A simplified stock-flow consistent dynamic model of the systemic financial fragility in the 'New Capitalism'

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19. January 2011

Version: 1.6; *Revised*: January 19th 2011

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Abstract. In the last few years, many financial analysts and heterodox economists (but even some 'dissenters' among orthodox economists) have referred to the contribution of Hyman P. Minsky as fundamental to understanding the current crisis. However, it is well-known that the traditional formulation of Minsky's 'financial instability hypothesis' shows serious internal logical problems. Furthermore, Minsky's analysis of capitalism must be updated on the basis of the deep changes which, during the last three decades, have concerned the world economy. In order to overcome these theoretical and empirical troubles, this paper, first, introduces the reader to the 'mechanics' of the financial instability theory, according to the formulation of the traditional Minskian literature (section 2). Second, it shows 'why' Minsky's theory cannot be regarded as a general theory of the business cycle (section 3). Third, the paper attempts to supply a simplified, but consistent, re-formulation of Minsky's theory by inter-breeding it with inputs coming from the 'New Cambridge' theories and the current 'formal Minskian literature'. The aim of this is to analyze the impact of both capital-asset inflation and consumer credit on the financial 'soundness' of the non-financial business sector (sections 4-7). Some concluding remarks are provided in the last part of the paper (section 8).

Keywords: Financial Instability; Stock-Flow Consistency; Capital-asset Inflation

JEL Classifications: B50, E12, E32, E44

Contents

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The first few sections of this paper rely largely on an unpublished work with Riccardo Bellofiore, entitled 'Minsky, the monetary circuit and the current crisis' and presented at the international conference *Can it happen again? Sustainable policies to mitigate and prevent financial crises*, University of Macerata, Italy, October 1-2 2010. I would like to thank Riccardo Bellofiore, Antoine Godin, Paul Hudson and Emiliano Merlin for suggestions and comments. Any errors that might still be present are mine.

1. Introduction

> Instability is determined by mechanisms within the system, not outside it; our economy is [unstable][not] because it is shocked by oil, wars or monetary surprises, but because of its nature.
>
> Minsky 1986: 172

In the last few years, many financial analysts (see first and foremost Magnus 2007) and a number of heterodox (but even 'dissenting' orthodox) economists (see, for instance, Kregel 1997, 2008; Papadimitriou and Wray 2008; Tymoigne and Wray 2008; Vercelli, 2009a,b; Wray 2008; see also Passarella 2010) have referred to the contributions of Hyman P. Minsky as fundamental to understanding the tendency of capitalistic economies to fall into recurring crises. In fact, according to many observers, both the 'dot-com' crash of 2000-2002 and the burst of the so called 'subprime loan' crisis at the beginning of the summer of 2007 would confirm many of Minsky's forecasts: from the growing financial fragility of the economic system as the result of a previous period of 'tranquil growth'[1] to the risk of a credit crunch and a widespread debt deflation; from the gradual loosening of economic units' safety-margins to the reduction in the time elapsing between one crisis and another; from the bankruptcy of big financial institutions to the forced policies of 'Big Government' and 'Big Bank' that have been implemented by governments and central banks in the hope of avoiding a deep depression – in Minsky's words, to prevent 'it' happening again[2].

It should be plain, however, that the traditional representation of Minsky's implicit theoretical model presents some serious internal logical problems, as many authors have convincingly argued (see, first and foremost, Lavoie 1986; Lavoie and Seccareccia 2001; Toporowski 2008; Bellofiore and Halevi 2009, 2010). The main trouble concerns Minsky's belief that the leverage ratio for the business sector as a whole must eventually rise during the boom phase of the economic cycle, because of the growing non-financial businesses' debt-financed investment in fixed capital. Yet, from a macroeconomic point of view, the increase in net retained profits (in the form of bank deposits) coming from the higher investment may offset the higher debt (in form of bank loans) of the non-financial firms. This counter-intuitive outcome is known in Post-Keynesian literature as the 'paradox of debt' and can be considered the Kaleckian equivalent of the well-known Keynesian 'paradox of thrift'.

This paper aims to rescue Minsky's vision by strengthening and cross-breeding his model with inputs from the 'New Cambridge' theories and from the more recent 'formal Minskian literature'. In order to do so, the second section will introduce the reader to the mechanics of the financial instability theory, according to (a possible interpretation of) the traditional formulation. The third section will show the limits of Minsky's hypothesis insofar as it is interpreted as a general theory of the business cycle. In sections four, five and six we will develop a simplified stock-flow consistent model, in the wake of the current dynamic Post-Keynesian literature. This should allow us to analyze the impact of both capital-asset inflation (linked to the 'over-capitalization' of firms) and consumer credit on the financial 'soundness' of the non-financial business sector. Section 7 supplies some empirical evidence about the sectoral debt ratios, the trend in the share of equity-financed investment and their impact on the financial soundness of business sector. More precisely, we will try to show that households' 'autonomous' consumption and capital-asset inflation may have 'stabilizing', although temporary, effects on the non-financial business sector balance-sheet. Some concluding remarks will be provided in the last section.

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[1] The definition is derived by Joan Robinson (see Minsky 1986: 176, quoted in De Antoni 2009: 3).

[2] For an opposite but influential opinion, see Davidson: he argues that the current crisis 'is not a Minsky moment' (Davidson 2008: 669-670).

2. The 'mechanics' of the financial instability hypothesis

As is well known, the 'financial instability hypothesis' (FIH hereafter) of Minsky is grounded on the simple, but powerful, idea that, during periods of tranquil growth, each economic unit (and hence the economy as a whole) endogenously moves towards financial fragility. Although it is not an easy task to find a macroeconomic variable that could describe the fragility of a set of interrelated balance-sheets, the so called 'formal Minskian literature'[3] (FML hereafter), and Minsky himself, have often used the investment 'leverage ratio' of the corporate sector to this purpose[4]. However, as one might expect, the trend of the leverage ratio cannot be (*ex ante*) determined starting from the analysis of the behaviour of the 'representative' investing firm, since it (*ex post*) arises from firms' decisions on the whole. This trouble highlights a possible missing link between micro (or individual) and macro (or systemic) levels in Minsky's theoretical model[5].

In order to shed light on this point, let us consider – as Minsky, following Kalecki (1971), does in his mature works – the macroeconomic equality between the sum of consumption and investment, on the one hand, and the domestic income, on the other hand. Notice that this equality is always *ex post*-validated (namely, it is an *identity*) in an economy in which the government has a balanced budget and in which the trade account is also balanced. Then, by isolating the total profits and assuming that households save anything but their capital incomes (equal to the amount of firms' profits distributed as dividends)[6], one obtains the simplest version of the well-known Kalecki's macroeconomic gross profit equation:

$$\begin{aligned} P_{Gf} &= I + C - W \\ &= I + \left[W + \left(1 - \theta_f\right) P_f - S_h \right] - W \\ &= I = p\Delta K \end{aligned} \tag{2.1}$$

where P_{Gf} is the total profit (of the business sector) gross of bank interests, I is the current investment in fixed capital (labelled K), p is the price of the homogeneous output, C is the amount of total consumption, W is the wage-bill, θ_f is the share of retained earnings, P_f is the amount of total net profits and S_h is the amount of households' savings.

The internal funds which the non-financial business sector has available for it to fund the investment, ΔA_f, are the sum of accumulated net profits and the amount of (new) equities issued by firms, that is:

$$\Delta A_f = \theta_f P_{f(-\omega)} + p_{Ef} \Delta E_f \tag{2.2}$$

where $\omega \geq 0$ measures the (possible) time-lag between investment and profits[7], p_{Ef} is the current unit price of shares and ΔE_f is the number of new shares issued by firms[8].

For Minsky, external funds (essentially bank loans) allow firms to fund the purchase of

[3] The definition is drawn from Dos Santos 2005.

[4] See, for example, Lavoie 1986-87. A more recent work using the product of the leverage ratio and the mis-matching ratio as a better proxy for indicating the degree of financial vulnerability is that of Passarella 2010.

[5] As Toporowski has effectively argued, the point is that 'even if rising investment entails rising indebtness, it also entails rising liquidity and bank deposits held by companies … with the asset side [of firms' balance sheets] becoming more, not less, liquid as debt-financed investment proceeds' (Toporowski 2008: 734).

[6] This restrictive simplifying hypothesis will be relaxed in the next sections.

[7] As will be argued in the course of the paper, the very existence of this delay could be considered as one of the most controversial hidden hypotheses that sustains Minsky's theory (see Passarella 2010). The point is that, at the macroeconomic level, this assumption can be justified on the basis of the deferred spending out of capital income on consumption. In the presence of a positive time-lag between profits and capitalists' (here shareholders') consumption, 'it is possible, as an approximation, to say that profits follow investment with a time-lag' (Sordi 1986: 8; derived from Kalecki 1971). However, except for this case, the presence of a time-lag between investment and profits must be regarded as a mere microeconomic hypothesis, which cannot be immediately extended to the whole business sector.

[8] For the moment, the question of *where* the funds that are required to purchase these shares come from is left aside. Notice, however, that if one assumes that wage-earners are the only purchasing sector and they do not hold either cash balances or other financial assets, then: $p_{Ef}\Delta E_f = S_h = (1 - \theta_f)P_f$, and hence, in absence of any delay, we get: $\Delta A_f = P_f$.

capital goods (or assets) which cannot be financed adequately from internal resources alone[9]. Hence, the amount of required external funds, ΔL_f, equals the difference between the monetary value of planned investment and the internal funds[10], that is:

$$(2.3) \quad \Delta L_f = I - \Delta A_f$$

Of course, at the end of each period firms will pay off their bank debt including interests. These latter, in turn, depend on both the amount of bank loans and the bargained overall rate of interest, so we obtain:

$$(2.4) \quad J_f = i_L L_f$$

where i_L is the overall rate of interest (including all other charges imposed by banks) on bank loans. For the moment, we assume that this latter is bargained at the beginning of the period and paid at the end of the same period. Notice that, for Minsky, the interest rate on bank loans is an increasing function of the debt-financed investment, because of the 'lender's risk' borne by the banks. This risk – which is embedded in the cost of borrowing – affects net profits and hence the level of investment that is undertaken by each firm. However, for the sake of simplicity, we will disregard this aspect hereafter.

Finally, total net profit gained by the corporate sector is the difference between total gross profits and total interests on bank loans[11], that is:

$$(2.5) \quad P_f = P_{Gf} - J_f$$

Let us note that equations (2.1), (2.2), (2.3), (2.4) and (2.5) form a system of five equations in five unknowns (P_{Gf}, ΔA_f, ΔL_f, J_f and P_f). After solving the system by the amount of external funds, ΔL, one has:

$$(2.6) \quad \Delta L_f = I - \left[\theta_f \left(I_{(-\omega)} - i_{L(-\omega)} L_{f(-\omega)} \right) + p_{Ef} \Delta E_f \right]$$

Then, substituting the (2.2) and the (2.6) into the equation of the *marginal leverage ratio* (in other words, the marginal debt-to-investment ratio), one obtains:

$$(2.7) \quad \lambda_f = \frac{\Delta L_f}{\Delta L_f + \Delta A_f} = 1 - \left[\frac{\theta_f}{I} \left(I_{(-\omega)} - i_{L(-\omega)} L_{f(-\omega)} \right) + q e_f \right]$$

where $q = (p_{Ef} / p)$ and $e_f = (\Delta E_f / \Delta K)$ are, respectively, the well-known Tobin ratio[12] and the quantity of new shares per unit of real fixed investment. Finally, notice that the product of q to e_f gives us the share of equity-financed investment in fixed capital.

At a first approximation, we propose to label as the 'pure Minskian hypothesis' the case where the amount of new equities is negligible ($e_f = 0$) and where there is a positive time-lag – for instance, one-period lag ($\omega = 1$) – between profits and investment[13]. This means that

[9] Actually, firms 'need finance in order to set up and carry on any kind of production'. Hence, bank loans 'must cover the cost of total production and [are] not confined to financing specifically the production of capital goods' (Graziani 2003: 69). However, in order to make a comparison with the original Minskian formulation of the FIH, we keep on assuming that firms need loans in order to fund 'non-self-financed' investment.

[10] Bank debt is, therefore, the residual term to close the gap between investment and equity finance *plus* retained earnings (see Lavoie and Godley 2001-02: 288; see also Dos Santos and Zezza 2008). A different 'closure' of the model is supplied by Ryoo (2010), who assumes that the residual variable is the proportion of investment that is equity-financed.

[11] Notice that, since any given amount of loans must correspond to an equivalent amount of deposits, we are implicitly assuming that the interest rate on deposits (held both by households and by firms producing capital goods) is nil. On this point, see Michell 2010.

[12] This ratio measures the inflation in the capital-asset market (in comparison with the 'capital' goods market) and hence the profitability of the investment in fixed capital (see Tobin 1971).

[13] For the sake of simplicity, we assume also that households' savings are held in the form of non-interest-bearing

internal funds which are available at the beginning of a given period equal net money profits which have been accumulated at the end of the previous period. Given these 'Ricardian' assumptions, the equation (2.7) can be rewritten as:

$$(2.7') \quad \lambda_f = 1 - \frac{\theta_f}{1+g'}\left(1 - i_{L(-1)}\lambda_{f(-1)}\right) \qquad (0 \leq \lambda_f \leq 1)$$

where g' is the rate of growth of the investment in fixed capital. Minsky hypothesizes that this rate (which, for the moment, is assumed to be exogenous) is an increasing function of firms' long-run profit expectations and a decreasing function of the perceived risk on investment (the 'borrower's risk'), given the conditions of production of capital goods[14].

In summary, the equation $(2.7')$ shows that the leverage ratio for business sector depends positively on the growth rate of investment, g', on the bank loan rate of interest (in force during the previous period), $i_{L(-1)}$, and on the past leverage ratio, $\lambda_{f(-1)}$, whereas it depends negatively on the share of profits that are retained, θ_f. More precisely, the leverage ratio achieves its maximum value (namely, $\lambda_f = 1$) when there are no retained profits ($\theta_f = 0$). On the contrary, given a non-negative rate of growth of investment, the leverage ratio achieves its minimum value (namely, $\lambda_f = 0$) when investment stays constant ($g' = 0$) and profits are always entirely retained (so that $\theta_f = 1$ and $\lambda_{f(-1)} = 0$). In more intuitive terms, one can assert that marginal leverage ratio increases whenever debt-financed investment, pushed by profit expectations, grows at an *accelerating rate* (namely, whenever g' grows)[15], given both the rate of interest and the share of retained profits.

3. Limits of the FIH as a general theory of the business cycle

Let us assume – as do the majority of Minsky's interpreters (and critics) – both the absence of any time-lag between investment and (retained) profits and the possibility to finance a given share of investment by issuing equities[16]. Then, remembering that $P_{Gf} = I$, we see that equations (2.2), (2.3), (2.4) and (2.5) can be simultaneously represented in graphical terms by means of a four-axis diagram (see FIG. 1). In 'economic' terms, one can detect a causality that goes from investment decisions to profit, from profit to internal funds (on the basis of the share of retained net profits), from internal funds to the amount of the bank loan, and then from this latter to bank burdens (according to the level of the interest rate). It is easy to verify that, given the proportion of investment that is equity-financed, qe_f, the leverage ratio depends only on the relative trend of the share of retained earnings, θ_t, and the rate of interest on bank loans, i_L. In FIG. 1 leverage is measured as the ratio of segment 0-ΔL^* to segment 0-$\Delta L'$ in quadrant IV, which depends on the slope of the profit-line in quadrant II and the interest-line in quadrant III. Hence, if we assume that both the interest rate and the share of retained earnings are quite stable, then firms' marginal leverage ratio stays constant as well, whatever the level of investment (and this is the result of Kalecki's profit equation).

It should be clear, then, that Minsky's hypothesis of growing leverage ratio (for the whole corporate sector) cannot be the foundation of a general theory of the business cycle, but can only describe the particular case of a *debt-financed investment-led boom*, given some restrictive (and disputed) hypotheses. Broadly speaking, the FIH (interpreted as the idea that 'euphoric' profit expectations eventually lead to growing leveraged investment) can be regarded as either a *consistent* (but not general) theory or a *general* (but not consistent) theory,

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deposits.

[14] Notice that we are implicitly assuming that firms borrow at the beginning of a certain period and pay off the whole debt at the end of the same period. Consequently, interests on bank loans reduce to: $i_L \Delta L_f$.

[15] Or, anyhow, when debt-financed investment grows more quickly than the accumulation of capital stock. This point, clearly highlighted by Corbisiero (1998: 53) and then re-invigorated by Passarella (2010: 79), had been previously (partially) acknowledged also by Lavoie when asserted that 'an increase in the growth rate of capital requires […] a larger leverage ratio [and] corresponds precisely to a *boom* situation' (Lavoie 1986-87: 261).

[16] The leverage ratio is therefore: $\lambda_f = (1 - \theta_f - qe_f)/(1 - \theta_f i_L)$. Notice that we are implicitly assuming that $S_h > p_{Ef}\Delta E_f$ (see note 8).

but it cannot be considered as both[17]. Minsky himself was probably aware of this aspect. However, on the one hand, he thought that financing investment by the issuing of new shares was, in any event, a de-stabilizing factor, because of the extreme volatility in the quotations on equity markets[18]; on the other hand, the interconnection of firms' balance-sheets and cash-flows, as well as the practice of *stiffening* the temporal structure of liabilities during the ascending phase of the cycle, were considered to be enough to explain the reason why the economic system becomes more and more fragile (even in the presence of stable or quite low aggregate leverage ratios)[19]. The only necessary conditions for the tranquil growth to degenerate into an euphoric boom, and then into an open crisis, are the presence of financial imbalances between economic units and/or a wide positive spread of long-term compared to short-term interest rates[20]. Finally, notice that fusion, mergers and takeovers (which characterize phases of high economic growth), insofar as are financed by debt, determine an increase in the global leverage ratio (Passarella 2010: 80). Indeed, aggregate investment and money profits remain unchanged, whereas total debt of corporate sector increases (a point which has been underlined also by Lavoie 1986: 14).

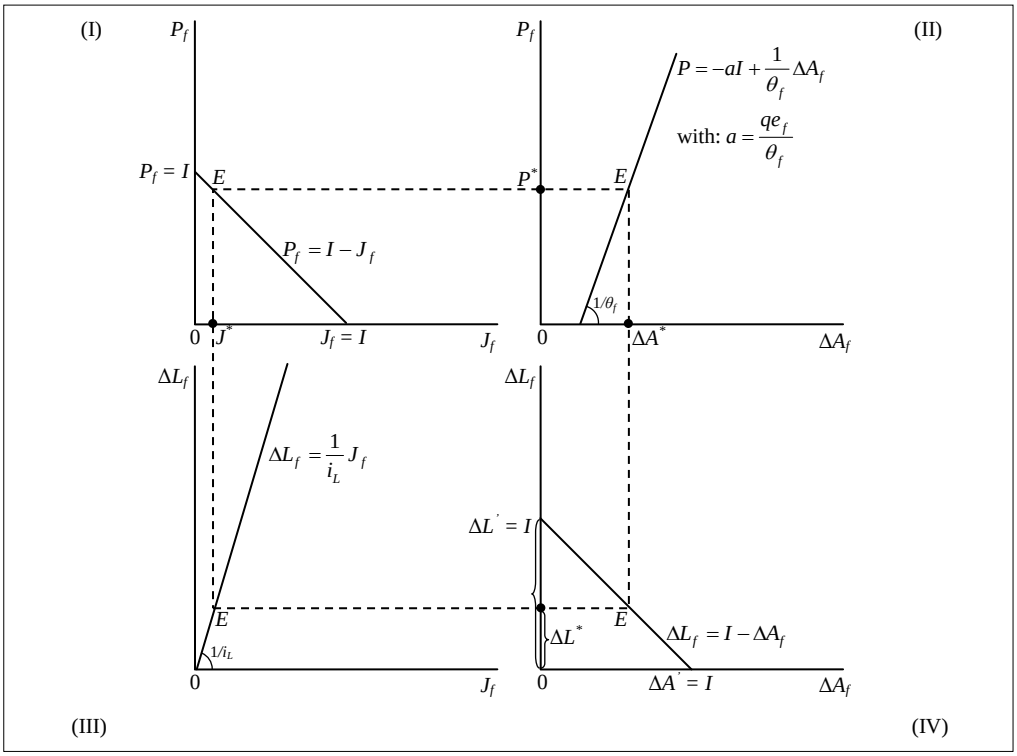

FIG. 1. The determination of internal funds and marginal debt for firms as a whole, given investment decisions (and qe_f). The ratio of 0-ΔL^* to 0-$\Delta L'$ supplies the measure of marginal leverage ratio.

Yet, as some authors have emphasized, during the last few decades (the years of the so-called

[17] In formal terms, what we have labelled 'the pure Minskian hypothesis' is the set of the following implicit restrictive assumptions: (i) investment is financed by loans and by retained earnings, but not by shares ($e_f = 0$); (ii) there is a positive time-lag ($\omega > 0$) between profits and investment, with the supposition that investment in fixed capital grows at an accelerating rate ($g', (dg'/dt) > 0$); (iii) the share of retained profits, θ_f, is quite stable (namely, 'ratchet effects' are nil or of a low order). An auxiliary hypothesis is that the effective interest rate on bank loans tends to increase during the upswing ($di_L / dt > 0$).

[18] Perhaps this is one of the reasons why he considered the new shares as anything but 'one class of outside funds' (Minsky 1976: 107; quoted in Lavoie 1986-1987: 260).

[19] See Passarella 2010. Notice that, insofar as one assumes this point of view, the criticism that the 'fallacy of composition' has been perpetrated in Minsky's theory can be avoided: the fact that the aggregate leverage ratio does not grow does not automatically entails that the system as a whole is 'hedge', but only that the aggregate leverage is not a good indicator of the financial 'unsoundness'. Indeed, individual financial fragility could, in any case, transmit from speculative units to hedge ones. On this point, see also Toporowski 2008: 735.

[20] As for the former condition, see Graziani 2003; as for the latter condition, see Passarella 2010.

'Great Moderation'), not only has total debt for the non-financial businesses not increased, but also that inflation in the money values of capital assets has allowed 'industrial' firms to finance their activity by issuing shares. Paradoxically, this has effects that are stabilizing (and not destabilizing, as Minsky would have expected) on firms' balance-sheets (see Toporowski 2000, 2010; Bellofiore and Halevi 2009, 2010; Bellofiore, Halevi and Passarella 2010a). Furthermore, the emergence of 'wealth effects' linked to the possession of assets whose market price was increasing more and more has allowed U.S. households to support both the U.S. and the entire world economy by means of a constant flow of importation from Europe and Asia. The reason is that this inflation process has 'un-pegged' the dynamics of consumption from the dynamics of labour incomes. Consequently, the leverage ratio for the non-financial businesses could remain quite stable, just as the debt ratios of households and financial businesses (namely, pension funds, insurance companies, hedge funds, private-equity funds and investment banks) were increasing more and more (see FIG. 3 in section 7). These are all factors that one has to consider explicitly, regardless of whether one wants to build a stylized model of the 'New Capitalism'.

4. The SFC accounting framework

As has been recently argued, models having reference to the formal Minskian literature 'can be phrased as special cases (or "closures") of a particular stock-flow consistent accounting framework' (Dos Santos 2005: 711)[21]. Hence, in the next two sections, the question of the trend of the investment leverage ratio will be developed within a stock-flow consistent (SFC hereafter) social framework where three sectors are explicitly considered: (i) households (or wage-earners), which sell their labour-power to firms (in return for a money-wage) and purchase consumer goods and financial assets (deposits and equities); (ii) non-financial firms, which produce a single homogeneous output by means of labour and the same good used as input; (iii) a macro-sector including a central bank and commercial banks (which lend credit-money to both non-financial business sector and households) *plus* financial operators (which create 'quasi-money'). Bothe the government and foreign sector are assumed away, because we are here considering an artificial 'pure credit' economy.

More precisely, we will adopt an accounting structure (which represents the analytical 'skeleton' of the model) where: (i) all interest rates and rates of return (on bank loans, i_L, and on bank deposits, i_D) are set for a given accounting period; (ii) each rate of interest (and dividend) paid in period t is pre-determined in period $(t - 1)$. Furthermore, it is assumed that: (i) households do not purchase real assets ('capital' goods); (ii) non-financial firms issue (and can also purchase a proportion of their own) equities, but do not hold securities issued by banks and non-bank financial intermediaries (hereafter NBFI); (iii) banks and intermediaries do not invest in real assets, but issue equities (that are subscribed by households) and hold a share of the non-financial business capital stock. Finally, following both Minsky (1986: 225) and Dos Santos (2006: 544), we reject the traditional distinction among commercial banks, on the one hand, and investment banks *plus* other non-bank financial intermediaries, on the other hand, by including all these actors in the same sector – that is to say, the sector labelled 'Banks and NBFI'[22]. Notice that this allows us to consider the deep changes which have occurred (especially) in the U.S. banking system during the last twenty years. However, unlike Dos Santos, we assume here that households are able to obtain bank loans in order to finance

[21] Although in principle it 'should be explicitly or implicitly valid for any consistent model, be it mainstream or heterodox' (Zezza 2010: 4), the label 'stock-flow consistent' usually refers to a specific set of Post-Keynesian models related to the 'New Cambridge' theories of the 1970s and then developed by Wynne Godley and other scholars of the *Levy Institute of Economics* (see, for instance, Godley and Cripps 1983; Godley 1996, 1999a,b; Lavoie and Godley 2001-02; Godley and Lavoie 2007a,b). These models are dynamic: they consider the effects of financial stocks on both income-flows and financial flows, as well as explicitly represent the role of the banking system. More precisely, 'the SFC methodology consists of three "steps": (1) do the (SFC) accounting; (2) establish the relevant behavioral relationships; and (3) perform "comparative dynamics" exercises' (Dos Santos 2005: 713). These latter are usually carried out by means of a system of differential (or difference) equations and computer simulations. The present article confines itself to developing step (1) and, in part, step (2). On problems and limits of the current crop of stock-flow consistent models, see Michell 2010.

[22] Notice, however, that we can keep on assuming that only banks are able to create credit-money, whereas the other financial units can just create 'quasi-money' (including 'derivatives').

consumption (even beyond the limit of their disposable income) and purchase financial assets. More specifically, we will assume that the amount of bank loans received by households is an increasing function of their net wealth and hence of the inflation in the stock market. The reason is that in the last few decades, Anglo-Saxon households have been embedded in the frenzy of financial markets by means of the holding of shares, supplementary pensions, and so on. This process has allowed households to borrow (also) on the basis of the value of their own financial (and real-estate) assets.

Previous assumptions are summarized in a consistent set of sectoral balance sheets where 'every financial assets has a counterpart liability, and budget constraints of each sector describe how the balance between flows of expenditure, factor income, and transfers generate counterpart changes in stock of assets and liabilities' (Lavoie and Godley 2001-02: 278)[23]. More precisely, TAB. 1 presents the nominal balance-sheet matrix of a pure credit economy and TAB. 2 is the corresponding transaction-flow matrix. For instance, row 2 in TAB. 1 shows that bank credit can be granted to both firms (which need it in order to finance investment in fixed capital, but also to pay a wage-bill to workers) and households (which use it in order to finance consumption and/or to speculate on the stock market); whereas row 4 in TAB. 2 shows the flow of 'passive' interests going from private sector to banking sector. Furthermore, TAB. 3 shows the uses and sources of funds – that is to say, shows the monetary budget constraint faced by each economic sector. More precisely, TAB. 3 demonstrates 'how the sectoral balance sheets are modified by current flows' (Dos Santos 2005: 719). Notice that loans borrowed by firms are defined in residual and temporary terms (namely, as the external resources that firms need to fund the non-self-financed investment in new capital goods), whereas bank lending to households is of different 'nature', since it entails an additional and (potentially) lasting indebtness. The very ratio of households' borrowing to their net worth is a an indicator of their financial fragility. Finally, notice that the difference between row 8 in TAB. 2 and row 5 in TAB. 3 must be zero, since 'every flow comes from somewhere and goes somewhere' (Godley 1999b: 394).

5. Asset inflation, autonomous consumption and the leverage ratio

Let us examine how the investment leverage ratio of the non-financial business sector is affected by the autonomous consumption of households and by inflation in th value of capital assets, two of the main features of 'Money-Manager Capitalism'. The total net profit for the corporate sector, considered as a whole, can be derived from the second column of TAB. 2:

$$(5.1) \quad P_f = C + I - W - i_{L(-1)} L_{f(-1)} + i_{D(-1)} D_{f(-1)}$$

where $D_{f(-1)}$ is the amount of bank deposits held by non-financial firms and $i_{D(-1)}$ is the rate of return on deposits (settled in the previous period)[24].

Notice that the aggregate consumption is equal to households' total income (including financial gains, but net of interests to the banks) *plus* consumer credit (namely, bank loans granted to households), *minus* households' savings, that is:

$$(5.2) \quad C = W + \left(F_{fh} + F_b + i_{D(-1)} D_{h(-1)} - i_{L(-1)} L_{h(-1)} \right) + \Delta L_h - S_h$$

where F_{fh} is the amount of dividends paid out by non-financial firms to households, F_b is the amount of dividends paid by banks and NBFI, $D_{h(-1)}$ is the amount of deposits held by households in the previous period, ΔL_h is the amount of bank loans borrowed by households[25],

[23] In a sense, the SFC modelling is the best way to develop the Minskian notion of the 'firm' as a balance sheet of assets and liabilities (in a world marked by radical uncertainty), as opposed to the traditional notion of the firm as a (completely rational and foresighted) individual agent that 'merely' combines the factors of production.

[24] Notice that, for the business sector considered as a whole, the amount of loans employed to fund investment spending corresponds to the amount of bank deposits obtained by firms producing capital goods. Hence, with regards to the investment spending, the net cost of borrowing is: $J_N = L_{f(-1)}(i_{L(-1)} - i_{D(-1)})$. This latter is 'proportional to the margin between the loan and the deposit rates of interest, rather than the absolute value of the loan rate of interest, as is usually assumed' (Michell 2010: 15).

[25] As has been anticipated, we can assume that bank loans to households are equal to a percentage of their net

and S_h is their current savings.

If, for the sake of simplicity, one assumes that the rate of interest on deposits is negligible ($i_{D(-1)} = 0$), then, substituting (5.2) into (5.1), one gets:

$$(5.1') \quad P_f = I + \hat{C}_h - i_{L(-1)} L_{f(-1)} \qquad \left(\hat{C}_h = C - W = F_{fh} + F_b - i_{L(-1)} L_{h(-1)} + \Delta L_h - S_h \right)$$

where $\hat{C}_h$ is the (positive or negative) gap between households' consumption and the money wage-bill paid by firms.

On the other hand, additional internal funds that are available to finance firms' investment-expenditures related to each period can still be calculated as the sum of retained profits (F_{uf}) and the value of new shares (see TAB. 3, second column, row 4 and 5) – that is:

$$(5.3) \quad \Delta A_f = F_{uf} + p_{Ef} \Delta E_f = \theta_f P_f + p_{Ef} \Delta E_f$$

If, in the spirit of Minsky, one assumes that firms use bank credit only in order to purchase capital goods (thereby implying that none of the firms' wage-bills is financed by bank credit), then marginal external funds that the corporate sector as a whole needs in order to realize planned investment are:

$$(5.4) \quad \Delta L_f = I - \Delta A_f$$

Substituting the identity (5.1′) into (5.3), and then this latter into (5.4), one obtains the amount of marginal external funds (namely, new bank loans) that non-financial business sector needs:

$$(5.5) \quad \underset{[3]}{\Delta L_f} = I - \underbrace{\theta_f \left(I + \hat{C}_h - i_{L(-1)} L_{f(-1)} \right)}_{[1]} - \underbrace{p_{Ef} \Delta E_f}_{[2]}$$

This latter is none other than the Kaldorian budget constraint of firms (see Kaldor 1966), that shows that investment 'must be financed by some combination of retained earnings [1], sale of new equities [2], and additional borrowing from banks [3]' (Lavoie and Godley 2001-02: 283)[26]. Thus, the marginal leverage ratio (calculated as marginal debt-to-investment ratio) of the corporate sector is:

$$(5.6) \quad \lambda_f = 1 - \left[\theta_f \left(1 + \frac{\hat{c}_h u}{v} - \frac{i_{L(-1)} \lambda_{f(-1)}}{1 + g'} \right) + qe_f \right]$$

where $\hat{c}_h = (\hat{C}_h / pX)$ is the share of households' 'autonomous' consumption in national income, $v = (\Delta K / X_C)$ is the *marginal* technological capital-capacity ratio, and $u = (X / X_C)$ is the rate of utilization of productive capacity. Hence, given u and v, leverage ratio depends positively on both the previous interest rate on bank loans, $i_{L(-1)}$, and the previous leverage ratio, $\lambda_{f(-1)}$, whereas it depends negatively not only on the share of retained profits, θ_f, but also on the share of equity-financed investment, qe_f, and on the percentage $\hat{c}_h$. This latter measures the excess of household consumption over wage-bill per unit of national income. This means that, *ceteris paribus*, the higher the autonomous consumption and the higher the possibility to fund the purchase of capital assets by resorting to the financial market (namely, by issuing equities), the lower will be the investment leverage ratio.[27]

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worth ($\Delta L_h = \alpha V_h$).

[26] See note 10.

[27] Notice that marginal leverage ratio depends negatively on the rate of growth of investment. This 'anti-Minskian' conclusion comes from the fact that, in absence of a temporal delay between profit and investment, the greater is g', the lower is the incidence of passive interests (of previous period) over firms' balance sheets.

Furthermore, it is easy to verify that non-financial business leverage ratio is affected not only by the decisions of 'industrial' firms (considered as a whole), but also by the behaviour of the other economic units. More precisely, on the one hand, besides firms' sale revenues (which are affected by $\hat{c}_h$), households directly affect the amount of new equities issued by non-financial business sector (ΔE_{fh}), as well as the market value of stocks (p_{Ef}, and hence q and e_f), and indirectly affect the share of retained earnings (θ_f). This happens, for instance, insofar as managers are driven to maximize the shareholder value of their firms. On the other hand, commercial banks and NBFI directly affect the overall rate of interest on loans ($i_{L(-1)}$), as well as ΔE_{fb} and p_{Ef} (and hence q and e_f), and indirectly affect θ_f. The central bank, in turn, can indirectly affect the effective rate of interest paid on bank loans ($i_{L(-1)}$) and, consequently, firms' dividend policy (θ_f), as well as prices on the stock market (p_{Ef} and ΔE_f), and so on. Thus, all these actors, somehow or other, affect the soundness of non-financial business sector balance-sheets. For instance, an increase in the share of autonomous consumption of households, insofar as it increases the net profit of non-financial firms, allows these latter to reduce their need of external funds. Analogously, inflation in equity-prices allows firms to replace bank borrowing with 'cheaper' long-term capital, and hence to reduce the investment leverage ratio[28]. Finally, notice that, in the presence of capital-asset inflation, banks could be forced to shift towards consumer-credit and change their nature into fee-related businesses, insofar as they no longer have the non-financial business sector as their main category of costumer. This process could be not only the result of spontaneous euphoria, but also the outcome of a specific expansive monetary policy pursued by the central bank[29].

6. A simplified dynamic model of systemic financial fragility

As might be expected, equation (5.5) is a macroeconomic reformulation of the financial constraints of industrial business sector (in the wake of Kaldor 1966; Wood 1975; Lavoie 1986-87, 1987; Lavoie and Godley 2001-02). As we will not be considering discontinuous lags in this section, we will develop a simplified model of systemic financial fragility within a continuous-time economic world[30]. In particular, if we call g the rate of growth of capital[31] and we remember that P_{Gf} is the whole amount of gross profits gained by non-financial firms, then equation (5.5) can be re-written as:

$$(6.1) \quad \Theta_f P_{Gf} = \left(pK - L_f - p_{Ef} E_f \right) g$$

where Θ_f is the rate of retention of gross (not net) earnings[32], K is the whole quantity of fixed capital and E_f is the whole quantity of stocks issued by non-financial firms (see TAB.1, rows 3 and 4). Dividing each side of equation (6.1) by pK, one obtains:

$$(6.2) \quad \Theta_f r_{Gf} = \left(1 - \lambda_f - q e_f \right) g$$

where r_{Gf} is the rate of profit realized by the non-financial business sector, gross of the rate of interest on bank loans. Notice that λ_f and the product qe_f stand respectively for the total (not marginal) leverage ratio and the total (not marginal) equities-to-capital ratio. Solving by the rate of growth of capital, g, one gets:

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[28] One could think that capital-asset inflation cannot produce *macroeconomic* changes, but only microeconomic effects, since capital gains realized by some units (households or firms) offset capital losses suffered by other units. However, this is not true whenever: (i) there is asymmetric information, so that units realizing capital gains react more quickly than units suffering capital losses; (ii) capital gains and losses entail a redistribution of income among different sectors (for instance, from households to firms); (iii) banks loans are linked to the value of assets, allowing units to realize capital gains *immediately*.

[29] In a sense, this is a self-feeding process: the change in the banking model has concurred to produce the inflation of the capital assets which, in turn, has concurred to modify the banks' customer profile.

[30] On the choice of the kind of 'time' to be used in the construction of dynamic models, see, for instance, Gandolfo 2010: 568.

[31] Notice that $g = dK / dt$, whereas $g' = dI / dt = d^2K / dt^2$.

[32] It is easy to verify that: $\Theta_f = \theta_f P_f / P_{Gf}$.

$$(6.3) \quad g = \frac{\Theta_f r_{Gf}}{\left(1-\lambda_f - qe_f\right)}$$

Taking the natural logarithms of the (6.3) and differentiating with respect to time, we obtain the following dynamic equation[33]:

$$(6.4) \quad \frac{\dot{g}}{g} = \frac{\dot{\Theta}_f}{\Theta_f} + \frac{\dot{r}_{Gf}}{r_{Gf}} - \frac{d}{dt}\ln\left(z_f - qe_f\right)$$

where $z_f = (1 - \lambda_f)$ is the complement of the leverage ratio, measuring the financial solidity of business sector. If, for the sake of simplicity, we assume initially that the share of investment financed by new issues is nil, and we make explicit $\dot{z}_f$, then we get:

$$(6.5) \quad \frac{\dot{g}}{g} = \frac{\dot{\Theta}_f}{\Theta_f} + \frac{\dot{r}_{Gf}}{r_{Gf}} - \frac{\dot{z}_f}{z_f}$$

This latter would seem to confirm – and even strengthen – the main proposition of Minsky's FIH: given the share of retained earnings and the gross rate of profit, an increase in the growth rate of capital would entail a growing leverage ratio (namely, $\dot{z}_f < 0$)[34].

However, if we apply the SFC principles and, remembering the $(5.1')$, we break down firms' gross rate of profit into its components:

$$(6.6) \quad r_{Gf} = g\left(1 + \frac{\hat{c}_h u}{v}\right)$$

where $v = (K/X_C)$ is redefined as the *total* technological capital-capacity ratio. In accord with Kalecki's theory, the gross profit for firms as a whole depends positively on the autonomous components of aggregate demand. More precisely, given u and v, the rate of profit depends on the 'propensity to invest' of non-financial firms (which is measured by the growth rate of capital) and the 'propensity to over-consume' of households.

Notice that, following Lavoie (1986-87: 260), we can also re-write the equation for the gross rate of profit as:

$$(6.7) \quad r_{Gf} = \frac{P_{Gf}}{pK} = \frac{P_{Gf}}{pX} \cdot \frac{X_C}{K} \cdot \frac{X}{X_C} = \frac{\pi u}{v}$$

where, as usual, $\pi = (P_{Gf}/pX)$ is the share of gross profits in national income, $v = (K/X_C)$ is the technological capital-capacity ratio, and $u = (X/X_C)$ is the rate of utilization of capacity.

Equations (6.6) and (6.7) form a system of two equations in three unknowns (r_{Gf}, g and π), and therefore the 'model' can be closed in two different ways. One could assume that, given the capital-capacity ratio and the rate of utilization of capacity (which is decided upon by firms), the combined decisions of the business sector (with respect to the 'composition' of output), banks and NBFI (with respect to both the interest rate on bank loans and the amount of consumer credit) would set the share of gross profit in national income and hence the gross rate of profit. In this case, both the rate of growth of capital and the rate of profit are endogenously and residually determined[35]. Alternatively, it is possible to assume that the rate of growth of capital is (exogenously) set by the non-financial business sector's investment

[33] We will use the Newton's notation for differentiation, where a *dot* over a given variable x refer to its time derivative (viz. $\dot{x} = dx/dt$).

[34] On this point, see Lavoie 1986, 1986-87.

[35] From (6.6) and (6.7) we obtain: $g = \pi u/(v + cu)$.

decision, viz. firms' long-run profit expectations and investment's risks (given the conditions of production of capital goods). The latter solution is consistent with the one followed by Minsky and preserves the causality implicit in Kalecki's macroeconomic profit equations.

Finally, if we substitute the equation (6.6) into the (6.3), isolate the variation of the complement of the leverage ratio and differentiate the natural logarithm of the resulting equation with respect to time, we obtain the fundamental dynamic equation of this simplified model[36]:

$$(6.8) \quad \frac{\dot{z}_f}{z_f} = \frac{\dot{x}_f + \Theta_f \dot{y} + \dot{\Theta}_f (1+y)}{x_f + \Theta_f (1+y)} \qquad \left(x_f = qe_f,\ y = \frac{\hat{c}_h u}{v} \right)$$

where x_f is the equity-to-capital ratio. At a macroeconomic level, the financial soundness of the business sector (described by the variation of the complement of the leverage ratio, z_f) is not affected by the variation in the rate of growth of capital, but only by variations in the share of equity-financed investment, x_f, the share of retained earnings, Θ_f, and the propensity to over-consume of households, $\hat{c}_h$ (which, given fixed values of u and v, determine the trend of y). More precisely, given the retention rate, an increase in the autonomous consumption of households and in the prices of equities on the financial markets, will go along with a reduction in the degree of fragility of firms' balance-sheets[37].

7. Some empirical evidence

As has been argued above, if one wants to explain the trend in the non-financial business sector's balance-sheet since the beginning of the 1990s, then one has to analyze the trend of $\hat{c}_h$ (or y), x_f and Θ_f. A thorough empirical analysis of these magnitudes is outside the aim of this paper. Rather, we will limit ourselves to a few considerations on both the debt of households and financial firms, and the share of equity-financed investment, which is the more controversial factor of financial fragility (or soundness). FIG. 2 shows the trend in the ratio of net issues of equities to fixed investment and the trend in the ratio of borrowing to fixed investment with reference to the U.S. non-financial corporations (1980-2009). As we can see, these ratios present a clear inverse correlation (of about –0,75 in the decade 1990-2009). As Minsky would have expected, in the U.S. the degree of soundness of the non-financial corporate sector (namely, the complement of the borrowing-to-investment ratio), as well as the equities-to-investment ratio, decrease during the upswing (supporting the idea that 'stability is de-stabilizing') and increase after crises, such as the Wall Street crises of 1987, 2000 and 2007.

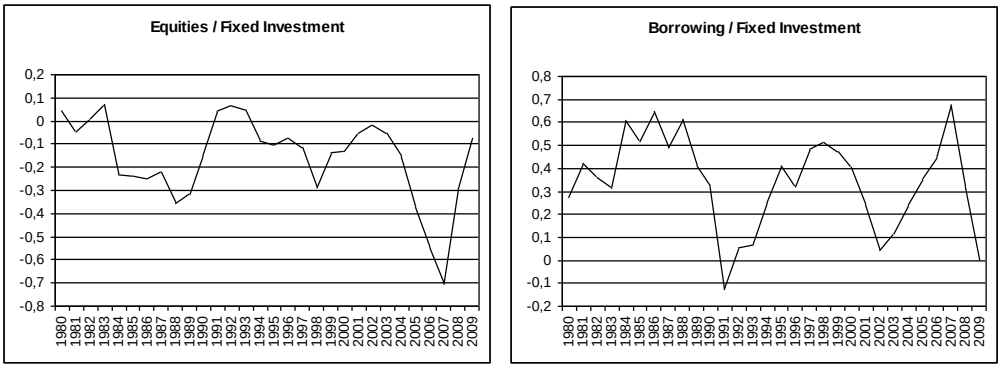

FIG. 2. The ratio of net issues of corporate equities to (nonfarm) non-financial corporate gross fixed (nonresidential)

[36] Notice that the aim of this simplified model is to supply a stylized description of the medium-run trend of the business sector's financial soundness (in the presence of consumer credit and capital-asset inflation), rather than to provide an account of the short cycles generated by the dynamics of the effective demand. On this point, see Ryoo 2010: 4.

[37] We are implicitly assuming that the average degree of 'mis-match' of debt (compared to the period that investment needs to be realized) does not change. On this point see Passarella 2010.

investment, and the ratio of corporate borrowing to gross fixed investment in the U.S. economy.

Source: Author's elaboration of the data in *Federal Reserve Board, Flow of Funds Account of the United States*, Tables F.213, F.102, F.6 and D.2, November 2010.

To be more specific, FIG. 2 shows that the equities-to-investment ratio increased at the end of the 1980s and stayed high during the early 1990s. This could explain why, in the same years, the marginal leverage ratio for the non-financial corporate sector investment in fixed capital stayed very low. The point is that between the end of the 1980s and the first 1990s U.S. non-financial corporations 'have issued capital in excess of their commercial and industrial needs'. This has generated 'a loop between financial inflation and over-capitalisation', which has been 'facilitated by (i) the mere interest of fund-managers in financial returns and shareholders value', (ii) the new forms of remuneration of senior management and (iii) the new techniques of debt-management. During this period, 'bank borrowing was substituted by cheaper long-term capitals which, in turn, were (also) reinvested in buying short-term financial assets' (Bellofiore, Halevi and Passarella 2010b: 7-8). As Toporowski (2000, 2010) has pointed out, the inflation of capital assets has fuelled the boom of the long-term equity financing (and then the boom of the real-estate market). Notice that, on the one hand, capital-gains expectations have 'made disequilibrium feeding up on itself, increased for a long while liquidity, and improved the quality of collateral'. On the other hand, the rise in the market value of the financial assets 'had no ceiling because there was neither an automatic readjustment mechanism nor an in-built tendency to equilibrium' (Bellofiore, Halevi and Passarella 2010b: 8). This very mix of capital-asset inflation and collateralised lending has hedged the balance-sheet of non-financial corporate sector, delaying the onset of the crisis.

By contrast, the equities-to-investment ratio fell in the period 2003-2007, as well as during the 1980s, mainly because of the stock-repurchase of the non-financial business sector. This is the other face of the inflation in the prices of capital assets. Indeed, it has been observed that 'when faced with a situation of rising prices in the equities markets, it may become profitable for overcapitalised firms to allocate excess capital to financial assets [namely, their own shares] in preference to engaging in real investment' (Michell 2010: 20). However, what is 'good' for the single firm (which can use the capital market in order to sustain the price of shares, maintain its own internal liquidity and realize capital gains, or even as a 'distributional' mechanism) can be not good for firms' balance-sheets as a whole. At the systemic level, the rate of the *net* issue of equities have become negative (since firms have bought back much more shares than they have issued in the same period), whereas the burden of bank loans – and, hence, the leverage ratio – have increased.

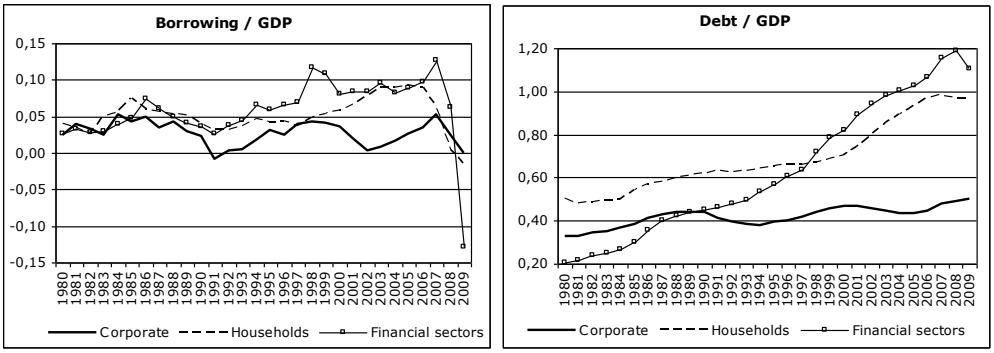

FIG. 3. Borrowing and debt outstanding by sector (non-financial business corporate, households and domestic financial sectors) as a percentage of GDP in the U.S. economy.

Source: Author's elaboration of the data in *Federal Reserve Board, Flow of Funds Account of the United States*, Tables F.6, D.2 and D.3, November 2010.

On the whole, the process of 'financialization' of western economies (which started at the end of the 1970s and continued to take place during the 1980s) has been associated with a continual fall in the retention rate on profits and a fall in the proportion of fixed investment that is financed by new issues (see, for instance, Ryoo 2010: 8-9). The reason why this process has not produced a sudden collapse of the financial soundness of the 'traditional' corporate sector has been the presence of the growth in debt-financed autonomous consumption coming

from households, along with a huge increase in debt of financial sector. Both these factors have involved an additional flow of liquidity towards non-financial corporate sector, via consumer and financial markets. FIG. 3 shows the trend in the respective debt-to-GDP ratios of (i) the non-financial corporate sector, (ii) the household sector and (iii) the domestic financial sector. As we can see, the household and financial sectors' indebtedness grows rapidly but only to lead to the bubble now called 'the subprime loan crisis', whereas non-financial (corporate) firms' debt stays quite stable during the same period.

These data would seem to confirm that Minsky's forecasts have eventually come true (as economic units' debt ratios have increased during recent growth phases), but with a number of differences compared to his original 'hypothesis'. Even though we leave aside the growing indebtness of governments (which is becoming the main target of international financial speculation), in the last two decades the first cause of financial fragility has not been a growing debt-financed investment in fixed capital, but the increasing debt of households (trying to defend their living standards against stagnating wages) and financial firms. It is true that indebtness has eventually hit also the non-financial corporate sector. However, it was not the increasing investment which caused the rise in the debt of non-financial companies at the end of the 1990s and after the 2006. Rather, 'debt was "forced" into them. Initially, because of the inflation of capital assets on the rise, and because of the behaviour of financial intermediaries (which shifted their debt into the industrial companies). Later, for the downside effects on the cash in-flows of the same non-financial companies resulting from the breakdown in the price of capital assets' (Bellofiore, Halevi and Passarella 2010b: 8). This suggests that, once again, instability has been 'determined by mechanisms within the economy, not outside it' (Minsky 1986: 172). But even that capitalistic economies are ever-changing systems which require an uninterrupted re-thinking also of Minsky's analysis.

8. Final remarks

In the previous sections we have developed a stylized SFC dynamic model aiming to analyze the effects produced on the balance-sheets of the business sector by the deep changes that occurred in the economic-financial structure of western capitalist economies during the few last decades. This has allowed us to explain why, although Minsky's financial instability hypothesis eventually came true at the beginning of the summer 2007, it has occurred with a different set of modalities and through a different concatenation of factors compared to the original Minskian formulation. The point is that in the early post-2003 upswing, as well as during the boom of the 1990s, the counter-tendencies to an increase in the leverage ratio for the non-financial business sector have been stronger than the tendency to an increase in that ratio. Among these counter-tendencies, emphasis has been placed on both the role played by autonomous consumption in sustaining firms' gross profits and the role played by the inflation in the prices of capital assets as a stabilizing factor for the business sector balance-sheets. As recent events have shown, these were just temporary factors that were (so to speak) destined, since the beginning, to lead the US in particular and much of the world economy generally into a 'Minsky meltdown' and hence into a deep crisis.

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SFC Tables and glossary of symbols

TAB. 1. Nominal balance-sheets of each economic sector in a pure credit economy

	1. Households	2. Non-financial Firms	3. Banks and NBFI	Totals (*column*)
1. Bank deposits	$+D_h$	$+D_f$	$-D$	0
2. Bank loans	$-L_h$	$-L_f$	$+L$	0
3. Capital goods		$+pK$		$+pK$
4. Equities	$+p_{Ef}E_{fh} + p_{Eb}E_b$	$-p_{Ef}E_f$	$+p_{Ef}E_{fb} - p_{Eb}E_b$	0
5. Net worth (Totals)	V_h	V_f	V_b	pK

Notes: A '+' before a magnitude denotes an asset, whereas '–' denotes a liability; the set of 'Banks and NBFI' includes financial firms; L_h is the total amount of bank loans borrowed by households in order to fund their 'autonomous' consumption.

TAB. 2. Nominal transactions among economic sectors

	1. Households		2. Non-financial Firms		3. Banks and NBFI		Totals (*row*)
	Current	Capital	Current	Capital	Current	Capital	
1. Consumption	$-C$		$+C$				0
2. Investment (capital goods)			$+p\Delta K$	$[-p\Delta K]$			0
3. Wages	$+W$		$-W$				0
4. Consumer credit	$+\Delta L_h$	$[-\Delta L_h]$					0
5. Interest on loans	$-i_{L(-1)}L_{h(-1)}$		$-i_{L(-1)}L_{f(-1)}$		$+i_{L(-1)}L_{(-1)}$		0
6. Interest on deposits	$+i_{D(-1)}D_{h(-1)}$		$+i_{D(-1)}D_{f(-1)}$		$-i_{D(-1)}D_{(-1)}$		0
7. Dividends (net profits)	$+F_{fh} + F_b$		$-F_f$		$+F_{fb} - F_b$		0
8. Current savings (Totals)	S_h	0	F_{uf}	0	F_{ub}	0	S_{tot}

Notes: A '+' before a magnitude denotes a receipt, whereas '–' denotes a payment; it is assumed that there is neither a government sector nor a foreign sector; both inventory stocks and capital depreciation are assumed to be negligible; the investment ($p\Delta K$) does not enter in the 'capital' column total (because it is included in TAB. 3) and the same goes for consumer credit.

TAB. 3. Flow of funds at current prices: uses and sources

Changes in:	1. Households		2. Non-financial Firms		3. Banks and NBFI		Totals (*row*)
	Current	Capital	Current	Capital	Current	Capital	
1. Bank deposits		$+\Delta D_h$		$+\Delta D_f$		$-\Delta D$	0
2. Bank loans		$-\Delta L_h$		$-\Delta L_f$		$+\Delta L$	0
3. Capital goods			$[-p\Delta K]$	$+p\Delta K$			0
4. Equities		$+p_{Ef}\Delta E_{fh} + p_{Eb}\Delta E_b$		$-p_{Ef}\Delta E_f$		$+p_{Ef}\Delta E_{fb} - p_{Eb}\Delta E_b$	0
5. Net capital trans. (Totals)	0	S_h	0	F_{uf}	0	F_{ub}	S_{tot}
6. Net worth (acc. memo)	$S_h + \Delta p_{Ef}E_{fh(-1)} + \Delta p_{Eb}E_{b(-1)}$		$F_{uf} - \Delta p_{Ef}E_{f(-1)} + \Delta pK_{(-1)}$		$F_{ub} - \Delta p_{Eb}E_{b(-1)} + \Delta p_{Ef}E_{fb(-1)}$		$S_{tot} + \Delta pK_{t-1}$

Notes: A '+' before a magnitude denotes a *use* of funds, whereas '–' denotes a *source* of funds; the total amount of bank deposits must be equal to total amount of bank loans: $\Delta D = \Delta L$; economy's *ex post* total saving equals total investment; the difference between current savings (row 8 in TAB. 2) and net capital transactions (row 5 in TAB. 3) is always zero.

Symbol legend of tables 1, 2 and 3

C	Households' total consumption (monetary value of consumer goods)
D	Total amount of bank deposits
D_f	Deposits held by non-financial firms
D_h	Deposits held by households
E_b	Equities issued by banks and NBFI (and purchased by households)
E_f	Equities issued by non-financial firms (total)
E_{fb}	Equities issued by firms and purchased by banks and NBFI
E_{fh}	Equities issued by firms and purchased by households
F_b	Banks and NBFI's dividends (distributed to households)
F_f	Non-financial firms' dividends (total)
F_{fb}	Non-financial firms' dividends distributed to banks and NBFI
F_{fh}	Non-financial firms' dividends distributed to households
F_{ub}	Retained earnings of banks and NFBI
F_{uf}	Retained earnings of non-financial firms ($\equiv \theta_f P_f \equiv \Theta_f P_{Gf}$)

i_D	Rate of return on bank deposits
i_L	Rate of interest on bank loans
K	Quantity of capital
L	Total amount of bank loans
L_f	Loans to non-financial firms
L_h	Loans to households (consumer credit)
p	Price of output (both consumer and capital goods)
p_{Eb}	Price of equities issued by banks and other NBFI
p_{Ef}	Price of equities issued by non-financial firms
V_b	Net worth of banks and NBFI
V_f	Net worth of non-financial firms
V_h	Net worth of households
W	Total monetary wage-bill