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Working Paper

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Working Paper, No. 453

Provided in Cooperation with:

Levy Economics Institute of Bard College

Suggested Citation: Temoigne, Eric (2006) : The Minskyan system, Part II: Dynamics of the Minskyan analysis and the financial fragility hypothesis, Working Paper, No. 453, Levy Economics Institute of Bard College, Annandale-on-Hudson, NY

This Version is available at:

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Working Paper No. 453

The Minskyan System, Part II: Dynamics of the Minskyan Analysis and the Financial Fragility Hypothesis

By

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June 2006

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ABSTRACT

This is the second part of a three-part analysis of the Minskyan framework. It studies in detail the dynamics at the root of the endogenous financial weakening of capitalist economic systems. This part combines the properties presented in part I with other important concepts, such as the paradox of leverage and conventional expectations, to explain the Financial Instability Hypothesis. It is demonstrated that the signs of fragility are not always visible and that financial weakening can take many different (even though well-defined) routes. This is used to draw some conclusion about the appropriate way to test for this hypothesis and the limit of data.

JEL classification: E5

Keywords: Post Keynesian economics, Minsky, financial fragility

By using all the points presented in Part I, Minsky formulated what he called the Financial-Instability View (Minsky 1975a, 16) or Financial Instability Hypothesis (Minsky 1977, 1978, 1986a). The earliest version of the Financial Instability Hypothesis emerged in the early 1960s (Minsky 1989, 174) in the form of three hypotheses (Minsky 1964a, 175). First, the behavior of real variables depends on the financial structure of the financial system. Second, the likelihood of a financial crisis depends on the financial structure of the economy, which reflects the past history of the economy. Third, the financial structure becomes more and more unstable as the boom proceeds.

The aim of these hypotheses is to show that the normal functioning of “a capitalist economy endogenously generates a financial structure which is susceptible to financial crises” (Minsky 1977 (1982), 25) because of the higher sensitivity of the economy to changes in income, cash commitments and asset prices. Thus, it is important to explain how the financial structure of the economy (or a sector) changes. This implies studying how it is affected by the prevailing convention regarding the appropriate balance-sheet and cash-flow structures, and by the developments in the productive economy: both the expectation and actual sides of the economy affect the financial structure of the economy.

The logic of this financial instability hypothesis is that during a prosperous economic period, there are forces that progressively lead the economy from conservative financial positions (hedge positions) to positions for which the articulation of cash flows is high and balance sheets are illiquid and highly leveraged (Minsky 1986a, 210-211):

The logic of this theorem is twofold. First, within a financial structure that is dominated by hedge finance, there will be a plentiful supply of short-term funds, so that short-term financing is “cheaper” than long-term financing. Accordingly, firms will be tempted to engage in speculative finance. Second, over a period of good times, the financial markets will become less averse to risk. This leads to the proliferation of financing forms that involve closer coordination of cash flows out with cash flows in—that is, narrower safety margins and greater use of speculative and Ponzi financing. (Minsky 1986b, 5)

The economy, therefore, becomes more sensitive to change in incomes, cash commitments and asset prices, and depends more on refinancing possibilities. In the latter case, an interruption in the channels that usually provide refinancing loans leads to a liquidation process which, if it spreads and is not controlled by “built-in stabilizers,” leads to large decreases in asset prices. This has a feedback effect on the real economic activity by affecting net wealth, entrepreneurs’

risk, as well as the lender's risk. This effect on the real economy affects the financial system and leads to further downturns. In the end, therefore, it is important to model all these feedback effects between, P_{Id}/P_I , I , and Π .

The essential conclusion is that market mechanisms cannot lead to a sustained, stable price, full-employment equilibrium. This leads to two theorems: the anti-laissez faire theorem, and the performance theorem (Ferri and Minsky 1992, 86-87). The first theorem implies that a “big” government (that is, a government large enough to sustain the aggregate cash inflows of different sectors and to put a floor on asset prices) is necessary to have an economy “where freedom to innovate and to finance is the rule” (Minsky 1993, 81). The second theorem means that not only does a free market economy not lead to full employment, but, in addition, it has a tendency to generate deep and long economic depressions.

1. THE DIFFERENT DYNAMICS

There are two essential dynamics going on in the Minskyan analysis. One concerns the change in the acceptable and desired financial leverages, i.e. the “expectation side,” and the other concerns what happens actually in the economy, the “real” or “actual side” of the economy.¹ Lavoie, Seccareccia, and others have complained that the Minskyan financial weakening process reflects a fallacy of composition in which ideas related to one representative firm are applied to the economy as a whole. There is, for example, no reason to assume that, at the aggregate level, the debt-equity ratio will increase because aggregate profit is endogenous and money refluxes. However, in addition to understanding the limit of the debt-equity ratio as an indicator of financial weakening, Minsky was aware of this endogeneity. In consequence, there is nothing automatic in the financial weakening of the economy depending on the source of economic growth and the degree of indebtedness (and so refinancing).

In each side, it is the articulation between cash flows (expected and actual) that leads the dynamics; therefore, it is the one that should be studied in detail. Below, following Minsky, this

¹ The adjective “actual” is better than “real” because expectations are also “real”; they affect the dynamics of the economic system.

is done in the context of the investment decision by entrepreneurs. The analysis could, however, be extended to all kinds of economic activities that need external funds.

1.1. Business Cycle and Convention: The Expectation Side of the Economy

In making their “fundamental speculative decisions,” individuals have to decide what the normal *leveraging of expectations* is. In terms of cash-flows, this means individuals have to decide what the appropriate relation between expected cash commitments and expected cash inflows from income and balance-sheet operations should be. For the firm sector we thus have:

$$E(cc) \equiv E(CC)/Q \text{ with } Q \equiv E(\Pi)$$

This ratio is the expected leveraging ratio (of profit), or expected flow-leveraging ratio.

This expected leveraging ratio can be detailed a little bit more. Indeed, one part of $E(CC)$ is certain and includes cash outflows induced by past financial commitments that depend on the characteristics of existing liabilities (type, maturity, etc.). The other part of $E(CC)$ is the expected additional cash commitments induced by the expected external funding of investment (Minsky 1975a, 110).² Therefore:

$$E(CC) \equiv CC + E(\Delta CC)$$

Thus:

$$E(cc) \equiv CC/Q + E(\Delta CC)/Q$$

Depending on the type of activity, the economic units involved in the determination of the preceding ratio change, but for the investment funding and capital-asset-holding decisions, it is the entrepreneur’s and banking conventions that matter (Ibid., 112). More formally, expectations are bounded by what is considered to be reasonable/normal by the most pessimistic economic sector:

$$E(cc) = \min(cc_d, cc_a)$$

² The expected change in the refinancing conditions (the “marginal lender’s risk”) should also be included but is left aside in the following.

where cc_d represents the desired leveraging of expectations (determined by the entrepreneurs' convention), and cc_a represents the acceptable leveraging of expectations (determined by the banking system). Thus, $E(cc)$ is a convention; it represents what economic units think is a normal way to fund economic activity, and so is a target that they try to reach, either by decreasing or by increasing their borrowing: the expected leveraging ratio is also the normal leveraging ratio ($cc_n \equiv E(cc)$). Thus, cc_n provides a view on the way to make a proper "fundamental speculative decision."³

All this leads to the determination of what economic actors consider to be the appropriate liability structure, and so a new level of expected borrowing when engaging in the main economic activity:

Acceptable liability structures are based upon some margin of safety. (Minsky 1977, 24)
The expected change in CC is determined by the expected external funding of I :

$$E(\Delta CC) = (i + a)E(\Delta L_I)$$

Therefore, knowing the definition of $E(cc)$, we have:

$$E(\Delta L_I) = \frac{E(\Delta CC)}{(i + a)} = \left(E(cc) - \frac{CC}{Q} \right) \cdot \frac{Q}{(i + a)}$$

So:

$$E(\Delta L_I) = \left(E(cc) - cc \cdot \frac{\Pi}{Q} \right) \cdot \frac{Q}{(i + a)}$$

Thus, the expected external funding of new economic activities depends on two important factors. The first represents the *borrowing power*. The latter is the difference between the expected leveraging ratio and the current leveraging ratio ($cc \equiv CC/\Pi$). The latter is adjusted by

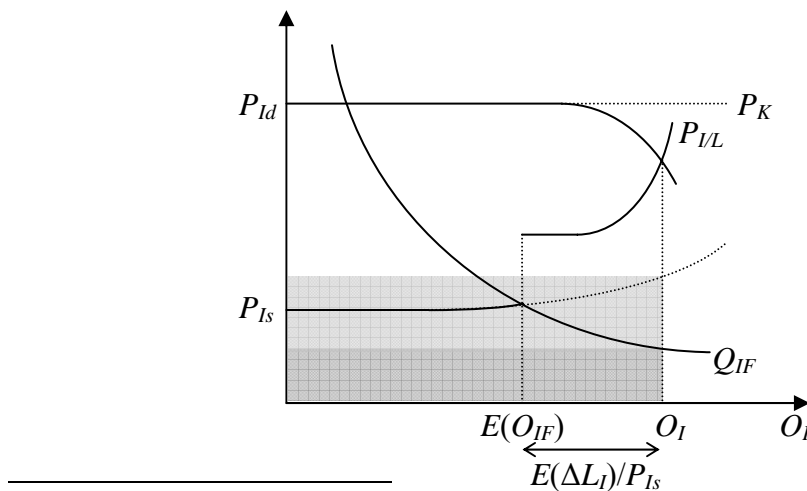
³ For the sake of simplicity, the model concentrates only on the flow side of the problem: it does not take into consideration the relevance of the normal net worth, or normal liquidity ratios.

the ratio between *current* expectations of profit and *current* profit:⁴ if $\Pi_t > Q_t$, it means that firms are bearish about the future economic situation so they want to invest by using less external funds. The second important element is the state of long-term expectations regarding quasi-rent discounted by the unit cost of external funds.

It is important to keep in mind that flow-leveraging ratios and cash-flow margins are inversely related. Thus, one can interchangeably talk about the flow-leveraging ratio or the cash-flow margin. For example, cc_n is both a convention about the appropriate leveraging ratio and a convention about the appropriate cash-flow margin. One, however, should be aware of their inverse implications for economic activity. Indeed, a lower cc is equivalent to a higher cash-flow margin, which means that a economic unit is more liquid, and, therefore, is good for investment. A lower cc_n represents a higher normal cash-flow margin: bankers and/or entrepreneurs have more conservative criteria of decision, which is bad for investment.

Now that this clarification has been made, the preceding can be represented graphically by Figure 1. The expected level of external funding will pay for part of the investment goods (light gray area) and entrepreneurs expect that a proportion determined by the dark gray area will be paid for with internal funds.

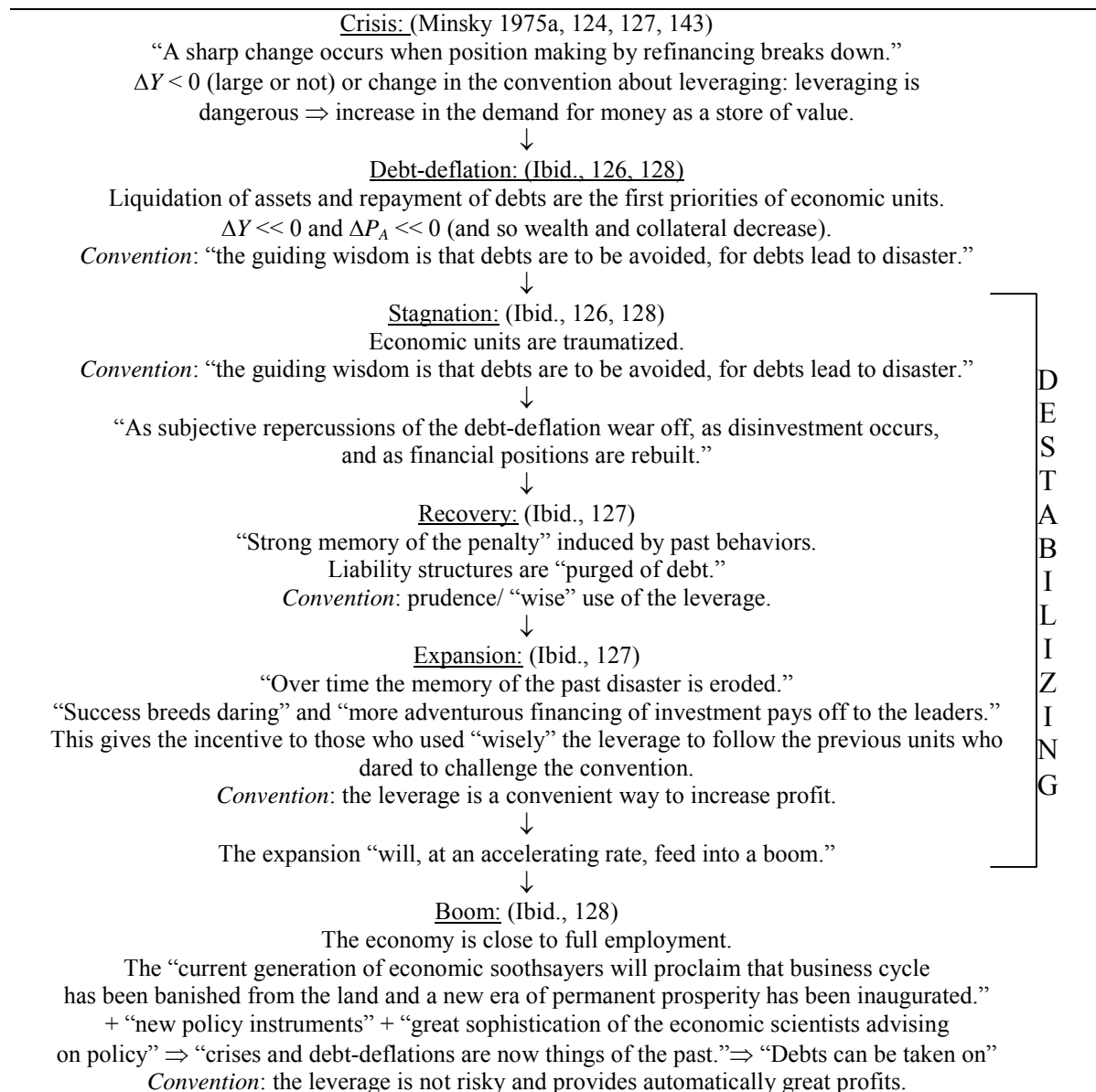
Figure 1. Determination of the Level of Expected External Funding



⁴ Note that the mechanism at work is not a comparison of past expectations with current results. It is a comparison between what is going on in the economy and what is expected in the future. The comparison of past expectations and actual results, the *ex ante/ex post* distinction, is not relevant for the analysis of current economic activity: current economic activity is determined by current expectations, “realized results are only relevant in so far as they influence ensuing expectations in the next production period.” (Keynes 1937, 179). The comparison between past expectation (Q_{t-1}) and actual result (Π_t) does matter because the comparison may affect the current state of expectations but current economic decisions are not based on this comparison.

The view of the business cycle by Minsky is presented in detail in *John Maynard Keynes* and is crucial to understanding how $E(cc)$ changes. Figure 2 shows the essential important points at each stage of the business cycle.

Figure 2. Business Cycle and Change in Leveraging Convention



The leading element is a convention about the appropriate use of leveraging. Over a period of prolonged expansion, this ratio *always* goes up, reflecting a loosening in the conventions concerning what can be considered as a “viable” economic project. This tendency is rooted in the psychological and social factors determining economic decisions.

Psychologists have shown that success, even if only in line with expectations, boosts confidence, and that an extended period of stability and growth by itself increases the confidence of economic units because of the tendency of the latter to discount or to forget about the past (Shiller 1999, 2000; Kahneman and Tversky 1973; Tversky and Kahneman 1974, 1983). During the boom, $E(cc)$ increases as most economic units, persuaded by “gurus” and other “experts” and pushed by competitive pressure to conform, believe that the economy reached a “new era.” This “new economy” convention leads one to believe that leveraging is safe and always provides great returns. Only “stupid” people would think the contrary. In a growing economy, therefore, the normal cash-flow margin of, first, the economic sector leading economic activity, and then other economic sectors, will go down ($E(cc)$ goes up). People will be more daring. On the contrary, when the crisis occurs, $E(cc)$ goes down sharply as the “new era” convention is proved wrong, and then stays low: nobody is ready to leverage highly, or at all, expectations of gross profit.

Changes in $E(cc)$ change the borrowing power of an economy (or a sector). If it decreases, this may have detrimental effects on the economy through several channels. First, the number of projects that can be implemented diminishes as it is *expected*⁵ that some of them can only be implemented by requiring a high amount of external funds, which affects I and so Π via Kalecki’s equation of profit. Second, the refinancing possibilities also shrink. In the latter case, when the economy has high refinancing needs, there is a credit crunch that is the direct cause of the crisis as forced liquidations are necessary to face cash commitments. In terms of the model presented above, if $E(\Delta L_I)/I$ is not significant, then changes in $E(cc)$ will not have a big impact on I , Π and so the liquidity of the firm sector. In the end, a decrease in the state of long-term expectations may have some dramatic consequences on production and employment if the financial positions of economic agents are fragile (Minsky 1975a, 1986a; Davidson 1993, 1994): expectation and actual side are intertwined

⁵ As shown below, this expectation may be misleading because of the “paradox of leverage” but all that matters for decisions is what bankers and others *think* will happen, nothing else matters. As stated earlier, the principle of increasing risk works on the same basis: the increasing risk perceived from increasing external borrowing may not be real but it is the expected result, *given a convention about appropriate leveraging*, that matters.

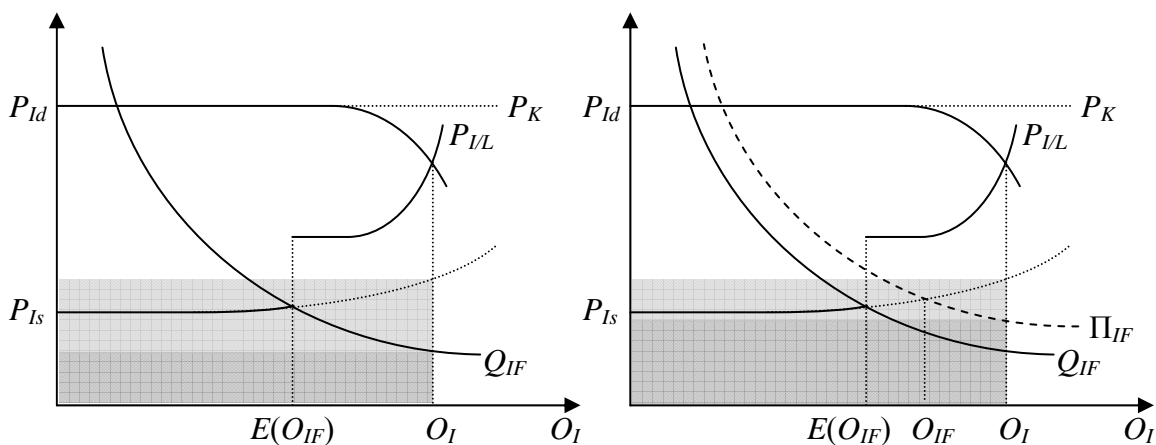
1.2. The Actual Side of the Economy

The expectation side is important and may be the only necessary side to generate fragility, but it is also important to show that there is a higher articulation of actual cash flows so that refinancing needs increase. At this level, macroeconomic forces may make microeconomic desire self-defeating; the paradox of thrift is a famous example of this type of situation. For example, taking the firm sector as reference, high investment will lead to higher profit and so the actual flow leverage ratio cc may go down or may stay stable during an expansion led by the private sector. Minsky was aware of this (Minsky 1975a, 107, 113; Minsky 1980b, 518) but he showed that this is a central mechanism that leads to a financial weakening of the economy. There are, moreover, additional forces that lead to a financial weakening of the economy. All those forces are presented below, starting with what can be called the paradox of leverage.

1.2.1. The Paradox of Leverage

At the aggregate level, profit, and so internal funds, is endogenously determined and depends on investment spending. Therefore, in addition to the Q_{IF} -curve, one needs to draw a Π_{IF} -curve in Minsky's investment diagram. Figure 3 shows the difference between expected/desired result (left Figure) and actual result (right Figure) in terms of the funding structure of investment.

Figure 3. Desired and Actual Funding Structure of Investment



One can see that, given the demand and supply price of investment goods, the amount of internal funding (dark gray area) is largely superior than expected:

$$\Pi_{IFt} > Q_{IFt-1}$$

Therefore, expectations are positively “frustrated” (Minsky 1975a, 114) and, over a period of time, this leads to a decrease in the lender’s and entrepreneurs’ risk which “reinforces the willingness of entrepreneurs and bankers to debt-finance further increase in investment” (Ibid.) given Q . Therefore, the following process is at work at the macroeconomic level:

1. Entrepreneurs expect flows of quasi-rent Q that are sufficient “after taxes, and after [their] required payments on [their] debts and [their] dividends to stockholders” (Ibid. 107) to fund $E(O_{IF})$: $Q_{IF} = Q - t_{\Pi}Q - CC$. This expected flow Q is largely independent of current investment (and so current gross profit).
2. To determine the level of investment demand, entrepreneurs have to determine a “financing plan.” They have a desired ratio of leveraging cc_d that reflects “the willingness to debt-finance” their activities. If $cc_d > 0$, entrepreneurs go to banks or financial markets. cc_d depends on past experience, uncertainty, and risk preference.
3. This cc_d is compared to cc and the acceptable leverage ratio cc_a defined by the financial community. cc_a is determined by conventions that are based on experiences (Ibid., 111). If $cc < cc_d < cc_a$, the desired external funding plan is “carried through” (Ibid. 114). If $cc < cc_a < cc_d$ there is some rationing.
4. Entrepreneurs anticipate the cash-flow Q by investing today through an application of the funding plan that allows buying $O_I > E(O_{IF})$
5. This generates a profit Π that depends on the level of investment from which it is possible to derive the Π_{IF} -curve.
6. If $\Pi_{IFt}(I) > Q_{IFt-1}$ the funding plan that entrepreneurs wanted to apply is “frustrated.” More investment goods can be funded internally and ΔCC , and so CC is lower than expected: cc goes down.
7. This good surprise increases the willingness to externally fund: $\Delta cc_d > 0$ and $\Delta cc_a > 0$, and, therefore, $\Delta E(cc) > 0$.
8. The unused leverage, $E(cc) - cc$, can be used for future investment.

9. As $E(cc)$ ratio grows Π grows less rapidly than I and CC (Ibid. 114). Thus, overtime, cc increases even if this may not always be the case during the business cycle, especially at the beginning of the expansion.

Therefore, there is what can be called a paradox of leverage because Q is determined at the micro-level, whereas Π is determined at the macro-level. This paradox does not mean that all firms will see their financial situation deteriorate but that, on average, the situation of firms will become worse. This paradox is essential to understanding why the boom can emerge, because, if economic actors could understand the macroeconomic consequences of their acts (if they had rational expectations in the New Neoclassical sense of the term), then they would not be “frustrated,” and they would not have an incentive to become more daring.⁶ In this case, there would not be any financial weakening on the actual side induced by the expectation side.

There is, however, a point that is left unexplained in the paradox of leverage. It has been shown why $E(cc)$ would go up during a prolonged expansion, but Point 9 did not clearly show how cc would grow over time; that is, why the growth rate of profit is lower than the growth rate of cash commitments over the business cycle. In order to explain this, it is necessary to look at the other forces leading to a weakening of the economy.

1.2.2. Profit (or Income) Growth versus Cash-Commitment Growth

The other forces that operate at the actual level in the expansionary period can be separated in two categories: those related to the decrease in the rate of growth of aggregate gross profit and those related to the increase in the rate of growth of cash commitments.

Aggregate Profit Growth. The decrease or deceleration in the gross profit tax as the economy grows can be explained by looking at each element of the aggregate profit equation:

$$\hat{\Pi} = \hat{I} + (\hat{G} - \hat{T}) + (\hat{X} - \hat{J}) + \hat{C}_{\Pi} - \hat{S}_w$$

⁶ It is important to note that this is not related to an asymmetry of information argument. Economic agents do not know the macroeconomic consequences of their behavior because the world is uncertain. And, even if they could take those consequences into account, it may be doubtful that they would if competition pushes them to act in their own interest (expecting to be the one that does not take the hit of high leveraging).

During an expansion period, there are several things that may happen to each of these variables. First, investment may grow at a slower path, or go down, either because the cost of external funds goes up through higher interest rates and lower maturities,⁷ and/or because optimism cannot maintain its impact on the growth of expectations and the decrease in the perceived risk. Second, as income goes up, the saving of workers goes up (or accelerates) and consumption out of distributed profit goes down or decelerates, which pushes a downward pressure on aggregate profit. This second force may not apply if consumption out of wealth exists and is large. For Minsky, however, consumption is usually hedge financed; therefore, the wealth channel is usually not used for consumption (Minsky 1980a (1982), 30).⁸ The third factor that can put a downward pressure on profit is the trade balance. This influence will depend on what leads the growth in the country. If the country has a strategy of export-led growth, then there is no adverse effect on the economy. On the contrary, if the growth is led by consumption and investment, the trade balance may become negative as imports grow to support economic growth. Finally, one of the central forces that put a downward pressure on aggregate profit is the tendency for government deficit to go down in order to avoid inflation.

Cash Commitments Growth. The level of cash commitment is composed of the unit cost of external funds and the level of outstanding liabilities:

$$CC = (a + i)(L_O + L_{NO})$$

And so:

$$\hat{CC} = \frac{1}{(a+i)} \cdot \frac{d(a+i)}{dt} + \frac{1}{(L_O + L_{NO})} \cdot \frac{d(L_O + L_{NO})}{dt}$$

One can see that four direct factors affect the growth of cash commitments: two price-related factors and two volume-related factors. Starting with the latter, it is composed of both liabilities generated to finance and fund the productive effort of the economy (L_O), and other unproductive activities (L_{NO}). As the economy grows, refinancing loans and other purely financial

⁷ Because of the optimistic state of mind of bankers and other forces, the unit cost of external funds may actually decrease during the expansion.

⁸ The development of credit cards, as well as the stock boom in the 1990s, has led to negative saving by the private sector.

maneuvering activities may also grow.⁹ The latter adds a debt burden without generating any actual or potential increase in Π (Minsky 1975a; Lavoie 1986). Leaving aside the refinancing component of L_{NO} , Minsky argued that during a long expansionary period and a boom period, there is a “reciprocating stimulus [...] between speculation on the exchanges and speculation by firms” (Minsky 1975a, 90). The success on the productive side of the economy leads to optimism in the financial markets and higher leveraging of positions by borrowing from brokers, or by tapping down reserves and liquid assets (Ibid., 121-123). Concentrating on the refinancing side of L_{NO} , refinancing activities increase over time because “there are both rational and market processes which lead firms, households, and financial institutions into speculative finance” (Minsky 1975b, 317ff.; Minsky 1986a, 213; Minsky 1993, 80-81). A first force is the interest rate differential (Minsky 1986a, 201, 211). Indeed, a shortening of maturity leads, for the same amount borrowed, to a lower interest payment ($\Delta iL < 0$) and a higher principal payment ($\Delta aL > 0$). As long as the maturity is not low enough to offset completely the interest payment gain from borrowing short-term, it is cheaper to do so. However, shorter maturity implies that it is necessary to recontract more often and so conditions may change that increase aL more than iL decreases. A second force, presented in Part I, is the nature of banks: banks are speculative and promote speculative financial structures because of the nature of their balance sheet. Finally, the innovation process leads also, in some cases, to a shortening of the debt contracts, this is especially the case in periods during which there is a “scarcity” of “clearing money” as reflected by its high cost (Minsky 1985, 16). In the end, therefore, the growth of purely financial operations has both a volume and price effect on CC by increasing L_{NO} and a .

Turning to the price-related factors, as the economy and optimism grow, the amortization rate also grows for all types of economic activities. Indeed, it is assumed by bankers and entrepreneurs living in a state of optimism that good results will be fast to come, and so that shorter maturity can be taken. In addition, if the liquidity preference of bankers increases, a also increases. Finally, over a period of prolonged expansion, interest rates tend to rise whatever the maturity. This rise in the interest rate is not explained by the loanable funds theory or the exogeneity of the money supply but other factors. First, we know that lending and borrowing

⁹ The Circuit approach has usually a narrow view of what needs to be financed and funded. Graziani (2003) recognizes the problem by showing the necessity to include financial-asset acquisitions in the analysis but still leave aside the problem of refinancing. This is all the more problematic that the closure of the simple circuit needs this refinancing.

activities are based on margins of safety, the latter being determined by conventions prevailing in the economy. If these margins are satisfied and actual margins continue to go up, then, unless the conventions change, there will be an increase in interest rates on debt contracts. This is related to the principle of increasing risk. One reason for interest rates going up would then be because the convention of bankers has a tendency to loosen up less rapidly than others. As shown earlier, bankers are the skeptics of the game, making it easier for cc_a to become inferior to cc . All this is consistent with the liquidity preference theory of interest rate.

A second important factor that promotes a rise in interest rates is the inelasticity of loan demand to interest rates. Indeed, the refinancing process creates a need for funds whatever the rate of interest. In a Ponzi finance, this need grows over time and it grows at an accelerating rate as interest rates increase and maturity decreases. In this kind of situation, unless the Ponzi process sustains an activity that will ultimately increase the cash generating power of a unit, the accelerating degradation of balance sheets will make banks more and more reluctant to lend, given the banking convention.

Third, monetary policy plays an important role in the rise of interest rates. As Minsky notes:

For interest rates not to rise during an investment boom, the supply of finance must be infinitely elastic, which implies either that a flood of financial innovation is taking place or that the central bank is supplying reserves in unlimited amounts. (Minsky 1982a, 33)

More precisely, it is necessary that the central bank accepts not to increase its interest rate target. Because of the inflationary pressure induced by the inflation barrier, the central bank, however, may be willing to tighten its policy, which “almost always means a rise in interest rates” (Minsky 1975b, 333). Given the state of financial innovations and the liquidity preference of banks, this rise in interest rate is transmitted to other interest rates, and this transmission occurs in a shorter time if interest rates are variable.

In the end, the cash commitments grow at a higher rate than aggregate profit because of the spreading use of external funds to finance and to fund all kinds of activities, because of the shortening of maturities, because of the rise of interest rates, and/or because of financial innovations. The latter may have a positive and a negative effect on the dynamics of the economy, by decreasing the income component of cash commitment but increasing the capital component.

1.2.3. Other Factors that Lead to $NCF_O < 0$

In addition to the paradox of leverage and the forces that tend to generate $\hat{\Pi} < \hat{CC}$, there are additional factors that may lead to a situation where $\Pi < CC$, that is, that generate a dependence on refinancing needs. Two extensive studies (Minsky 1964a, 252-262; Minsky 1975a, 73, 87, 115) give several reasons: 1) Deliberate choice ($Q < E(CC)$ or speculation on refinancing cost); 2) Errors of expectations; 3) Losses of income; 4) Rising labor cost; 5) Higher cost of refinancing; 6) Exercise of demand options; 7) Exercise of contingent liabilities (FSLIC bankruptcy, natural catastrophes); 8) Decline in asset prices or malfunctioning of a market.

The first reason why an economic unit may need to refinance its position is because it chose a financial structure that incorporates the need to refinance. The reasons why economic units may want to do so have been explained before. This does not result from irrational behaviors:

The upper turning point is completely endogenous once it is accepted that interest rates rise in a investment boom *and* that the successful functioning of the economy induces profit seeking bankers and their customers to engage in speculative financial arrangements and to economize on holding of money and protected financial assets. (Minsky 1982a, 33. Italics added)

A second reason for the existence of refinancing needs is because the expectations of NCF_O are not realized, or, more precisely, are off the margin of error included in the decision process. More precisely, Q can be redefined as $E(\Pi) - \theta\sigma_{\Pi}$ which needs to be compared to $E(CC)$. One important point to note here is that the margin of errors $\theta\sigma_{\Pi}$ has a tendency to shrink during the expansionary process as θ goes down.¹⁰ This leads to a greater possibility of non-realization of expectations, and so a higher chance of downward correction of expectations, decrease in investment, and lower profit (which accentuates the problem). The third reason is due to unexpected delays or interruptions in the inflows of cash because of reasons not under the control of a unit, like defaults of its debtors or unemployment for workers. In an economy in which the layering of financial decisions is high, this channel reflects the possibility of a systemic risk. The fourth and fifth reasons are related to an increase in factor costs. As the economy tends toward full employment, and especially if unions are strong and financing is

¹⁰ See also section 2 of Part I for further discussion of this point.

available (Minsky 1986a, 259; Minsky 1975a, 163-164), workers will be more easily satisfied in their demands on their labor contracts (w includes payroll and other direct and indirect payments to workers). Also, as shown earlier, the cost of refinancing in terms of interest rate and/or amortization speed tends to increase. If firms can pass along these higher costs on their prices, the financial condition will not be worse but will depend on the maintenance of an inflationary process. Reasons six and seven are linked to the nature of the debt contracts. Demand debts may lead to a sudden large increase in the cash commitments by their issuers. The typical example is the run on banks that occurred before lender of last resort interventions. The exercise of contingent liabilities may be so high so as to put a unit (or even a large portion of financial-markets participants) into financial distress. The typical recent example of the latter case is the long-term capital management (LTCM) crisis.

A final reason that can lead to a refinancing need is related to both the cash-flow and stock impacts that asset prices have. The first impact is a cash-flow impact because, as shown in Part I, liquidation is not a solution at the aggregate level because it creates a locking-in effect. In addition, some economic units generate most of their cash inflows by realizing capital gains and may face a depressed financial market and so $NCF_S < 0$. The second impact of decreasing asset prices is a decrease in the net wealth of *all* the units holding these assets, whatever their actual creditworthiness. Net wealth is an essential determinant of the borrower's and lender's risk so this may affect the conditions at which agents can issue debt contracts and so may impact the scale of their cash commitments, leading them into continuous refinancing needs.

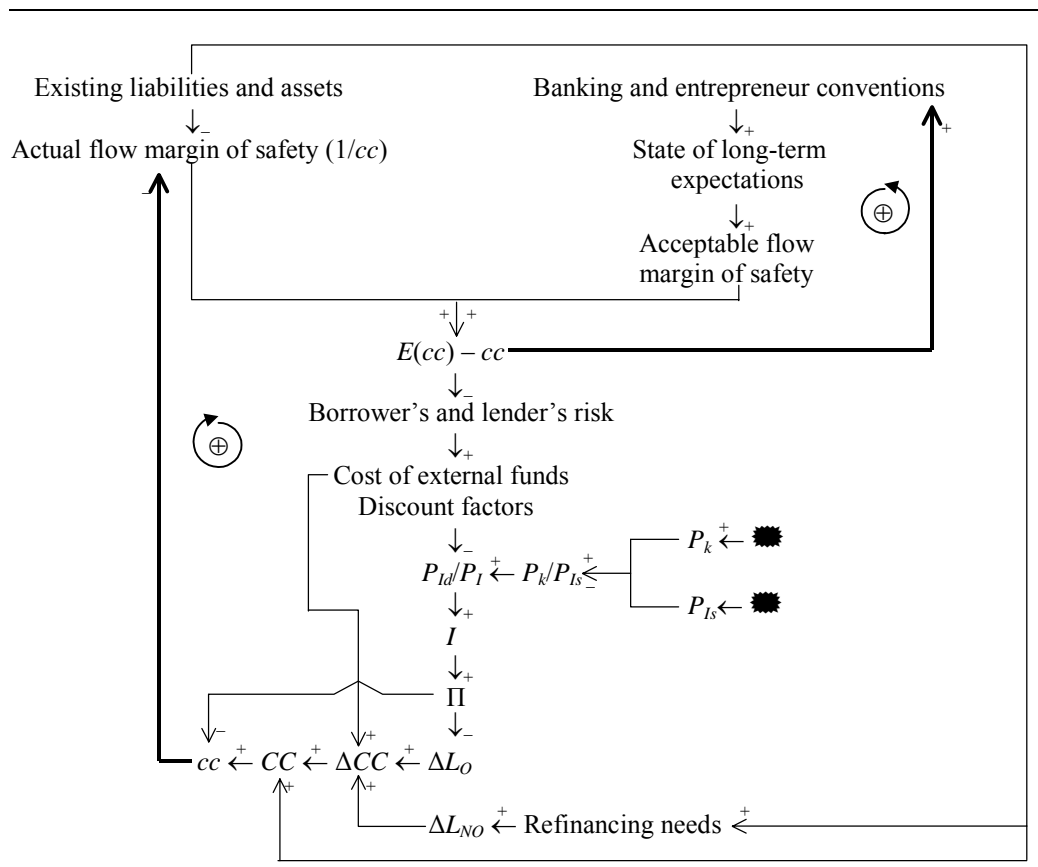
In total, there are many other reasons why a negative net cash inflow from income and usual portfolio operations may be generated, *and* these reasons have a tendency to become more and more prominent as the economy goes toward full employment in a free-market system, or a market system that is badly managed.

1.3. The Feedback Loops Involved in the Financial Weakening

There are several positive feedback loops that are important to take into account in order to understand the financial weakening of the economy. Those feedback loops concern the relationship between productive and financial variables and may be classified in four categories: cash-flow feedback loops, flow feedback loops, stock feedback loops, and expectational feedback loops. Figure 4 represents the two feedback loops related to the funding of the

investment process: a positive cash-flow feedback loop and a positive expectational feedback loop. There are some elements that are unexplained, namely the price of capital assets and the offer price of investment goods. Financial assets would add considerations about net wealth into the actual and acceptable margins of safety and would generate a positive stock feedback loop.

Figure 4. Some feedback Loops Involved in the Funding of the Investment Process and Including the Cash-Flow Margin



1.4. Factors Limiting the Financial Weakening of the Economy

There are several limits to the progress of financial weakening, which means that there is nothing automatic in Minsky's theory (Minsky 1986a, 211-213). Sometimes the weakening may stop or may never happen. First, because of the nature of a monetary production economy, there are some financial limits to what can happen. These financial limits play at two different levels. A

first factor that limits the financial weakening of the economy is the entrepreneur's risk. Entrepreneurs will not show bankers projects that they think will not work: there is a first cut by entrepreneurs (Wolfson 1996). Therefore, as long as entrepreneurs are "conservative" they will not engage in speculative financing and funding. This is not, however, the main element preventing the weakening. One essential brake is the lender's risk. Indeed, loan officers (or analysts and underwriters in financial markets) play a large role in determining the relevance of the positions taken, and are aware of "Bill Janeway's first law, 'Entrepreneurs lie'" (Minsky 1990, 59). A second factor is important at both stages of the financial process and is related to the innovative process. Indeed, there is a "financial innovation barrier" (Minsky 1986a, 212, n. 15) that puts limits on what can be financed and funded profitably. A third factor that limits the weakening is related to the paradox of leverage that frustrates expectations by limiting the needs of funding. Of course, as stated earlier, if the government (or, more generally, the top IOU issuer) is highly involved in the growth process, the weakening may then never occur. In the end, therefore:

The existence of profit opportunities does not necessarily mean that fragile financing patterns will emerge immediately. (Minsky 1986a, 211)

There may even be situations for which the financial weakening pattern will not emerge if the government has the right policy strategy: employer of last resort policy, income policy, functional finance view, and *continuous* innovative regulations and management of the financial markets and financial matters. There are, however, always tensions in the private sector that push toward financial weakening. In addition, as stated earlier, policies may also be a source of financial weakening and inflation. There are not final solutions.

1.5. Conclusion

There are, therefore, behavioral (both psychological and social), economic, political, and logical arguments for the financial weakening of the economy. At the behavioral level, the idea is that a hedge financial structure promotes, in a competitive environment, daring and optimism and so destabilizes. At the policy level, the lender of last resort policy, especially "premature" lender of last resort intervention, and the maintenance of a floor for profit may promote moral hazard and

economic expansion before bad debts are purged completely. At the logical level, there are forces in the private sector that limit the non-inflationary growth of aggregate income:

Thus we have that the rise in *CC* reflects the rise in the willingness of business to increase cash flow commitments and of the uncovering of bankers and banking organizations that will go along with the desires of business. On the other hand, the quasi-rents grow at the rate at which full employment income is growing. The rate of growth of cash flows due to financial commitment is greater than the rate of growth of quasi rents. (Minsky 1974, 270)

2. THE CRISIS AND DEBT-DEFLATION PHASES

The preceding presented in detail the forces at the origins of the financial weakening of the economy and how this financial weakening was not necessarily automatic. The immediate implication for the origins of the crisis is the following:

During a long wave expansion each of these elements of the financial environment changes in such a manner as to increase the probability of a panic taking place; balance-sheet payments increase relative to income receipts, asset prices are bid up, and income and other financial assets grow faster than ultimate liquidity. Hence a financial panic is not something that just happens; it is an outcome of the very cyclical phase it brings to an end. (Minsky 1964b, 334)

Thus, a financial crisis is the product of random events on the economy that are uncontrollable, but the conditions that lead to a financial crisis are systematic to the way the capitalist system works (Minsky 1991). In this case, a not abnormal change in cash inflow or cash outflow creates an urgent need for refinancing, and if net worth and liquidity of a large proportion of economic units is low, position making may not be possible by the normal expected channels. Therefore:

A financial crisis occurs when a not unusual decline in income or run of defaults on financial contracts occurs in a 'favorable' environment. (Minsky 1964b, 334)

This "refinancing crisis" (Minsky 1983, 112) leads, to unusual ways to make position (Minsky 1972, 103), and, depending on the extent of the financial distress, the degree of layering, the existence of effective built-in stabilizers, the indirect effect on the wealth of hedge units, and the effect on expectations, may generate a debt-deflation (Minsky 1964a, 1975a, 1986a). If a large

proportion of economic units are in speculative (or Ponzi) financial positions, the refinancing needs are large and, therefore, large liquidations will take place in asset markets. If these units are largely intertwined in their financial relations, large defaults and liquidation will have a large direct effect on each other, multiplying the effects of the initial massive liquidation by increasing the needs for funds. If the liquidation leads to a large decline in asset prices and a downward revision of expectations, prices go down *and* stay low as the normal price is revised downward. This leads to a durable decrease in the net worth of all the holders of assets being liquidated and so to a decrease in their borrowing power. The latter case may, then, lead to more liquidation. If no built-in stabilizers exist, the crisis creates a large instability and will stop only when the financial structure is simplified, which may take many years (Minsky 1986a, 177). Finally, depending on the effect on expectations, economic activity will be more or less affected. The degree of revision depends on the risk aversion of economic units and on the effectiveness of built-in stabilizers: an economy in which the entrepreneurs are risk-averse will take more time to recover (Minsky 1972, 109). If risk aversion is high, the downturn will be low and the recovery rapid and if the built-in stabilizers work there will not be a large crisis. However, built-in stabilizers, by preventing a revision of expectation toward a more conservative view, may also promote long-term instability.

In the end, therefore, trying to predict the downturn of a business cycle is useless and pretty much impossible. It is useless because if policy makers want to implement *effective*¹¹ policies to prevent the downturn and its consequences, they have to act during the early phase of expansion, when everybody is still preoccupied with shaping up the economy. By the time people and analysts start to worry about the downturn it is too late. Second, it is impossible because, when an economy is financially fragile, there are many different channels that can generate a crisis. Thus, what matters is not the cause of the crisis but the whole process that led to the *possibility* of a crisis.

¹¹ Effective in the sense that policies prevent both short-term *and* long-term instability.

3. EMPIRICAL VERIFICATION

There have been several empirical studies, in addition to those done by Minsky (for example, Minsky 1962, 1964a, 1975d, 1984, 1986a), that have tried to capture the financial weakening of the economy. Minsky insisted that his view is empirically founded:

At any one time, 'the market' seems to operate with a consensus about the extent to which operations can be debt-financed for a particular rating, but this consensus can be both stretched and changed: both the acceptable and the actual debt-equity ratios vary in a systematic way over the longer business-cycle swings. (Minsky 1975a, 111)

However, other empirical evidence does not always give clear results. For example, Isenberg (1988, 1994), who concentrated on the firm sector, studied the Great Depression period and showed that there was no aggregate financial weakening, but that it was concentrated in the dynamic part of the firm sector, especially in large firms. Lavoie and Seccareccia (2001) found no conclusive manifestations of the financial weakening process for the G-7 between 1971-1995, and no or opposite effect for real GDP, real interest rate, and deficit on the debt-equity ratio. There are, however, several important points to recognize when doing an empirical analysis.

First, as stated earlier, restricting Minsky's theory to a theory of investment funding is a narrow approach to Minsky's theory: the center of the problem is not in the productive sector but the financial sector. Thus, for example, the household sector can be a source of instability if consumption starts to be externally financed and funded, or if households are involved in Ponzi financing for their holding of stocks:

An upturn in debt-financed consumer durable sales can lead an expansion. (Minsky 1964a, 268)
Banks, of course, always leverage their positions and so are a great potential source of instability. In his study of the Great Depression, Minsky, did not concentrate on the firm sector but on the household, banking, and government sectors. He then studied four different causes for the financial weakening of the period:

(1) the uses to which credit was put in the stock market, (2) the nature of household debt and in particular the household mortgage, (3) the expansion of utility-holding companies and (4) the reduction of the government debt. (Minsky 1984, 247)

The willingness of the government to maintain “sound” fiscal principles and the structure of balance sheets of households were essential during this period.

This leads to the second important point that the federal government, which usually does not leverage its position, can be a source of instability if it is obsessed with “sound” fiscal principles. Wray showed that the tendency of the government to always look for surplus has become a main cause of instability: each period of major surplus in the U.S. was followed by an economic crisis (Wray 1999).

Third, the theory must be tested in nominal terms, not in real terms. Real interest rate, real wage, and other “real” variables are poor measures of financial weakening because there are cash outflows and cash inflows that are unrelated to the inflationary process. As shown in Part I, the articulation between cash inflows and outflow is essential: it determines the liquidity of a unit.

Fourth, the evolution of interest rates provides only a very partial view of the change in the cost of external funds. Among other important variables is especially the amortization rate because one important tendency in the Minskyan approach is that debt maturity decreases. In addition, even if the cost of external funds does not change at all during the business cycle, this does not put into question Minsky’s analysis because what matters is the growth of CC relative to the sum of the net cash-inflow from income operation and cash inflows from balance-sheet operations (if required the sum may have to include net cash inflows from portfolio transactions). At the aggregate level, as long as cash commitments increase for reasons not related to national income creation, the preceding tendencies can occur without any change in the cost of external funds.

Fifth, the fragility of the economy does not need to be visible because it may only concern the expectation side of the economy in the sense that margins of safety become smaller:

Hedge, speculative, and Ponzi financing positions at current interest rates may all have the same flows of cash commitments, but they will have different margins of safety to protect them from probable changes in future interest rates and increasing future payment commitments. (Kregel 1997, 547)

In addition, the financial weakening may come from one central individual in the financial market, like for example LTCM and others recently. In both cases, an empirical analysis is not

helpful, and what is needed is better supervision by the central bank, which Minsky and others also advocated (Minsky 1972, 1975c, 1986a; Campbell and Minsky 1987; Shull 1993; Philips 1997; Guttentag and Herring 1988).

Sixth, the debt-equity ratio may be misleading and has to be accompanied by a more detailed analysis of balance-sheet structure. First, as stated earlier, a speculative financial position does not increase debt, and both speculative and Ponzi positions can go through a liquidation of positions in cash and liquid assets. Second, a lower mismatch of inflows and outflows reduces the level of financial weakening.¹² Thus, in both preceding cases, the debt-equity ratio cannot capture, by itself, the financial weakening process of the economy. Better ratios to calculate are those related to the cash box condition, *i.e.* cash-flow ratios and liquidity ratios, because they provide a more accurate view of the articulation of flows and of the capacity to meet problems without depending on financial market conditions. Net worth (assets – debts) may also provide some information about the situation of a unit, Ponzi financial structure leading to an automatic decrease in net worth (while speculative finance may lead to a decrease in net worth if liquidation is preferred to refinancing). Finally, all financial obligations should be included, for both balance-sheet and off-balance-sheet financial contracts.

Seventh, related to the previous point, cash commitments have to include all kinds of outflows related to financial contracts so that one can get a financial obligation ratio for each sector. At the practical level, however, data have large drawbacks because some cash outflows, especially from the capital account and off-balance sheet obligations like principal payment or margin payments, are usually not available. In addition, the data available do not provide a good evaluation of the market value of assets (Minsky 1962, 257-258).

Eighth, a good analysis of the financial fragility of a system does not go only by measuring ratios but also by doing a sensitivity analysis. Minsky actually suggested this kind of analysis (Minsky 1972, 1975c), what he called “surprise analysis,” by looking at the conditional value of assets and cash flows under different sets of assumptions:

¹² Isenberg (1988, 1066) concludes in the same way for her study of the Great Depression: “These [debt] ratios, while exhibiting the proper quantitative relationship for the Minskyan hypothesis over the cycle, did not reflect a move into speculative or Ponzi finance. As has been stated, the maturities of debts and assets were matched.”

A conditional cash flow examination of individual and of classes of financial institutions would determine the impact upon the institution or class of institution of various policy-determined conditions. (Minsky 1972, 129)

This procedure of analysis needs more work but is also more rewarding in terms of results because it allows checking the minimum variation in income, interest rates, asset prices, and expectations that will lead to liquidity or solvency problems (Vercelli 2001, 43).

Ninth, as stated several times earlier, if the growth of the economy is led by the government, the financial weakening may not happen from the business cycle. Other forces may be involved that will lead to this financial weakening like speculation in the financial markets. And, if those others forces are not operative, no financial weakening occurs at the aggregate level.

4. CONCLUSION

The dynamics of the Minskyan analysis are complex and varied and involve several feedback loops. Two central dynamics during the expansionary phase are that $E(cc)$ always increases while cc does not necessarily go up until late in the expansion. An increase in cc is, however, *not* necessary in order to generate a higher sensitivity of the economy to shock. If there is no increase in cc , the crisis can only be explained by an endogenously generated reversion of states of mind or exogenous abrupt change in the conventions that decrease $E(cc)$ and so the borrowing power of economic units. All this leads to the conclusion that in Minsky's framework, there is what Vercelli called a "structural instability," which is rational and guided by profit-seeking behaviors under a competitive economic environment (Vercelli 2001, 34, 45):

The evolution of the debt structure and of financial institutions, as well as the changes in the standards of acceptable liability structures to finance positions in assets, are important empirical correlatives of the migration of non-linear iterative systems from producing coherent to producing incoherent results. (Minsky 1982b, 383)

Thus, the modeling must take into account the weakening of the actual and expectation levels. One way to do this is by using non-linear equations or systems of equations that have intrinsic

cyclical properties. However, an alternative method, which seems more satisfying, is to create models with shifting behavioral parameters. In the latter case, the existence of a cycle is not imposed but explained by the structure of the model and the behaviors of economic agents.

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Notations

P_{Id} : demand price of new capital assets (i.e. demand price investment goods)

P_I : supply price of new capital assets (i.e. supply price investment goods: unit cost of acquisition)

P_K : price of old capital assets

P_{Is} : offer price of new capital assets (i.e. price of investment goods paid to their producers)

O_I : quantity of investment goods demanded (and produced)

$I \equiv P_{Is}O_I$: Nominal investment

Π : aggregate profit

CC : amount of cash(-flow) commitments

Q : expected aggregate gross profit

Q_{IF} : expected internal funds

cc : flow-leveraging ratio (CC/Π)

cc_n : normal flow-leveraging ratio

cc_a : acceptable flow-leveraging ratio (set by banks)

cc_d : desired flow-leveraging ratio (set by firms)

i : interest rate

a : amortization rate

$E(\Delta L_I)$: expected external funding of investment

$E(O_{IF})$: expected quantity of investment goods that can be funded internally

t_{Π} : tax rate on aggregate profit

X : exports

J : imports

C_{Π} : consumption out of distributed profit

S_w : consumption out of wage

G : government spending

T : tax receipts

L_O : outstanding debts created to support output production and output acquisition

L_{NO} : outstanding debts created to support non-output related activities.

θ : margins of safety above the statistical margin of error

σ_{Π} : margin of error

w : wage rate

NCF_S : net cash flow from speculative activities (see Part I)

NCF_O : net cash flow from income and balance sheet transactions