kaldor (1956) Pasinetti (1962) and Lima Meirelles (2007). Employees, who are providing the labor force, production and they receive a wage ( $W$ ) departed in consumption ( $C$ ) and savings ( $S$ ):

$$W_t = C_t + S_t \quad (1)$$

Employees are considered investors and not entrepreneurs. Take advantage from the benefits of investments in both profitable and liquid offered by the financial market that allow them to engage their financing capacity reversible manner.

Capitalists whose income is formed by compensation ( $r_t$ ) as entrepreneurs and profit rate ( $\Pi_f$ ) of the shareholding in financial firms shares. Income is derived as follows:

$$R_t = \Pi_{ft} + r_t K_t \quad (2)$$

Banks hold a wealth ( $W$ ) as prime portfolio consisting of bonds Treasury ( $B$ ), reserves and liquidity ( $L$ )(assumed equal to household savings). The banks's wealth is written:

$$W_t = R_t + B_t + L_t \quad (3)$$

The profitability of one unit of capital in the financial market is given by, (the rate at which individuals expect  $p_{kt}$  to change):

$$\rho_{kt} = \frac{r(p_{kt})}{p_{kt}} + \pi_{kt} \quad (4)$$

Which ( $\pi_{kt}$ ) represent the expected value of the rate of return on capital( $R$ ). The rate of return of holding the national currency ( $L$ ) is the rate of inflation:

$$\rho_m = \pi_m \quad (5)$$

The treasure's bonds ( $B$ ) are expected dependent in variable of interest rates and the inflation.

$$p_b = i_b + \pi_m \quad (6)$$

The government anticipates the growth of the population with a given rate which translates into an equivalent increase in consumer demand. And firms adopt a behavior investment to increase production and meet the potential demand. To do so, firms have recourse to bank credit to finance their new investment and meet the potential demand. It is assumed that both types of firms (Note 14) operate in two different sectors. Firms, whose capital intensive demand for credit depends on the capital, held the cost of application for new credit capital ( $f_{kt}$ ) and anticipated profitability of financial assets ( $r_{t+1}$ ):

$$D_t^k = D_t^k(K_t, f_{kt}, r_{t+1}) \quad (7)$$

With investment in capital good is intensive in capital  $\frac{\partial D_t^k}{\partial K_t} > 0$ , cost of capital depends  $\frac{\partial D_t^k}{\partial r_{kt}} < 0$  and expected future returns  $\frac{\partial D_{t+1}^k}{\partial r_{t+1}} > 0$ . The second type of firms producing consumer goods based on the capital invested, the

cost of capital ( $p_k$ ) and the growth level of consumer prices ( $p_t$ ):

$$D_t^k = D_t^k(K_t, p_{kt}, p_t) \quad (8)$$

With  $\frac{\partial D_t^k}{\partial K_t} < 0$  the investment in consumer goods is less capital intensive and decreasing the cost of capital  $\frac{\partial D_t^k}{\partial p_{kt}} < 0$  and depends positively on the price level of consumer goods  $\frac{\partial D_t^k}{\partial p_t} > 0$ .

Both types of firms choose to finance their investments by borrowing from banks. Investment depends negatively on the interest rate of the bank ( $i_b$ ) with  $\frac{\partial I_t(i_b)}{\partial i} < 0$  and  $\frac{\partial^2 I_t(i_b)}{\partial i} < 0$ . Suppose first that firms producing consumer goods, whose price is known before, decided to meet future global demand  $D_{t+1}$  en  $t + 1$ . Either, ( $Y_{ct+1}$ ) anticipated production and firms decide to invest in ( $I_t$ ) to satisfy demand in ( $t + 1$ ), and we have:

$$Y_t = \mu I_{t-1} \quad (9)$$

Whose ( $\mu$ ) represents a measure of productivity. Anticipated demand for the consumption good is then written:

$$D_t = a + bY_t; 0 < b < 1 \quad (10)$$

With ( $a$ ) are autonomous spending and ( $b$ ) the marginal propensity to consume. Assuming that expectations are perfect, firms anticipate that they now sell tomorrow. They must invest  $D_{t+1}/\mu$ , in ( $t$ ) to serve the market in ( $t + 1$ ), and their requests for credit can write:

$$\mu C_t^d = P_t D_{t+1} \quad (11)$$

Which ( $C_t^d$ ) are the nominal amounts of credit given by banks. Thus, we assume that banks, to meet the demand progressive funding, decided to offer a credit equivalent amount of liquidity available (Savings:( $s$ )) and reserves held at the central bank. In fact, as mentioned by Blinder (1985), the amount credit offered by banks varies between a demanded credit ( $C_t^d$ ) and a maximum volume of disponibility ( $C_t$ ), as follows:

$$C_t^o = \min(C_t^d, C_t) \quad (12)$$

So the investment made by firms is equal to:

$$I_t = \min\left[\frac{D_{t+1}}{\mu}, \frac{C_t}{P_t}\right] \quad (13)$$

And the market price of goods and services is adjusted according to the law of supply and demand:

$$P_{t-1} - P_t = \theta(D_t - Y_t) \quad (14)$$

Borrowing constraint related to the current interest rate on the banking market pushes firms to react by loosening this constraint as a lower interest rate. However, the liability structure of firms make significant in explaining the behavior of loan application to finance their investments. In this context the fair value tool, allowing immediate recognition of unrealized gains and losses on the balance sheets, provides a tool for the influx of funding in the financial markets.

Indeed, the value of the company remains on the market for axial issuance of shares and attract new shareholders or to persuade bankers to finance their investment as suggested by Bernanke et al: *“Everything else equal, a rise in the expected discounted return to capital reduces the expected default probability. As a consequence, the entrepreneur can take on more debt and expand the size of the firm. He is constrained from raising the size of the firm indefinitely by the fact that expected default costs also raise as the ratio of borrowing to net worth increases”*. Bernanke et al (2000). Thus, we assume the existence of a single type of assets on the market. Financial firms come from their initial capital stock held by the capitalist market financial ( $t$ ) whose value is estimated at  $V_t$  and bank credit  $(1 - \alpha)(L_t + R_t)$  with a hazard ratio ( $\bar{w}_t$ ). Firms use their market valuation (Tobin's Q greater than expected 1) for a potential demand of credit equal to the difference between expenditures on capital and net worth:

$$D_{t+1} = Q_t K_{t+1} - N_{t+1} \quad (15)$$

And entrepreneurs achieve anticipated revenue estimating  $R_{t+1}$ , choose the value of the firm  $Q_t K_{t+1}$  with a hazard ratio defines and addresses the bank for the loan  $B_{t+1}$  ( $D_{t+1} = B_{t+1}$ ). And leverage that, thanks to the loan, allows the firm to acquire assets with minimal capital, which corresponds to accumulate capital through debt: leverage =  $\frac{D_{t+1}}{Q_t K_{t+1}}$

The firm expects profits  $R_{t+1}$  to cover the cost of capital and allows it to be solvable. The loan agreement entered must make a profit to cover the cost of the contract  $H_{t+1}$ . In the absence of risk of default then:

$$R_{t+1}Q_{t+1}K_{t+1} = H_{t+1}D_{t+1} \quad (16)$$

In this context and according to the Minsky's financial instability theory, the free play of individual opportunistic behavior (pushing borrowers to increase the market value of the firm to seek new loans) coincides with speculative bank. Bank to cope with this change in behavior, decided to move the idle money by introducing a risk of default "circulate idle liquidity through asset created by Occasion so increase the amount of funding possible with a given amount of central (Note 15) bank money" Minsky (1957). The amount of credit granted by banks depends on the availability of liquidity as mentioned by Blinder (1985). It is assumed in this context that banks choose the combination of credit allocation between productive firms  $\alpha(L_t + R_t)$  and firms operating in the financial sector, whose share is  $(1 - \alpha)(L_t + R_t)$ .

A firm operating in the sector of production their constraint reads as advanced by Blinder (1985):

$$\frac{C_t^o}{P_t} = \frac{\alpha(L_t + R_t)}{P_t} + \omega Y_t \quad (17)$$

We assume that the market for goods and services is in equilibrium and compute the steady state of the market good and service; that  $I_t = \frac{C_t^o}{P_t} (I^*, P^*)$ .

$$I_t = \frac{\alpha(L_t + R_t)}{P_t} + \omega \mu I_{t-1} \quad (18)$$

Subtraction  $I_{t-1}$  on both sides we can write:

$$I_t - I_{t-1} = \frac{\alpha(L_t + R_t)}{P_t} + (1 - \omega \mu)I_{t-1} \quad (19)$$

The second half of the equation allows us to write:

$$P_{t+1} - P_t = \theta[a - \mu(1 - b)I_{t-1}] \quad (20)$$

In the equilibrium we have:  $I_t = I_{t-1}$  and  $P_{t+1} = P_t$ , then we obtained:

$$I^* = \frac{a}{\mu(1-b)}; P^* = \frac{\alpha(L_t + R_t)\mu(1-b)}{\alpha(\omega\mu-1)} \quad (21)$$

In the absence of default risk, a firm operating in the financial sector stress their credit application is written in equations (15) and (16):

$$\frac{R_{t+1}Q_{t+1}K_{t+1}}{H_{t+1}} = Q_t K_{t+1} - N_{t+1} \quad (22)$$

The cost of capital is estimated assuming equation (16) and assuming that the demand for capital is equal to the offer:

$$R_{t+1}Q_{t+1}K_{t+1} = (1 + \alpha)(L_t + R_t)H_{t+1} \quad (23)$$

As stated previously, there is a single homogeneous type of share on the market that is supposed to perfect competition. In this part of the analysis is given an important role in accounting. "Suggest that within the firm the lack of a market price is replaced by systems for allocating decisions among managers, and measuring, rewarding, and punishing managerial performance. Accounting plays a role in these systems and so appears to be part of the firm's efficient contracting technology" Meckling and Jensen (1986). The homogeneity condition allows us to write the following formula:

$$\frac{\text{total equity}}{\text{number of ordinary shares outstanding } (N)} = \text{book value per share } (V^e)$$

So since we have assumed that capital firms are comprised of shares held by the capitalists then:

$$Q_{t+1}K_{t+1} = NV_t^e \quad (24)$$

The cost of capital is deducted as the cost per share multiplied by  $(N)$  the equation (23) gives us:

$$r_{t+1}NV_t^e = (1 + \alpha)(L_t + R_t)H_{t+1} \quad (25)$$

Let us write the equation (24), in the following mathematical form by assuming that the total credit is equal to:  $\frac{(1+\alpha)(L_t+R_t)H_{t+1}}{N} = C_t^d$ :

$$r_{t+1} * NV_t^e = C_t^d \quad (26)$$

We proceed to anticipate the solvency of companies according to fair value accounting. We consider that the initial and final value of the share and the book value of the asset on the market evolve linearly. Mathematically (Note 16), assuming the function  $V$  primitive  $v_t$  (the present value),  $[v_i, v_f] \in I$ ,  $I$  is the interval with the

carrying amounts of financial assets, we write the relation as the following form:

$$V_t^e = v_i + \int_{v_i}^{v_f} v_t dt \tag{27}$$

We recall in this context that when a transfer of assets is made below its carrying value, an impairment loss is transferred to the income statement on the basis of the asset transferred. An asset is sold above its book value is equivalent to a profit reported in the income statement. Thus the equation (26), which is the book value of the debt of the firm becomes:

$$Nr_{t+1} * \left( v_i + \int_{v_i}^{v_f} v_t dt \right) = C_t^d \tag{28}$$

With the number represented by this integral does not depend on  $t$ , we can write:  $\int_{v_i}^{v_f} v_t dt = F(v_f) - F(v_i)$ .

**4. Model Analysis**

We assume that the returns are known and before we draw the curves representing the variation in the value of assets in the volume of credit. To do so, we derive the equations (28). Two cases are possible. If we assume that the return on capital is constant and known previously as the derivative of the previous equation gives:

$$\frac{\partial C_t^d}{\partial v_i} = \frac{1}{2} Nr_{t+1} \int_{v_i}^{v_f} \frac{1}{2} V_t^2 dt = \frac{1}{2} N r_{t+1} = \frac{1}{6} Nr_{t+1} [V_f^3 - V_i^3] \tag{29}$$

Repayment of the credit depends on the difference between the book amounts of the asset. This relationship is made obvious in fair value accounting regime, the asset is recorded according to its market value. Three cases are possible:

- The book value at the maturity date is greater than the initial value, in this case the system is stable (Fig. 1). When the value is less than the cost of the credit system is speculative area ( $S$ ). A situation that emerges area hedge ( $H$ ), where the book value exceeds the cost of credit.

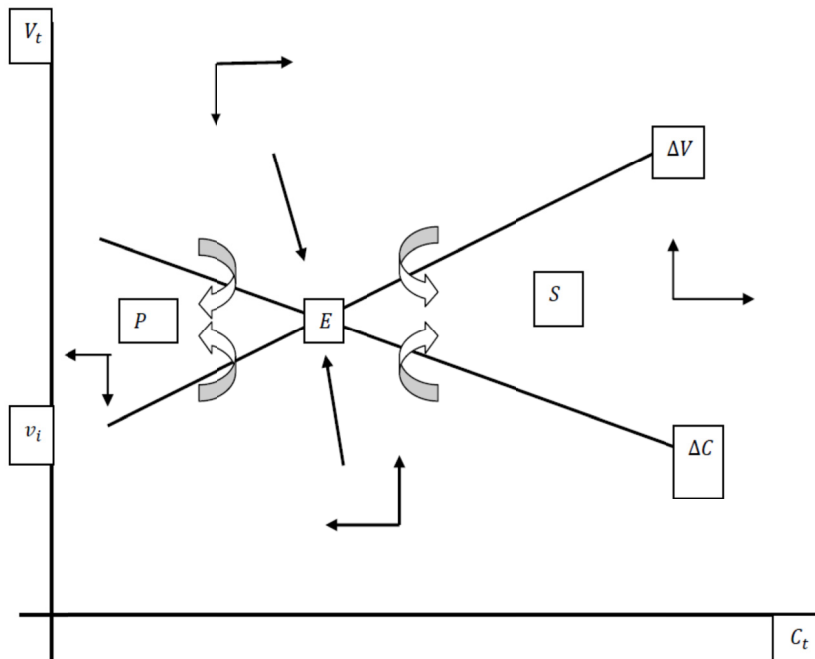


Figure 1. Hedge finance

- In the second case, the variation of asset’s book value is zero, firms repay interest only. This situation causes the system to speculation (Fig. 2). The area which lies below the equilibrium in the system is ponzi area ( $P$ ).



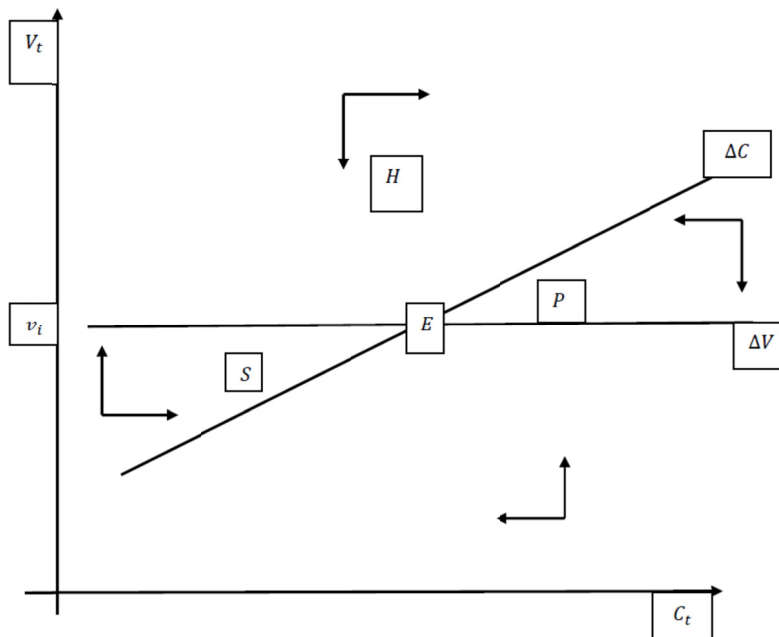


Figure 2. Speculative finance

➤ The book value at maturity is less than the initial value. And the financial system has failed (Fig. 3).

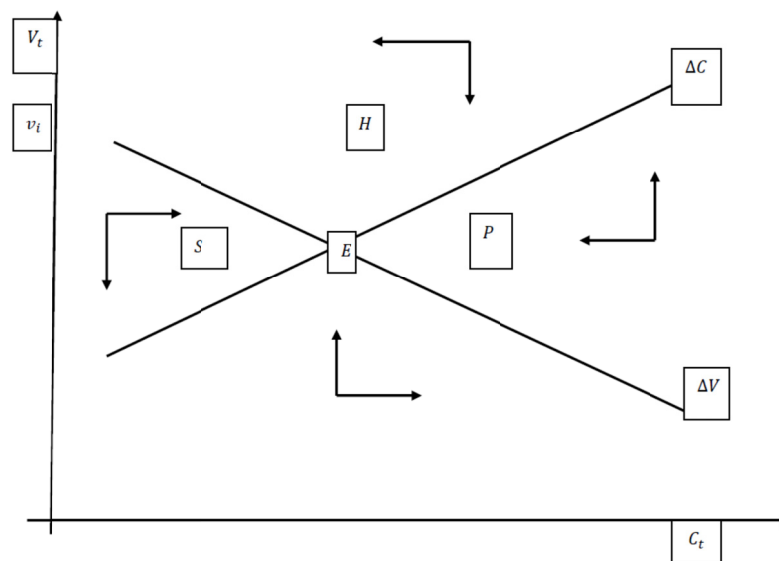


Figure 3. Ponzi finance

The hedge economy erected a period characterized by rising stock values attracting speculators seeking more value and funders who are a good opportunity to move their liquidity against attractive returns. Thus, we are witnessing the rise of speculation prompted by attractive rents. The insertion of results in the evaluation of accounting firms and the use of the fair value measurement of liabilities for accounting and solvency of firms, implied that an increase in the value of assets is reflected immediately and with same degree, the behavior of banks anticipate this change upwards as remedy sign of the firm in question. In this stage, entrepreneurs take advantage of the opportunity to build their credit needs which are unlimited if you take opportunistic behavior gents. This behavior eventually snowballs building which will be completed by high prices of financial assets markets. Attack succeeds and the economy is instable. Ponzi phase remains more remarkable than the recession. The Ponzi phase is wider spreads and undulatory propagate in space and area. The mortgage crisis in USA is exemplary to support our reasoning. Made several sectors in the real economy are affected financial (banking,

insurance, transport, production of raw materials ...) and countries of the world (Europe and countries of course). We are witnessing crises (Note 17) that spread temporally and geographically. The recognition operation and the delivery of accounting continues to apply even if economic conditions change, “*Bookkeeping, as the control and ideal synthesis of the process, becomes the more necessary the more the process assumes a social scale and loses its purely individual character*”. Marx (capital).

In this level, the variation of credit does not depend on the value of the action but depends only on profitability. Historical cost regime in the asset is measured at the beginning because the book value of an asset has no relation to the market value of the asset. And the asset is valued in the accounts at its price at the date of purchase, even if its market value has meanwhile evolved. The recession is longer and this is due to the recovery time to higher market values of firms. Such values which, according to our reasoning, include in the evaluation of assets and liabilities of financial firms. In this case using the cost value, the equity value increases moderately slower than in the case of fair value. And the completion of new loan agreements and even the amount of credit is limited. In this regard, the crises in Mexico and Argentina are examples that use our reasoning well as time duration of the crisis and the recession.

## 5. Dynamic Model and System Stability

### 5.1 Interest Rates and Financial Instability Hypothesis

The theory of financial instability brought by Minsky was a closed economy whose profits determine the level of investment and consumption. Idle money is injected into the economy through the creation of new financial products. This creates a speculative market behavior from the agents who buy these products. In the presence of uncertainty, decisions depend on the assessment of asset prices. A confrontation between the offer price of capital and the sale price determines the amount of credit granted to the market. A cycle occurs, triggers the desire to move idle money and speculative behavior of buyers of financial assets. We are witnessing degradation liquidity ratio compared to shares. This will lead to an increase in the velocity of circulation of money and that is reflected in the appreciation of net debt. The cycle with the rise of speculation lead to an overstatement of asset prices and the cycle is speculative.

To establish the dynamics of interest rates and financial instability assumes a shock occurs in financial markets causing a hazard ratio ( $\bar{w}_t$ ). According to Minsky (1975), two consequences result from this behavior: ineffectiveness of monetary policy and leads to an increase in the debt / net worth ratio resulting in greater volatility in the value of money market assets. The risk of illiquidity and insolvency therefore increase simultaneously. And the repudiation of debt by financial firms is reflected in this equation.

$$(1 - w)R_{t+1}Q_{t+1}K_{t+1} \quad (30)$$

Banks revise their estimates of interest rates like a weighting of interest rate  $i_t$  and profit rate  $r_{t+1}$ . Behavior results analytically by a weighted interest rate compared to current rates and profitability. Thus we write:

$$i_{t+1} = f(i_t, r_{t+1})$$

$$(1 - \alpha)i_t + \alpha(1 - \bar{w}_t)r_{t+1} = i_{t+1} \quad (31)$$

Thus:

$$\Delta i_t = \alpha[(1 - \bar{w}_t)r_{t+1} - i_t] < 0 \quad (32)$$

With  $i_t$  represent the interest rate basis depending on the level of economic activity to decide when to change interest rates, downward or upward. The right side of equality (32) describes the banking markup, positive or negative, and  $\Delta i_t$  is the difference between the real and the nominal interest rate. This linear relationship seems logical. However, financial crash and according to the initial conditions of the model changes to decrease or increase the interest rate depends on the sign of the term  $(1 - \bar{w}_t)r_{t+1} - i_t$ . This makes  $(1 - \bar{w}_t)r_{t+1} - i_t > 0$  or if  $\bar{w}_t < 1 - (i_t/r_{t+1})$ . In the second case we assume that  $(1 - \bar{w}_t)r_{t+1} - i_t < 0$  which is equivalent to remember that  $\bar{w}_t > 1 - (i_t/r_{t+1})$ .

Our reasoning is suitable with the financial instability hypothesis of Minsky which provides that the financial shock is caused by rising interest rates. In fact, and according to the relationships that it has lead to a rise in interest rates worsen the financial crisis and growing panic. Such a situation can be abandoned when the rates are kept down. We represent the subprime's example (Note 18) where a higher interest rate played a big part in crisis. Equity has increased during the crisis. Accounting rules were “pro-cyclical”, that is to say, they aggravated the crisis.

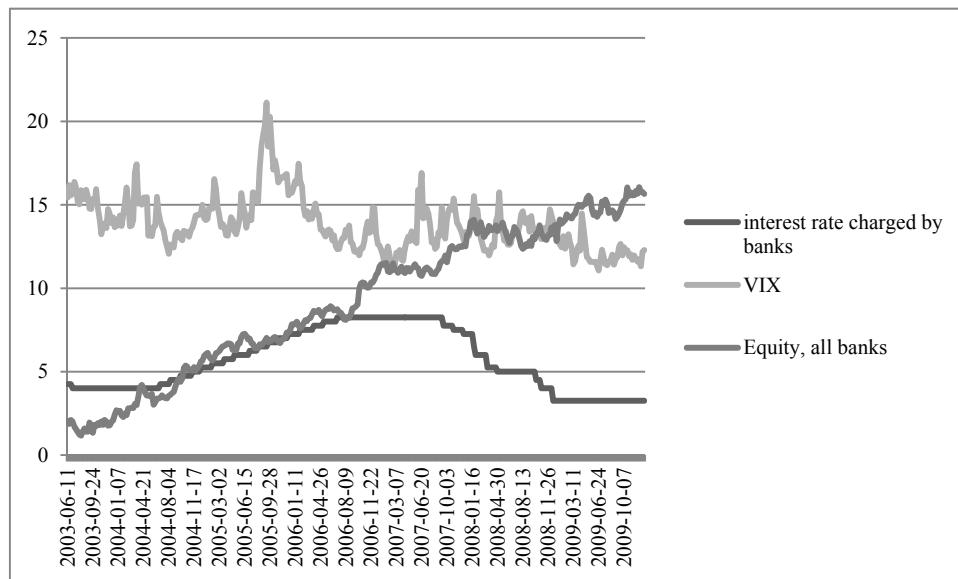


Figure 4. Subprime crisis and effect of interest rate

### 5.2 Interest Rates, the Effect of Feedback and Contagion

Laux and Leuz (2009), studying the effect of procyclical and contagious fair value, provide a great deal of controversy returns to the confusion about the fair value (which is new and different), “*fair value only played a limited role for income statements and bank’s capital ratios Regulatory except for a Few banks with large trading positions (Note 19)*”. The new standard is far from being a compromise between relevance and reliability. Indeed, concerns the registration of said assets to market values in times of financial crisis when we recognize the relationship between contracts and regulations or that bankers and investors are concerned about the market reaction to short-term. Laux and Leuz (2009) express the roots of the crisis to worries implementation in practice impairs the contagious nature of fair value, “*it is obvious that extant accounting standards can be blamed for causing contagion effects. That it is possible to aim, in practice or in crises, the standards do not work as intended (Note 20)*”.

The banking markup policy depends on the ratio interest rates compared to the return on assets in the financial market. This makes banks anticipate a decline in interest rates and hence a negative cash margin. In this part of the analysis we take the work of Lavoie (1992) argues that the failure of macroeconomic activity, which results in an increase in the banks’ preference for liquidity, pushing the banking system to increase the differential between the interest rate and the credit base. Lima and Meirelles (2007) meanwhile, argue that the banks use the level of economic activity to decide when to markup the following bank interest rates. In our case, banks have invested ( $\alpha$ ) in the real sector and  $(1 - \alpha)$  in the financial sector. At the end of the period, this investment has brought lower revenues than anticipated previously made the repudiation of debt from financial firms. Given the interest rate ( $i_t$ ) initially known, markup cyclicity of bank depends on the distribution of bank credit between the two sectors: real and financial sectors. In this perspective, a financial shock causes the reduction of profits and therefore lowers in bank funds. This is reflected in the revision of the share of credit requested for each sector.

This behavior under the conditions of our analysis is resulted from a countercyclical markup by the downward revision of interest rates. Propagation in the “orbit” of the financial shock occurs, by contagion, the imbalance of the real sector. According to equation (21), we arrive at the lower level of interest rates. This can be misinterpreted by consumers who reduce their savings. Thus, firms, to maintain the same level of production, must increase autonomous spending (equation 10). “... *And that instability is due to the way capital and asset accumulation are holding Financed. Simons was correct: Banking, that ‘is, the financing of capital asset ownership and investment, is the critical destabilizing phenomenon ... the liability structures available to units That own the massive capital assets of the economy must be constrained ... Keynes’s solution-the socialization of investment -may be a way of attenuating, although not Eliminating, financial instability by Removing the financing of the capital-intensive processes most expensive capital assets and debt from private markets*”(P. 520 Minsky., 1980).

The financial shock that occurs in the market could also have a negative effect on household wealth: capitalists

and workers, as well as the level of investment. Returning to equation (1) representing the stress distribution of income of employees and in combination the effect of the shock on the general price level, two cases can be interpreted. First, if employees believe their hold constant level of consumption, they must reduce their marginal proportion to spare. This translates into a reduction of capital flows to banks. Banks and wealth is reduced. This results in a decreasing volume of credit to the productive sector as well as financial. Capitalists, for their part, their share of profit (equation 2) is shrinking due to the depreciation in value of the assets they hold. Therefore profitability ratios / capital and production / capital ( $y$ ) are in descending order. Expectations are revised downwards. Of such behavior equivalent to decreasing interest rates will eventually decline of the inflation gap, nominal interest rate ( $\rho - \pi^e$ ). The rate of capital accumulation ( $g$ ) by the banking sector deteriorates. Finally, the system sets itself up to the destabilizing Mundell-Fleming:

$$(y \downarrow) \Rightarrow \pi_m \downarrow \Rightarrow \pi^e \downarrow \Rightarrow (\rho - \pi^e) \downarrow \Rightarrow \rho_{kt} \downarrow = (g \downarrow) \Rightarrow (y \downarrow)$$

In the second case, maintaining the same level of savings, employees receive satisfaction reduced rigid wage regime. Aggregate demand is compressed, distinguished by declining rate of firm's profit. Demand for credit deteriorates; banks adopt a bank to encourage markup revival of investment activity. The nominal interest rate is lowered to stimulate growth. In this case, economic growth resumes its upward pace which translates into an increase in the level of production and hence the ratio of production/capital. This reasoning is explained Keynesian effect debt:

$$(y \downarrow) \Rightarrow \pi_m \downarrow \Rightarrow m \uparrow \Rightarrow (\rho) \downarrow \Rightarrow (\rho - \pi^e) \downarrow \Rightarrow \rho_{kt} \downarrow \Rightarrow (g \uparrow) \Rightarrow (y \uparrow)$$

Such effect that does more if we consider that the stabilizing effect of wealth is ambiguous compared to destabilizing debt (Asada, 2004). In addition, banks and in their effort to maintain a level of savings and real money demand constant, must not lower nominal interest rate. In this case the interest rate will be zero; the Keynesian effect no longer works (Asada, 2004). Our analysis corresponds to the model of Irving Fisher, who studied a microeconomic model dealing maximizing behavior of the profit rate in net cash flow in correspondence with the hypothesis of increasing cost adjustment Uzawa (1969) and assumption of increasing risk of investment Kalecki (1937). Capitalists, for their part, the financial shock induces degradation of their income from profits due to the holding of risky financial assets in the equity of companies in crisis. However, a financial shock on a growing market, which is characterized by a debt/equity base very high, resulting in lower growth and production volume. So the debt/equity ratio and interest rates decline. The amount of debt seems like disability so that the rate of capital accumulation itself up to the downside. Thus we have a Fisher's debt effect:

$$(y \downarrow) \Rightarrow \pi_m \downarrow \Rightarrow d=D/(pK) \uparrow \Rightarrow g \downarrow = (y \downarrow)$$

In conclusion, the results of our analysis are similar to several conclusions of the work at the micro level. Thus, we study both sides of controversial issues in the debate. Proponents of fair value accounting argue that this method of accounting reflects the true (and relevant) value balance sheets of financial institutions. This should enable policy makers and investors to better assess their risk states and undertake the discipline of the market and the most appropriate remedial policies. By contrast, opponents claim that this method of accounting leads to excessive and artificial volatility. As a result, the value of the balance sheets of financial institutions will be driven by short-term fluctuations in the market that do not reflect the value of the basic principles and the value at maturity of liabilities and assets. Our analysis extends over the long term; we concluded the immediate effect of the carrying value of assets and liabilities on the financial solvency and stability of the firms. Our analysis allowed us to affirm the view of Minsky when the role of rate interest in system instability. The residual between assets and liabilities can give a new perspective for research.

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## Notes

Note 1. Adoption of innovation, deregulation, globalization ... Minsky (1978-1986).

Note 2. There is no effective arbitration between the accounting valuation of capital and the market valuation.

Note 3. The resulting loss of depositors of bank failure is not internalized by the owners, this is an externality.

Note 4. A high level of cash flow increases investment firms must without the risk or cost of debt or those associated emissions of new shares.

Note 5. Lima and Meirelles (2007), consider the cyclical nature (procyclical or countercyclical) markup of banks is taken into account in conjunction with the operating capacity of firms. Increased rate of exploitation and profits raises the ability of companies to use its financial obligations, reducing their perceived risk of default and, consequently, leads to a fall in the banking markup (eg, Wolfson, 1996). Another reason is that the decline in macroeconomic activity, increasing the banks' preference for liquidity, the banking system will lead to increase the difference between the basic rate and the loan rate (eg, Lavoie, 1992). A markup procyclical bank, based on a vision of intra-capitalist, it could be supported by the increase in macroeconomic activity.

Note 6. Depend on the characteristics of banks, the macroeconomic conditions, the nature of taxation and the nature of financial structure and the underlying regulation. In the Post Keynesian monetary economy, the demand for money is essentially power financial credit by the business sector. The flow of credit does not count as an exogenous stock of money. In this particular approach, the focus is on bank loans, or assets. Liabilities are considered a causal link that responds to changes in the asset. Portfolio theory is abandoned. Kaleckian approach

for the banking sector becomes possible Rousseas, 1985, p. 135).

Note 7. Hedge, speculative and Ponzi. In this context, Lavoie (1995) presents a comparative view of the way through which post Keynesian models of growth and distribution of currency incorporate the endogenous nature of money, and the exogenous interest rate. While the short-term model developed by Lima and Meirelles (2007), is similar to the version developed by Kalecki Lavoie, who, on his side dynamics, contributes to the post-Keynesian approach incorporating a flexible bank rate. While in all variants presented by Lavoie, economic activity has no effect on the rate of interest. In the model-Lima Meirelles (2007), the ability to use a feedback effect on the decision of fixing the interest rate banks. A detailed analysis of several studies post Keynesians, the endogenous nature of money, Lima and Meirelles (1998).

Note 8. Treated endogenously whose employment is a positive function of effective demand is the given wage.

Note 9. No distinction between nominal and real variables.

Note 10. In this context, the distribution of income plays a crucial role in the dynamics of the current system and the fragility of financial instability.

Note 11. The rejection of the hypothesis of complete markets are perfect as advanced by Arrow-Debreu was destroyed in Minsky's model made of asymmetric information.

Note 12. This is according to Marx, Kalecki (1971), Kaldor (1956), Robinson (1962) and Pasinetti (1962), Asada (2004), Lima and Meirelles (2007).

Note 13. Les modèles qui introduisent les données micro pour un traitement macroéconomique sont rares (les modèles de rationnement de crédit: Getler et Blinder, IS-LM augmenté: Blinder...).

Note 14. Minsky predicted that the dynamics of the crisis is perceived through combination between the financial and productive system.

Note 15. Minsky's financial instability as: uncertainty and liquidity cycle basis, O. Brossard 1998.

Note 16. See appendix.

Note 17. Stijn Claessen "Systemic Banking Crises: A New Database Prepared by Luc Laeven and Fabian Valencia 1", November 2008.

Note 18. Dataset of equity are from Federal Reserve Board H.8, the VIX from CBOE and interest rate from Bank of Canada. The period of sample is between Juan 2003 and December 2009.

Note 19. Laux and Leuz (2009). Accounting organization and society. p857.

Note 20. Laux and Leuz (2009). Accounting organization and society. 34, pp 826-834.

## Appendix

Let  $f$  be a function defined on an interval  $I$  and admitting primitives.  $F$  is a primitive of  $f$  on  $I$ ,  $a$  and  $b$  in  $I$ . We call integral from  $a$  to  $b$  from  $f$ , the number:

$$F(b) - F(a)$$

Which does not depend on the choice of the primitive of  $f$ , because primitives  $f$  on the interval  $I$  differ from a constant function. We note this number:

$$\int_a^b f(t)dt \text{ noted: } [F(t)]_a^b$$

In the notation with the symbol of the integral,  $t$  plays the role of a dummy variable, and we

$$\int_a^b f(t)dt = \int_a^b f(x)dx$$

In addition, the number represented by the integral is independent of  $t$ .