UNIVERSITY OF CRETE

DEPARTMENT OF ECONOMICS

MASTER'S DEGREE PROGRAMME

"Economic Theory and Policy"

MSc. Thesis

"THE FINANCIAL INSTABILITY HYPOTHESIS OF HYMAN MINSKY AND ITS RELEVANCE TO THE CURRENT (2007-TODAY) ECONOMIC CRISIS"

A Thesis Submitted in Partial Fulfillment of the Requirements for the Degree of Master of Science in "Economic Theory and Policy" of the Department of Economics University of Crete

Stylianos Zampetakis

Supervisory Committee:

1. **Prof. A. Papadopoulos University of Crete**
2. **Prof. G. Argitis University of Athens**
3. **Prof. G. Srtathakis University of Crete**

Cosupervisor: Prof. A. Yiannopoulos

Rethymno, February 2011

ACKNOWLEDGMENTS

This dissertation would not have been possible without the generosity of many. I am grateful to the members of supervisory committee Professors A. Papadopoulos, G. Argitis and G. Stathakis who accepted to supervise and offered me valuable support and guidance. I am also grateful to Adj. Professor A. Yiannopoulos who cosupervised this Thesis for his directives, provision of bibliography and his valuable hints and comments during several long meetings. I would also like to thank Prof. D. Milonakis who encouraged me to take up this study. My special thanks to Lecturers M. Koukouritakis, G. Tsiotas, and S. Lapatsioras for the long discussions which helped me to clarify some confusing aspects.

"THE FINANCIAL INSTABILITY HYPOTHESIS OF HYMAN MINSKY AND ITS RELEVANCE TO THE CURRENT (2007-TODAY) ECONOMIC CRISIS"

Abstract

The financial and economic crisis that began in 2007 brought to an abrupt end a period of economic tranquility that many macroeconomists had celebrated as "The Great Moderation". The trend for recessions to become less frequent and milder abruptly gave way to a sharp decline in output, a steep increase of unemployment and a temporary fall into deflation.

The causes of this economic calamity will be debated for decades, but there should be little debate with the proposition that it was not predicted by any variant of mainstream economic analysis available at the time. It was however a prediction of the non-mainstream "Financial Instability Hypothesis" (FIH) developed by Hyman Minsky. It is no surprise that many analysts have looked back to his writings in order to understand the nature of the current crisis while it is now commonplace to find references to his theory. One even finds mainstream economists saying that "stability is destabilizing" (the quote that in three words describes Minsky's theory conclusion).

In this essay we argue that the current crisis provides a compelling reason to show how Minsky's approach offers us grounding in the workings of financial capitalism. In the first section we present the investment theory of the business cycle developed by John Maynard Keynes, and then examine Minsky's extension that added a financial theory of investment. This allowed Minsky to analyze the time evolution of the modern capitalist economy toward fragility (what is well known as Minsky's Financial Instability Hypothesis). Then we analyze the current crisis and explain it within the Minskian framework. The section ends with the critics that FIH faces.

In the subsequent section we present and review the modeling efforts undertaken by several economists putting emphasis on the most promising models (according to our opinion) along with suggestions for further research.

The third section provides the difficulties for empirical investigation of the FIH due to nonlinearities, mathematical complexities and lack of

appropriate data and presents some of the relevant efforts along with suggestions for further investigation.

The next section discusses briefly the challenges that Minsky's FIH brings in front of the mainstream economic theory in a Kuhnian frame. The essay ends with a conclusions section.

"Η ΥΠΟΘΕΣΗ ΧΡΗΜΑΤΟΟΙΚΟΝΟΜΙΚΗΣ ΑΣΤΑΘΕΙΑΣ ΤΟΥ HYMAN MINSKY ΚΑΙ Η ΤΡΕΧΟΥΣΑ (2007- ΣΗΜΕΡΑ) ΟΙΚΟΝΟΜΙΚΗ ΚΡΙΣΗ"

Περίληψη

Η οικονομική κρίση που ξεκίνησε το 2007 από τον χρηματοπιστωτικό τομέα διέκοψε απότομα μια περίοδο σχετικής σταθερότητας της παγκόσμιας οικονομίας κατά την οποία οι κρίσεις δεν ήταν συχνές και όταν συνέβαιναν ήταν σχετικά μικρής έκτασης και βάθους. Η σημερινή κρίση αντίθετα εκδηλώνεται με μεγάλη μείωση του ΑΕΠ, ραγδαία αύξηση της απεργίας και αποπληθωρισμό σε πολλές από τις αναπτυγμένες οικονομικά χώρες.

Τα αίτια της κρίσης αυτής θα δώσουν τροφή για αντιπαραθέσεις τα επόμενα χρόνια ενώ ήδη η διεθνής βιβλιογραφία τόσο η ακαδημαϊκή όσο και η γενικότερου ενδιαφέροντος βρίθει από προσπάθειες κατανόησης και επεξήγησής της. Αδιαμφισβήτητο όμως γεγονός είναι ότι καμιά από τις επικρατούσες σήμερα σχολές οικονομικής σκέψης δεν την είχε προβλέψει.

Όμως η παραμελημένη ΥΠΟΘΕΣΗ ΧΡΗΜΑΤΟΟΙΚΟΝΟΜΙΚΗΣ ΑΣΤΑΘΕΙΑΣ του H.MINSKY που για αρκετά χρόνια ήταν εκτός της επικαιρότητας και είχε αγνοηθεί από την επικρατούσα οικονομική θεωρία εμπεριέχει ακριβώς την περιγραφή κρίσεων όπως η σημερινή και εξηγεί αναλυτικά και τα αίτια και την προέλευσή τους.
Δεν αποτελεί συνεπώς έκπληξη για τους γνώστες της θεωρίας του Minsky το γεγονός ότι τα τελευταία τρία χρόνια πολλοί οικονομολόγοι τόσο Ακαδημαϊκοί όσο και Αναλυτές μελετούν προσεκτικά τις εργασίες του στην προσπάθειά τους να κατανοήσουν την κρίση ενώ έχουν πολλαπλασιαστεί οι αναφορές που γίνονται στις ιδέες του. Ακόμα και οι γνωστοί οικονομολόγοι στυλοβάτες της επικρατούσας σήμερα οικονομικής θεωρίας που πρεσβεύει την απόλυτη ελευθερία στις αγορές αναφέρονται σ' αυτόν, ενώ η έκφραση ''Η ευστάθεια (της οικονομίας) εμπεριέχει την αστάθεια της – και οδηγεί σ’ αυτήν'' που είναι ο πυρήνας των ιδεών του Minsky έχει καταγραφεί και ακουστεί στον τύπο, σε συνέδρια και σε προτάσεις οικονομικής πολιτικής.

Στην εργασία αυτή υποστηρίζεται ότι η τρέχουσα οικονομική κρίση είναι μια ευκαιρία για να αποδειχθεί το πώς η προσέγγιση του Minsky δίνει τη

βάση για την κατανόηση της λειτουργίας του σύγχρονου καπιταλιστικού χρηματοοικονομικού συστήματος.

Στο πρώτο μέρος παρουσιάζεται η θεωρία της επένδυσης του Minsky και η σύνδεσή της με την επενδυτική θεωρία του οικονομικού κύκλου του Keynes. Αναλύεται η υπόθεση χρηματοοικονομικής αστάθειας και με αυτή τη βάση αναλύεται και εξηγείται η σημερινή κρίση ενώ γίνεται αναφορά και στην κριτική που έχει δεχθεί.

Στο δεύτερο μέρος της εργασίας παρουσιάζονται τα μαθηματικά υποδείγματα της θεωρίας που έχουν αναπτυχθεί με έμφαση στα κατά τη γνώμη μας πλέον ελπιδοφόρα και με προτάσεις για περαιτέρω έρευνα.

Στο τρίτο μέρος αναφέρονται οι δυσκολίες εμπειρικής διερεύνησης της Υπόθεσης Χρηματοοικονομικής Αστάθειας ενώ παρουσιάζονται και αξιολογούνται κάποιες από τις προσπάθειες που έχουν διενεργηθεί πρόσφατα.

Η εργασία κλείνει με την εξέταση, σε ένα πλαίσιο τύπου Kuhn, του κατά πόσο η θεωρία του Minsky σε συνδυασμό με την γενικότερη εξέλιξη και πρόοδο των λεγόμενων "ετερόδοξων" οικονομικών θα μπορούσε να προκαλέσει με αξιώσεις την επικρατούσα σήμερα οικονομική θεωρία και παρουσιάζονται κάποια γενικότερα συμπεράσματα.

TABLE OF CONTENTS

1. **Introduction**

"Within this theory, which I call the financial instability hypothesis, the recent behavior of the capitalist economies is not an anomaly: these economies have been behaving the way capitalist economies with sophisticated financial institutions are supposed to behave once economic intervention prevents fragile financial relation from leading to debt deflation and deep depressions. Because the financial instability hypothesis leads to a different view of the normal functioning of the capitalist economies it has implications for economic policy that differ from those of the standard economic theory of our time".
(Minsky 1982, p. 90)
The 1960s were the turning point of the functioning of capitalist economy, from the Minsky´s view. As he wrote: "From the 1930s to early 1960s, no serious financial disturbances took place. Because of the financial assets and liquidity inherited from the World War II, the significantly larger size of the federal government (the result of the cold war and various transfer payment schemes), and some positive uses of fiscal policy to run deficits when needed, the United States [...] achieved a significantly closer approximation to full employment over a sustained period of time than they had ever achieved before". (Minsky1986, p. 44) The U.S. economy witnessed several mild recessions, but from the general view, twenty years after the World War II was a period of prosperity.
But in the mid-1960s, the economy gradually became unstable. In 1966, the credit crunch appeared, and other financial crises came very soon (1970, 1974-5, 1979-80 and 1982-3). Minsky also says we cannot return to the old tranquil times before the 1966. What could be witnessed by the time of credit crunch was the beginning of a new period of capitalism, when old policy measures do not work and when instability appears. About ten years after the credit crunch he wrote: |We are in the midst of three closely related crises in economics: in performance, policy, and theory". (Minsky 1982, p. 90)
By the crisis in performance, Minsky meant that economy was affected by inflation, financial disturbances, high unemployment rates or instability of international exchanges.These unfavorable trends characterized not only American but also other developed economies.

But according to Minsky, the economies witnessed also ineffective fiscal and monetary policy. This point he labels as the crisis in policy.
The last crisis is in the economic theory, and from Minsky's point of view it has two aspects. Firstly, there are "devastating logical holes" (Minsky 1982, p. 91) in the mainstream theory; secondly, the conventional theory is not able to explain financial crises which have already occurred.
The problem of standard theory of Minsky's days was not only that there was lack of explanation of financial fragilities, but also that the conventional theory did not regard financial crises as a normal functioning result of the economic process. The aim (of his thesis) should be to find a theory, which would not regard a crisis as a problem caused by exogenous factors: "In an era when performance failures demonstrate the need for economic reform, any successful program of change must be rooted in an understanding of how economic processes function within the existing institutions. That understanding is what economic theory is supposed to provide [...] the way in which money and finance affect the behavior of the system can be perceived only within a theory that allows money and finance to affect what happens". (Minsky 1986, p. 3)
Minsky created the financial instability hypothesis as his answer to non-existing explanation of the financial fragilities since 1966. It is an attempt to find a theory which would regard a financial crisis as something that belongs to the capitalist economy and is caused by endogenous factors.

2. A short biography

(The following short biography is strongly based on Papadimitriou and Wray "The Economic Contributions of Hyman Minsky: Varieties of Capitalism and Institutional Reform" Working Paper No. 217 December 1997)

Hyman (Hy) Minsky was born in Chicago on September 23 1919 and died in Rhinebeck, October 24, 1996. The influence of Oscar Lange, Paul Douglas, Jacob Viner, Frank Knight and Henry Simons, all members of the University of Chicago economics faculty in 1937 when Hyman Minsky was an undergraduate there, played a pivotal role in reinforcing his interest in studying economics, even though his B.S.

degree was in mathematics. The courses and seminars taught by the "Chicago greats," his friendship with Gerhard Meyer and Abba Lerner as well as the socioeconomic environment of his youth contributed to Hy's decision to further his education in economics, which he did at Harvard, from which he earned his master's and doctoral degrees under Schumpeter's and Leontief's supervision. In his dissertation, and in later research, Minsky explored the interrelationships among market structure, banking, the determinants of aggregate demand, and business cycle performance.

Many of his Chicago friends and other acquaintances had moved to the Harvard-MIT community, but he never saw Harvard as his intellectual home. To him, the intellectual powerhouse was the University of Chicago, which continued to influence him during the Harvard days. It was Chicago that he would visit with every chance he had to renew his friendship with Carl Christ, Leonid Hurwicz and other remaining friends at the University andthe Cowles Commission, and to meet new friends including Kenneth Arrow. The classes and seminars at Harvard were not challenging for they lacked the rigor and clarity of those at Chicago. The self-appointed American disciples of Keynes -Alvin Hansen leading them- were content with the conventional and almost mechanistic interpretation of countercyclical fiscal policy, ignoring the significance of uncertainty and the role that money and finance played in a complex capitalist system. Minsky's refusal to accept this narrow and fundamentally incorrect interpretation of Keynes, which necessarily led to a simplistic belief that market behavior can be neutralized by interventions affecting aggregate demand, played a significant role in his later research and writings.

His first academic appointment was in the faculty of Brown University where he was tenured and promoted to associate professor. He moved to the University of California at Berkeley in 1957. During his years at Berkeley, Minsky developed his ideas about the importance of cash flows in contractual commitments in that current borrowing is obtained by committing future cash, a perspective not considered in the traditional flow of funds analysis.

Also, while at Berkeley, he instituted a banking seminar sponsored by Bank of America, which helped sharpen his knowledge of institutional innovation in banking and of the details of a bank's internal operations. In 1965 he moved to Washington University in St. Louis. On his

retirement in 1990 from Washington University, as an Emeritus Professor, he became a Distinguished Scholar at the Jerome Levy Economics Institute of Bard College, where he remained until his death.

Minsky's work represents one of the most important links between Post Keynesians and Institutionalists. He did not like to be labeled "Post Keynesian"; this was probably for three reasons.

First, he believed that a more accurate description of his approach was "financial Keynesian", for this singled out his debt to Keynes while focusing on what he believed to be his clarification of, and extension to, the economics of Keynes, namely, the addition of complex financial relations, markets, and institutions. Second, he wanted to distance himself from a tendency in Post Keynesian economics to push institutions into the background in order to develop "general theories". He firmly believed that general theories are either plainly wrong, or are simply too general to be of any use. He would ask: what sort of economic theory can be applied equally well to a tribal society, a peasant economy, a small government capitalism, and a big government capitalism with complex financial arrangements? According to him, institutions must be brought into the analysis at the beginning; useful theory is institution specific (Minsky 1992d). All of his work emphasized that our economy operates within a modern capitalist system with a big government sector, with long-lived and privately owned capital, and with exceedingly complex financial arrangements.

While he was convinced that mainstream analysis is not only wrong-headed, but that it is also dangerous when it forms the basis of policy formation, he was also convinced that he could "move the discipline" at least a little. This conviction was amply in evidence in his work at the Jerome Levy Economics Institute, for otherwise there would have been no reason to attempt to influence policy and theory.

Minsky had little use for pure exercises in "history of thought", rather, he always argued that he stood "on the shoulders of giants", like Keynes, Schumpeter, and Simons. (His most famous book, John Maynard Keynes, is, of course, most assuredly not about Keynes). Whether he got their theories "right" was a matter of little consequence to him, for he used their contributions only as a springboard for his own analysis. Minsky would make great use of the

"Kalecki-Levy" profit equation, which is derived from national identities and shows that aggregate profits are identically equal to the government's deficit, plus the trade surplus, plus investment, plus consumption out of profits, and less saving out of wages. (Minsky 1992d) He would incorporate this view into his theory as the proposition that "investment today is forthcoming only if investment is expected in the future" as aggregate profits will not exist unless investment occurs. He, then, argued that profits cannot be explained as a result of competition (since in the aggregate they are determined as in the Kalecki-Levy equation); this means that competition and innovation can only redistribute profits among firms. Finally, if investment falls, then profits will fall, which will further discourage investment unless one of the other components of the profit equation should rise in compensation. The likely candidate, of course, is government deficit spending (Minsky 1980). In this way, he came back to his earlier conclusion that government deficits can be stabilizing; here he added the notion that deficits create profits, and as it is the expectation of profit that drives the economy, countercyclical deficits can be stabilizing. (Minsky 1992d.)

Minsky always insisted that theory must be institution-specific. Because there are a variety of possible types of economies, and even "fifty seven" varieties of capitalism, theory must be appropriate to the specific economy under analysis. His analysis concerned an evolving, developed, big-government capitalist economy with complex and long-lived financial arrangements. His policy recommendations were designed to promote a successful, democratic form of capitalism given these financial arrangements. These policies would have to "constrain" instability through creation of institutional "ceilings and floors" while at the same time they would have to address the behavioral changes induced by reduction of instability.

The policies would also have to promote rising living standards, expansion of democratic principles, and enhancement of security for the average household. Thus, his proposals go far beyond "invisible hand waves" of free market ideologues, but also well beyond macroeconomic tinkering normally associated with "Keynesians" to take into consideration the required institutional change that would promote the sort of society he desired. In this sense, we think it is accurate to claim that Minsky successfully integrated "Post" (or, better,

"financial") Keynesian theory with an institutionalist appreciation for the varieties of past, current, and feasible future economic arrangements.

3. Financial instability hypothesis

a. The financial instability hypothesis

The financial instability hypothesis is rooted in the Minsky's theory of investment and endogenous money. In his theory of investment, he developed the investment theory of John Maynard Keynes and added new aspects to it. At first, a brief summary of Keynes's theory of investment will be made; afterwards, Minsky's theory of investment will be described. Secondly, the financial instability hypothesis will be discussed.

ai. The theory of investment

ai1. Keynes´s theory of investment

According to Keynes, the equilibrium level of employment and output is generated mainly by the aggregate level of effective demand. The aggregate level of effective demand is determined primarily by the level of investment. It is clear that the investment plays a crucial role in economy because through the aggregate level of effective demand, it determines the equilibrium level of output and employment.

The level of investment is determined by an interrelationship of two factors: marginal efficiency of capital and market interest rate. The causality goes as following: When the marginal efficiency of capital is higher than the interest rate, the investment is undertaken. In the opposite case, there would be no incentive to invest. Hence, the economy is in equilibrium when the marginal efficiency of capital equals the market interest rate.

Some authors regard this explanation as a simplified view of Keynes's theory of non-sufficient investment. For example, Wray and Tymoigne wrote: "While such exposition can be found in Keynes's book, this caricature does not come close to capturing Keynes's theory of investment. To really understand Keynes's theory, one must turn to chapter 17 of the General Theory, a rather complex exposition that is

normally avoided by all but the most serious of his followers." (Wray & Tymoigne, 2008)

In the chapter 17, Keynes elaborated the theory of what is behind the marginal efficiency of capital. He states that every kind of capital asset must have its own interest rate which is different from the other assets. This interest rate emanates from the difference between spot and market contracts and can be expressed in money. (Keynes, 1960). The expected return of holding the asset in terms of money can be calculated by following formula: ***q-c+l+a*** *,* (Wray & Tymoigne, 2008, p. 5) in which *q* is the asset's expected yield*, c* is carrying costs, *l* is subjectively evaluated liquidity-premium and *a* is expected price appreciations/depreciation. According to Keynes, instrumental or consumption capital may have negligible liquidity-premium (in such case, the expected total return consists only of ***q-c***). On the opposite there is money, in which case "its liquidity-premium much exceeds its carrying cost" (Keynes, 1960, p. 227). Money has negligible carrying cost, and its yield is nil.

One can see that in this structure of marginal efficiency of capital, the expectations play a significant role. Optimistic expectations about future economic development raise the asset's expected yield and decrease the need to hold liquid assets (optimistic expectations about future decrease the sense of danger and thereby decrease a liquid-premium *l*. According to Wray and Tymoigne, it leads to the situation when the marginal efficiency of capital relatively increases to the assets the return of which emanates from liquid premium *l*. (Wray & Tymoigne, 2008, p. 6) This will stimulate the production of capital assets and thereby the equilibrium level of output and employment. The growth will continue until ―there is no marginal efficiency of any type of machine that exceeds the expected return on liquid, financial assets.‖ (Wray & Tymoigne, 2008, p. 6) This causality can be reversed, and economy can move into downturn if the marginal efficiency of capital falls or expected return of liquid one's rises.

ai2. The financial theory of investment by Hyman Minsky

Minsky tried to extend the investment theory of Keynes and formulated his own financial theory of investment. He found Keynes's investment theory incomplete (Wray & Tymoigne, 2008, p. 6) because

in Keynes‘s theory, an explicit theory dealing with boom and crisis was missing, except some hints. Keynes did not model any development of liability structure of financial institutions and firms, and “how the endogenous generation of money and money substitutes takes place” (Minsky H. P., John Maynard Keynes, 1975, p. 106)
Minsky´s interpretation of the Keynes´s investment theory is based on the chapter 17 of the General theory of Employment, Interest and Money.

This is a very important point because Minsky does not agree with the concept that investments are mainly determined technologically by a productivity of capital. Nevertheless, he does not deny the influence of the productivity of capital on determining the expected cash flow at all (Fazzari & Papadimitriou, Financial Conditions and Macroeconomic Performance: Essays in Honor of Hyman P. Minsky, 1992, p. 4); he simply considers the financial factors as more relevant. Hence, the theory is called the financial theory of investment. He looks at the economy from the view of the “Wall Street”. From this perspective, the economy is seen “as a complex network of cash flows involving both current economic production and liability structures that necessarily arise because investment has to be financed through money now in exchange for money in the future arrangements. From a Wall Street perspective, the economy is a financial paper world of commitments to pay cash today and in the future.” (Raines & Leathers, 2008, p. 143). Minsky is interested in a cash flow of economic units. It means he looks at households, corporations or for example national government as if they were banks. Every economic unit has its own financial commitments – for example some debts which must be validated. From this perspective, “a decision to invest – to acquire capital assets – is always a decision about a liability structure” (Minsky, Stabilizing an Unstable Economy, 1986, p. 172)
Before the financial theory of investment will be focused on, Minsky‘s price system should be mentioned. He distinguishes the prices of current output from the prices of capital assets. The prices of current output depend upon the mark-up over labor costs and include investment, consumption, government and export goods and services. They also reflect short-run or current consideration (Minsky H. P., 1982, p. 102). On the other hand, the capital assets are the key determinant of the level of investment which depends on the relation

between the demand and supply price of capital assets. (Papadimitriou & Wray, 1999, p. 9) They reflect the long-run expectation.
In short, the business cycle is rooted in the movement of these two prices. When the prices of capital assets are higher than the prices of current output, the willingness to invest decreases and vice versa.

Let's now move to the determination of the level of investment. The two-price system is linked by the investment goods because they are part of current output. The price of current output is the supply price of capital. The demand price of capital is determined by the prices of capital and financial assets.
A firm can finance its investment by cash (and equivalent assets – for example treasury securities or commercial paper) which are not required by current operations, internal or external funds. A firm can get external funds by running into a debt or by issuing equities if internal funds are not sufficient. This is a crucial point of Minsky's analysis; a firm running into a debt has to fulfill some payments commitments in the future to repay debt. Therefore, it has implications for the firm's decisions about future investment which must provide sufficient cash flow.
A firm operates under the conditions of uncertainty. Cash flow from internal funds depends upon the development of the economy. There is no guarantee that a planned cash flow (from internal funds) will be achieved. Hence, firms think over mixing the financing of investment from internal and external funds. This mix depends upon "the extent to which finance for the investment goods will be forthcoming from profits" (Minsky H. P., Stabilizing an Unstable Economy, 1986, p. 185). Lenders and borrowers of debts protect themselves against the element of uncertainty by the margin of safety (let's denote it by φ). The margin of safety is dependent on expectations. If the performance of economy is good, the entrepreneurs will less fear of default; therefore, they will less secure themselves against the probability of default by lower level of margin of safety than before, and vice versa. In other words, they will invest more in the fixed amount of margin of safety in the situation of optimistic expectations and boosting economy (and the opposite in the case of pessimistic expectations).
A borrower has to face the so-called "borrower's risk". If he wants to be engaged in external financing, and his expectations are stable or fixed, he protects himself from default by decreasing his demand price

for capital assets(in case of changing expectations, the situation differs).The lowering of demand price for capital assets occurs if a borrower wants to rise his margin of safety; respectively, if he wants to increase the ratio of external to internal financing (he is in the situation when he can demand more investment only if he uses more external financing or runs down holding of financial assets which are superfluous to operations (Minsky H. P., Stabilizing an Unstable Economy, 1986, p. 191)). Simply, he wants to pay less for the capital assets than usual because he feels on his side there is probability to be on default, and he wants to protect himself by lower price. This philosophy lays behind the fact that demand curve for capital assets DI is sloping downward after reaching a certain point (see Figure 2-1). The amount of internal funds is determined by anticipated internal cash flow which is represented by curve Qn. If the internal cash flows (or quasi rents) intersect the supply price of capital assets, the amount of investment covered full by internal funds is established (point Ii). Behind this point, a firm has a lower internal revenue than the supply price of investment, which means that a firm has to gain additional money to invest and therefore starts participating in external financing. After reaching a certain amount of debts, the borrower starts lowering his demand price as was described above.

At this moment, a supplier of investment is also in the situation when he wants to protect himself. He is worried about the default of his client if the client has not enough internal funds to fully finance investment and engage in external funding (raising debts). If a supplier feels a risk of default of a client, he raises a supply price of capital assets to ensure a margin of safety which would secure him some additional profits in case of default. This is the reason why supply curve of capital assets is sloping upwards (Si). The optimal amount of investment is in the point where demand curve DI intersects supply curve Si (in Figure 2-1 shown as a point I*). Total amount of external financing is expressed by interval (I_i,I*). The investment takes place only if demand price of capital assets is higher than supply price. For better clarity, the relation of margin of safety and the supply and demand price of investment can be formalized as such: When $\frac{E}{I} > 0$ (E the is value of external financing and I is the value of internal financing) then $\varphi > 0$ while

$$\frac{\partial \varphi}{\partial E} > 0 \qquad \frac{\partial P_D}{\partial \varphi} < 0 \qquad \frac{\partial P_S}{\partial \varphi} > 0$$

The Figure 2-1 represents the situation of fixed expectations (the case of lowering demand price and rising margin of safety described above The Figure 2-2 represents the situation of changing expectations – if the economy is growing, and the expectations are optimistic, the demand curve DI moves to DI2, and supply curve SI moves to SI2 because borrowers and lenders are less afraid of default (or unpaid debts). Hence, they lower the level of margin of safety for the certain amount of investment. As a result, the level of investment is higher (II*).

Figure 2-1 Determination of the level of investment (fixed expectations)

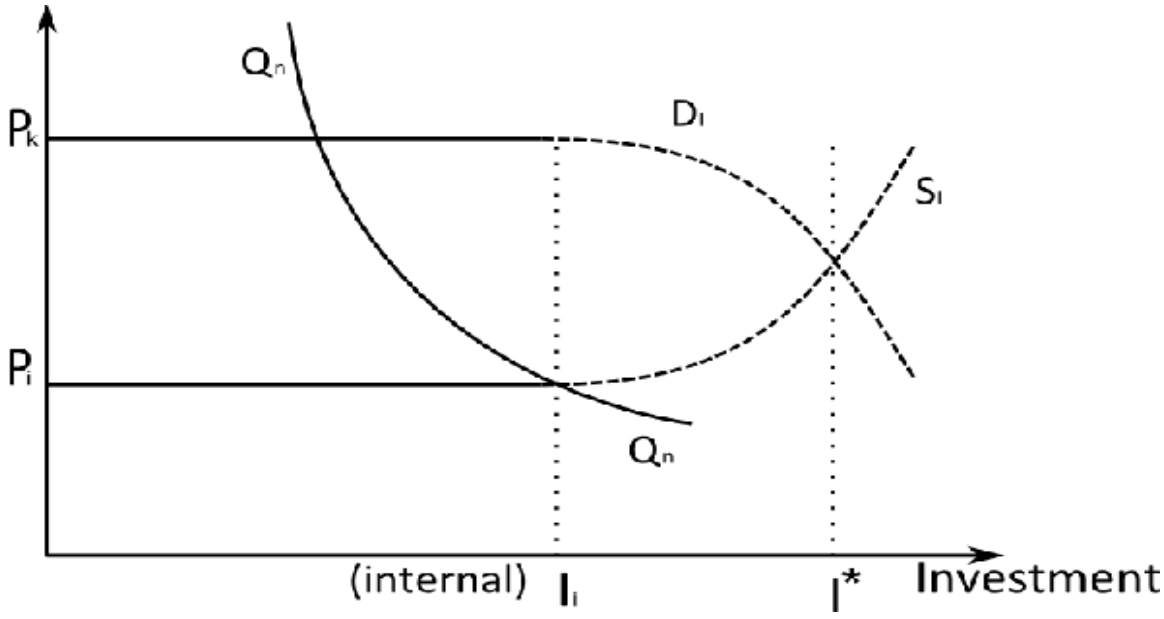
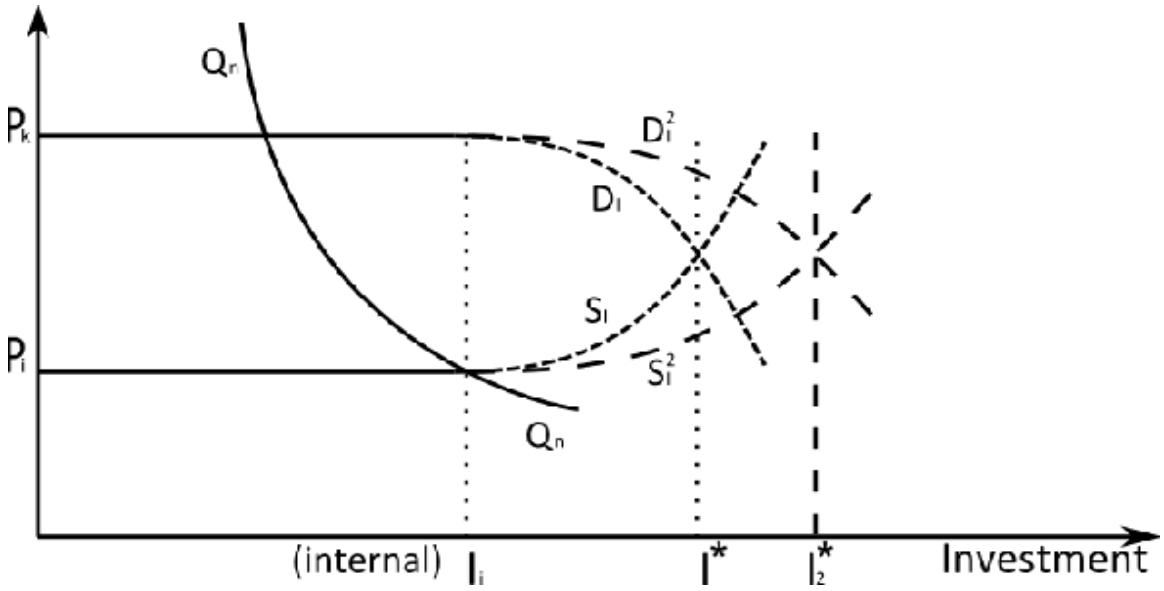


Figure 2-2 Determination of the level of investment (changing expectations



Source: (Minsky H. P., Stabilizing an Unstable Economy, 1986)

ai3. The role of profits in the capitalist economy

Another key building block of Minsky´s theory, which influences the level of investment, is profits. According to Minsky profits plays three roles in a capitalist economy (Minsky H. P., 1982, p. 104):

1) The cash flows that may (or may not) validate debts and the prices paid for capital assets

2) The mark-up on labor costs assuring that what is produced by part of the labor force is allocated to all the labor force

3) The signals whether accumulation should continue, and where the surplus should be used

A firm has to generate enough profits to validate debts (past financial commitments) to gain mark-up but also to have enough money for future or planned investments (future payments). "Profits are the critical link to time in a capitalist economy" (Minsky H. P., 1982, p. 104) because they affect the long-run expectation of business and bankers. If a firm has enough profit in present (because of successful today's investment), the past decision about investment and financing turned out to be right, and the firm has enough money to validate

debts and also to invest in the future. Whether or not a firm has enough profits today depends on the level of "today's investment". However, the willingness of a firm to invest depends on the expectations about future. If managers are pessimistic about future economic development, they will invest less; therefore, they get less profit today, and their firm can hypothetically get into a trouble in case of very pessimistic expectations leading to a very low level of profits and inability to repay debts. In short, sufficient profits validate past decisions of a firm and enable external debt financing. A firm also has expectations about future development; these determine the level of future investment and thereby the level of future profits.
Obviously, "we are dealing with a capitalist economy with a past, a present and a future" (Minsky H. P., 1982, p. 104) A smooth functioning of capitalist economy depends on the investment generating profits. As Minsky said, "profits are the carrot and stick that make capitalism work" (Minsky H. P., 1982, p. 105)

The level of profits generates expectations. A firm's ability to fulfill financial commitments determines parameters of future financial conditions for other economic units. If firms have problems to repay debts (generate enough profits), banks will be less willing to lend money (and vice versa) to all economic units. High profits are also a "carrot" for other companies to enter the prosperous industry.
It is clear that profits are the key factor for firm's investment decisions. It raises a question: how can a firm establish sufficient amount of profits; respectively, can a firm set prices of its product to gain enough profits? The ability to set prices depends on the firm's market power. Two cases can be distinguished. In the first one, firms have no market power, and prices are set by equality with marginal cost. However, as Raines and Leathers state: "... in modern capitalist economies, most markets are oligopolistic in varying degrees, with a relatively few large corporations possessing various degrees of market power. Those firms applying mark-ups to the sum of variable costs, fixed and overhead costs, ancillary costs, and financial commitments determine output prices" (Raines & Leathers, 2008, p. 145) These corporations can set prices and adjust level of output instead of price level of their products to shifts in demand for the outputs.
The question is, what exactly determines profit. In this case Minsky incorporated work of Michal Kalecki (1971). For Minsky, Kalecki's

conclusion that "including the Big Government makes total gross profits – namely, the cash flows that firms draw upon to meet their cash commitments – a positive function of government budget deficits" (Bellofiore & Ferri, Financial Keynesianism and Market Instability, 2001, p. 12) was important. For Minsky's thinking, this is a crucial statement because it means that firms' profits can be sustained by government fiscal policy in case of business profits insufficient to fulfil financial commitments. Kalecki explicitly wrote: "It is the export surplus and the budget deficit which enable the capitalists to make profits over and above their own purchases of goods and services" (Kalecki, 1971, p. 86). Now let's move to the formalized determination of profits.

Kalecki's equations

Supposedly, workers spend all their income on consumption and profit receivers do not consume. An open economy, role of the government and taxation are assumed. Then the gross national product *"GNP"* is given by: $GNP=I+C+G+(X-M)$

Where I is gross investment (only private, public are included in G), C denotes consumption, G is government expenditure on goods and services and $(X - M)$ is the surplus of export over import. Kalecki assumes that "the total value of production is divided between capitalists and workers or paid in taxes" (Kalecki, 1971, p. 81). Kalecki constructs a balance sheet of the gross national product.

Table 2-1 Kalecki Equations

Gross profits (net of direct taxes)	Gross Investment
Wages and salaries (net of direct taxes)	Export surplus
Taxes (direct and indirect)	Government expenditure on goods and services
	Capitalists' consumption
	Workers' consumption
Gross national product	**Gross national product**

In the next step, Kalecki subtracts from both sides taxes. Because taxes are used to cover government expenditure and transfer payments, the total value of taxes is subtracted from both sides, and the transfers are added because the government does not take the money for them. Following balance sheet is got:

Table 2-2 Kalecki Equations

Gross profits (net of direct taxes)	Gross Investment
Wages and salaries (net of direct taxes)	Export surplus
	Budget deficit
	Capitalists' consumption
	Workers' consumption
Gross national product minus taxes plus transfers	**Gross national product minus taxes plus transfers**

Now let's move to the determination of profits (deduced from the balance sheet above):

$$\text{Gross profits (net of direct taxes)} = \text{Gross Investment} + \text{Export surplus} + \text{Budget deficit} + \text{Capitalists' consumption} + (\text{Workers' consumption} - \text{Wages and salaries (net of direct taxes)})$$

$$\text{Gross profits (net of direct taxes)} = \text{Gross Investment} + \text{Export surplus} + \text{Budget deficit} + \text{Capitalists' consumption} - \text{Workers' savings}$$

Seemingly, the relations in society (political, economic, social and psychological) are factor that influence independent variables in the equations. From Kalecki's point of view, technology is not the only one determinant of profits.

It is a very dynamic look on economy. Turbulences in expectations and therefore in investment affect the level of profits and in consequence, they affect the ability of a firm to validate its debts or not. A few steps remain to the Minsky's theory of cycle. Before getting there, it is necessary to describe the last important building block –possible financial positions of a firm which influence a liability structure of firms.

4. Financial positions

a. Hedge finance

An economic unit is involved in hedge financing if it has enough cash flow to validate its financial commitments at every moment. It means that such economic unit is resistant to fluctuations of price of capital assets to some extent.

b. Speculative finance

The speculative finance position is characterized by rolling over a debt due to expected cash flows not covering financial commitments in every period. This unit has to take a loan to cover usually rather a short period. In a long run, the unit expects its cash flow will grow sufficient to cover all debts (for example, it expects its income flow will rise, but at this moment, it needs external financing). The key characteristic is that in case of speculative financing, the unit does not enlarge its debts (i. e. it has still enough money to cover interest payments).

c. Ponzi finance

A Ponzi financing is similar to speculative one, but there is an important difference. A unit involved in Ponzi financing does not have enough money even to cover interest payments. The unit‘s debt burden is rising. This unit must usually increase its debts to cover existing financial commitments.

Back to The financial instability hypothesis

Now the Minsky‘s theory of cycle should be introduced. As said before, the movement of price of current output and capital assets (“two-price system”) creates a cycle. Firstly, the mechanism will be described on the example of boosting economy.

A tranquil, boosting period

If an economy experiences a tranquil period, it experiences also positive expectations about future. Most of the firms are involved in hedge financing and expect future rise of their profit flows. Consequently, the demand price for investment is rising because of higher expected profit of firms, and because they want to invest more. Another reason for rising demand price of investment is that firms are lowering their margin of safety because of positive expectations about

future (debtors expect lower borrower's risk). Accordingly, the supply price of investment starts falling because of lowering margin of safety (bankers expect lower lender's risk). Banks now lend money to more risky firms than before. The situation of rising demand price and lowering supply price of investment enlarges the gap between these two prices; hence, firms invest more.

The boosting periods are also characterized by rising profits. They attract other firms to enter the industry or to extend their activities (they invest more) and lower circumspection. In this situation, firms take more debts to expand and move their liability structure to more fragile state. A firm's willingness to run into debt more than before is followed by financial innovations on the banker's side. Banks are trying to maximize their profit and developing new financial products:

"As profit-seeking financial institutions invent and reinvent "new" forms of money, substitutes for money in portfolios, and financing techniques for various types of activities, financing of investment becomes easier. Each new financial instrument that is introduced or old one that is used to a greater extent results in the financing of more investment in the form of additional capital and financial assets. That results in higher prices of assets, which, in turn, raises the demand price for current investment and increases the demand for more financing of investment, creating more inducement for financial innovations by lenders" (Raines & Leathers, 2008, p. 153)

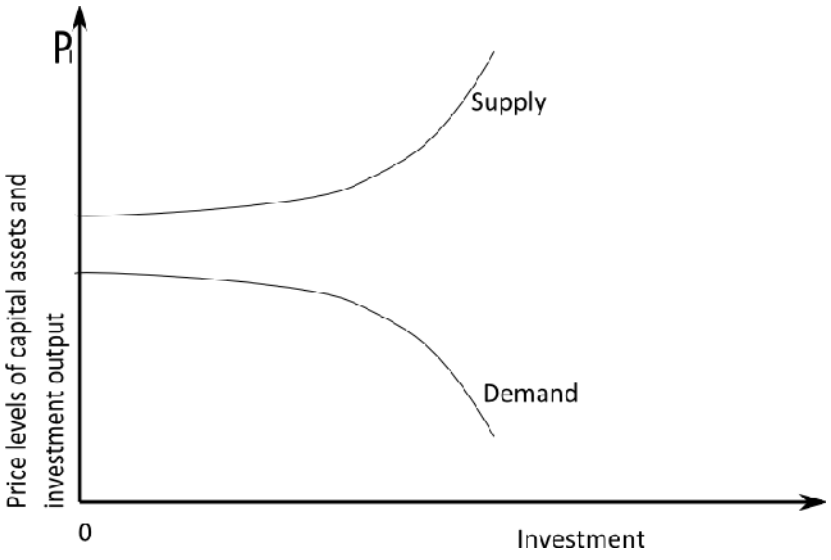
New financial products create additional demand for investment that would not occur without them. In consequence, profits are rising. Because of that, the price of capital assets rises, the demand price of investment also becomes higher etc. An economy in consequence moves beyond the state of full employment.

Creation of financial crisis

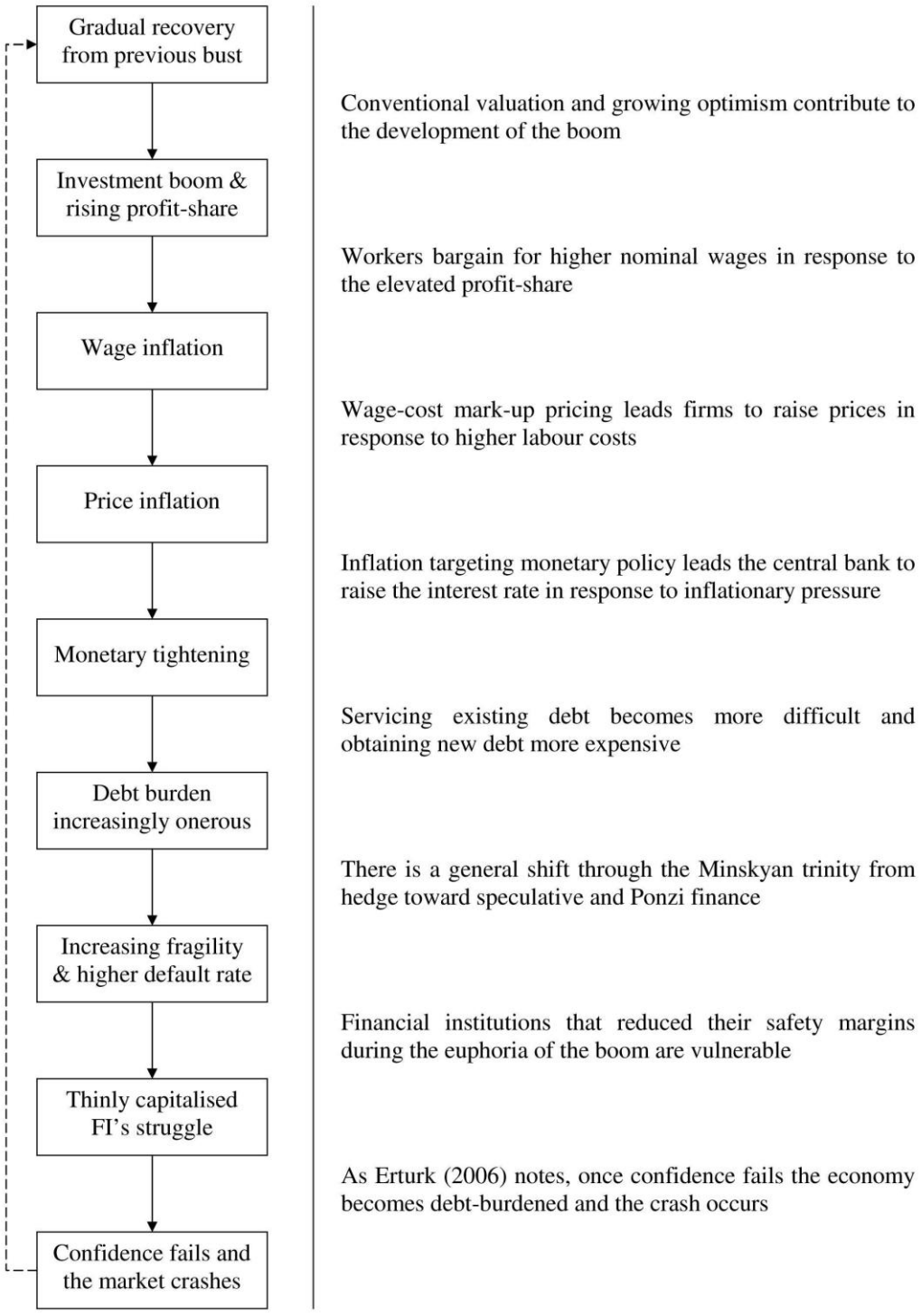
During the period of boom, many firms involved in hedge financing become speculative because of the willingness of taking loans rising. The same shift in liability structure affects also the units originally involved in speculative financing – they become Ponzi units. This is the consequence of shifting liability structure into more fragile one due to optimistic expectations. Firms become more vulnerable to changing economic conditions and movements of interest rates.

What creates a crisis is the change of expectations (from optimistic to more pessimistic). This does not necessarily mean there is an objective economic problem (for example, huge speculative so-called bubble). The term "expectations" means shift in general expectations in economy, and the causes can be also of more psychological than economic nature. In all cases, as a result market expects more pessimistic times, market agents lower profit expectations about the future. The consequences on the "investment market" are obvious. The demand price of capital decreases because of rising margin of safety. As the margin of safety rises, the supply price of capital reacts by rising as well. As a result, the supply price of capital may be higher than the demand price of capital (see Figure 2-3 where the extreme case is illustrated). This situation ("change of long-run expectations about profits and desirable financing structure" (Minsky H. P., 1982, p. 109)) leads to crisis and distortion of an investment process. Capitalists now expect fewer profits which are crucial for validating debts.

Figure 2-3 The extreme case of expectation changes



Source: (Minsky H. P., Stabilizing an Unstable Economy, 1986)



A Schematic Representation of the Minksian Boom-Bust Cycle (Source Greenwood-Nimmo 2009)

The more pessimistic expectations, the more falling profits and the higher probability for entrepreneurs of being unable to fulfill financial commitments made in past (profits are falling but the value of debts are nominally fixed). There is no guarantee that the fall will immediately end – pessimistic expectations cause falling profits; that causes falling investment and attempts to reduce costs (falling wages, production etc.). This can lead to even more pessimistic expectations about future etc. Eventually, a firm may not have enough money to fulfill its financial commitments and may end in bankruptcy. As a firm wants to keep from its own bankruptcy, it sells out positions. This leads to lowering asset prices. As a result, the way to deep recession is established.

5. The policy – role of government and central bank

Government and central bank policy can serve as the countercyclical force. Minsky argued that the reason why financial crisis had not occurred during the twenty years after the World War II was the "big government" and the central bank. If a recession is at the beginning, a government can run a deficit and help entrepreneurs maintain their profit. A central bank as the lender of the last resort prevents banks from falling down and provides them cash flow through loans.

Unfortunately, these countercyclical policies have ―the other side of the coin‖. Government spending and investment creates inflation which generally helps borrowers to repay their debts; but, as Minsky wrote: "The floating off debt through inflation is a game that can be played only a number of times; the propensity to expand into a boom will be atrophied as bankers become wary of Ponzi schemes. Alternatively, government intervention to sustain investment can become co overpowering that the "sharp pencils" needed to assure that investment yields real rather than nominal, social rather than private, benefits become blunted...once the doctrine of salvation through investment becomes deeply ingrained into our political and economic system, the constraints on foolish investments are relaxed" (Minsky H. P., 1982, p. 112)

Huge, uncontrolled government spending and lenders of the last resort policy can emit different message than was originally intended. Entrepreneurs or banks can consider the signal as the validation of their past decisions instead of warning and as a chance to consolidate

their business and cash flow policy, even if their decision were bad, and their positions are fragile and on the way to bankruptcy.
The policy of a central bank has another effect. If a central bank regulates the financial market, banks and other player on financial market try to avoid it. A bank is also maximizing his profit and it "is always trying to find new ways to lend, new costumers, and new ways of acquiring funds, that is, to borrow; in other words, [it] is under pressure to innovate" (Minsky H. P., Stabilizing an Unstable Economy, 1986, p. 237) The result of the innovation and the attempts to get away from the control of the regulatory authority is that new non-regulated instruments or financial companies come into being. New instruments are more sophisticated to avoid the regulation, and for this reason are also much less controllable. The more regulations a central bank issues, the more non-regulated instruments and players appear on the financial markets. This can cause serious problems because the financial market can be less controlled than before and can shift into a more fragile structure much faster and without any ability of regulatory authorities to intervene to prevent the financial crises.
Clearly, the regulation has no straightforward effects. On one hand, regulation, according to Minsky, stabilizes policy and is therefore necessary. However, on the other hand, the regulation can be counterproductive. The virtue of regulation is to find sufficient level of state intervention that does not send unwanted signals towards the market, but Minsky does not offer precise solution of this dilemma. He personally prefers policies which stimulate the consumption production of consumer goods, because according to his skeletal model, the "output of consumer goods is deflationary" and is therefore countercyclical. Another Minsky's important point is the simplification of financial instruments and the financial structures generally in order to gain better control and transparency of the market.

6. The heterodox presuppositions of Minsky's economics

Over the last seventy years, the dominant macroeconomic theory has assumed ever new and more sophisticated facets. There seems to be, however, a continual thread in its evolution: the constant reference to General Equilibrium Theory (GET). It is thus this aspect that seems to qualify macroeconomic orthodoxy. Amongst other things, standard

GET is based on two fundamental pillars: (i) the assumption of unbounded individual rationality, according to which, at any given price vector, perfectly competitive agents are able to choose the quantities that maximise their target function and (ii) the assumption of unbounded collective rationality, according to which prices are able to lead to an instantaneous and generalized market clearing. Seventy years ago, *The General Theory* rejected the perfect rationality assumptions.

Firstly, in Keynes's world agents have a bounded rationality. The future, in particular, is totally unknown to them. Secondly, the equilibrium price vector may not exist. The existence of a positive interest rate level able to align full employment savings and investments is, for instance, not guaranteed. Moreover, even if the equilibrium price vector did exist, there would be no auctioneer that instantly leads prices to their equilibrium level. The perfect rationality pillars, and with them GET, are thus totally unrealistic and have to be rejected. In short, this seems to be the essence of the Keynesian 'revolution'.

Hyman Minsky's contributions cover the period 1954-1996 in which GET resurfaces, firstly as a benchmark and then as a direct representation of reality. Drawing on *The General Theory*, of which he is one of the most famous and original interpreters, Minsky (1975) rejects as unrealistic the unbounded rationality pillars. In Minsky's (op. cit.) view, the limits of collective and individual rationality feed each other, generating deviation-amplifying mechanisms that make the economy unstable.

Starting with the collective rationality, Minsky (1975, 1982a, 1986) radicalizes Keynes's arguments. He does not limit himself to reject the auctioneer (i.e. the omnipotence of the price mechanism) but banishes the concept of equilibrium itself.

Hyman Minsky's economics is not unstable because it lacks the tendency to general (or any other) equilibrium. It is unstable because its structure and the qualitative characteristics of its dynamic behavior autonomously evolve with the simple passing of time (Vercelli, 2001). It endogenously changes in the same way as seasons do, assuming a cyclical behavior that drives it from the torrid summers of speculative booms to the gloomy winters of debt deflations and deep depressions.

Let us now come to the limits of individual rationality. Minsky's (1975, 1982a, 1986, 1996) world endogenously changes at a pace quicker than the one compatible with learning processes. Agents do not succeed in knowing the model and (above all) are conscious of this. To quote Minsky (1996 p.2): "The uncertainty that permeates the economics of Keynes and the economics of bounded rationality is due to the unsureness about the validity of the model that enters in the decision process".

What matters is not only the expectation about the future, but also the confidence placed in it. Both of them are based on recent past and consequently end up with performing a deviation-amplifying role. As Minsky (1986) argues, "A history of success will tend to diminish the margins of safety that business and bankers require and will thus tend to be associated with increased investment; a history of failure will do the opposite" (p. 187). The limits of collective and individual rationality thus feed each other performing a deviation-amplifying role.

Drawing on *The General Theory*, Minsky (1975) places uncertainty at the centre of his analysis. Uncertainty mainly hits perspective yields on financial and real assets.

Investments need external financing thus this becomes a crucial issue. Advanced economies presuppose large and expensive long-term investments that are debt financed. The underlying expectation is that investments generate profits greater than debt commitments. This expectation, however, is not necessarily confirmed by facts. More generally, the coherence of a market economy does not require only the clearing of all individual markets. It also requires that investments actually generate profits greater than debt commitments (Minsky 1986, p. 141).

Starting from these presuppositions, Minsky (1975, 1978, 1982a, 1986) launches his attack on the dominant theory. Even if general equilibrium did represent a reliable approximation to reality, the price mechanism would not necessarily be able to coordinate the system.

In addition to the realism and stability of the general equilibrium, however, Minsky also questions the less ambitious concept of short-run equilibrium. Subjective evaluations ruling financial markets and expected returns on real assets are changeable and consequently investment is volatile. Short-run equilibrium continuously changes with the passing of time and the system never succeeds in reaching it.

Instead of speaking of equilibrium or disequilibrium, Minsky (1986, p. 176)**,** argues in terms of states of tranquility, which hide in themselves destabilizing forces destined to gain strength with the simple passing of time. As in case of the seasons, every state nurtures the forces destined to change it.

By relying on the rationality pillars, the dominant theory has amputated crucial aspects of the reality as uncertainty, the external financing of capital accumulation, the relevance of monetary and financial factors, the financial instability of capitalism and the crucial role of institutions. The originality and the importance of Minsky's contributions lies precisely in recovering these issues and placing them at the centre of his financial instability hypothesis.

From this point of view, Minsky does not place much faith in monetary policy. Given that a great part of the money supply is endogenously created by banks and given the innovative capacity of the financial system, the central bank has only a limited control over the supply of money. In any case, its intervention may turn out to be harmful as well as ineffective. As Minsky (1986) argues, "Monetary policy to constrain undue expansion and inflation operates by way of disrupting financing markets and asset values. Monetary policy to induce expansion operates by interest rates and the availability of credit, which do not yield increased investment if current and anticipated profits are low" (p. 303-4). Instead of aiming to control the money supply, the central bank should thus focus on its function as a lender of last resort. By enabling the funding of financial institutions and by sustaining asset prices, it might prevent or reabsorb financial crisis, so removing the threat of debt deflations and deep depressions. In any case, "Fiscal policies are more powerful economic control weapons than monetary manipulations" (p. 304). The task to stabilize and to support the economy has to fall on the government. This is the main message of Minsky's famous 1986 book: *Stabilizing an Unstable Economy*.

The followers of Hyman P. Minsky

The work of Hyman P. Minsky was not in the centre of interest of the mainstream economics. Even though he was ignored by orthodox economists (Wray & Tymoigne, 2008, p. 2), the heterodox scholars (especially post-Keynesians) have been elaborating Minsky's work to

this day. The recent financial crisis has made the Financial instability hypothesis more popular, and it has reached "at an all time peak" (Wray & Tymoigne, 2008, p. 2)

The financial instability hypothesis is very rich in institutional and microeconomical aspects. Therefore, with a certain level of simplification, two general attitudes towards the Minsky's hypothesis will be observed.

The first opinion states that Minsky's theory is standing out against straightforward mathematical formalizing. Some basic aspects of Minsky's hypothesis can be modeled but rigorous models "lose most of the richness of Minsky's account in the translation to mathematical language" (Foley, 2001, p. 54) The explanation of the hypothesis is provided mainly in plain text in order not to lose qualitative aspects of the theory. A good example of this attitude is Fazzari & Papadimitriou (Fazzari & Papadimitriou, Financial Conditions and Macroeconomic Performance: Essays in Honor of Hyman P. Minsky, 1992) where the majority of text and explanation of Minsky's theory can be dealt without any signs of algebra. Michael Carter (1989) extended Minsky's idea through new financial innovations, which had not appeared during formulating the financial instability hypothesis. Isenberg (1988) tested the relevance of the Financial instability hypothesis in consumer durable goods' sector during 1920s in the U.S. Mehrling regards Minsky as a representer "of continuation of the American institutionalism tradition of monetary thought, a tradition deeply influenced by roots in American progressivism" (Mehrling, 1999, p. 129) Another clear example of this sort of work is working papers by Papadimitriou & Wray (1999), Whalen (2001) or Wray & Tymoigne (2008).

Several others try to deal with the financial instability hypothesis by a rigorous mathematical apparatus. They are aware of complexity of Minsky's theory but regard an adequate simplification by mathematical modelling as useful. The first and the most important step was done by Taylor & O'Connell (1985), who modelled only macroeconomic aspects of Minsky's theory because numerous details of the theory are "beyond the reach of mere algebra" (Taylor & O´Connell, 1985, p. 871) An interesting rigorous work is the one by Santos (2005) who regards Minsky's model as what he calls "formal Minskyan literature";

that is, a specific case of "stock-flow consistent accounting framework".
Other authors tried to build Minskyan model on the base of Goodwin cycles model (Goodwin, 1967). Keen incorporates "prototypal real finance sector" (Keen, 1995, p. 614) into Goodwin model. After the change, the model may tend into instability instead of the original stability. In another work, Keen's (1998) model was extended also by incorporating the impact of a variable price level, and inflation-dependent rates of interest. Yet another author modifying the Goodwin model is Toichiro Asada (1989), who added monetary sector and Keynesian investment function into the former model. He called his model "Keynes-Goodwin model of the growth cycle" (Asada, Monetary stabilization policy in a Keynes-Goodwin model of the growth cycle, 1989, p. 146).
New Keynesian economists created also endogenous business cycle theories. Some of them cite Minsky and take inspiration from Minsky's work. Some others do not bear on Minsky; they are inspired by his work only in some parts. We appreciate the descriptive accounts and recognize that important aspects of these accounts may be lost in a mathematical model. A formal model, however, can illuminate the dynamic implication of interactions between variables more rigorously than is possible in purely descriptive models. For example, Minsky asserts that boom conditions lead to an increase in the ratio of debt to income. But because the boom causes both the numerator and the denominator of this ratio to rise, it is not obvious from a descriptive account alone whether the debt-income ratio rises or falls. A formal model is a natural vehicle for addressing this kind of issue. We will elaborate further on modeling the Financial Instability Hypothesis in a subsequent special section of this thesis.

7. The contemporary financial crisis

This section examines whether the current financial crisis, its origins and depletion, can be approached through Minsky's financial instability hypothesis. Commentators often use the term "Minsky moment" which refers to the point in which expectations change

a. The discussion about "Minsky moment"

The term "Minsky moment" was coined by Paul McCulley, the Managing Director at Pimco in 1998 during the Russian crisis (Lahart, 2007). The term became quite popular and can be often read in newspaper or financial journal comments concerning the financial and sub-prime mortgage market crises which occurred in 2007, see for example (Magnus, The Credit Cycle and Liquidity: Have we arrived at a Minsky Moment?, 2007), (Magnus, What this Minsky moment means, 2007), (Magnus, The Credit Cycle: Getting Closer to a Minsky Moment?, 2007), (Magnus, Is there time to avert a Minsky meltdown?, 2008), (Cassidy, 2008), (Chancellor, 2007), (McCulley, 2007),.

According to George Magnus, a Senior Economic Adviser at UBS Investment Bank, a "Minsky moment" occurred "when lenders become increasingly cautious or restrictive, and when it isn't only over-leveraged structures that encounter financing difficulties. At this juncture, the risks of systemic economic contraction and asset depreciation become all too vivid" (Magnus, The Credit Cycle and Liquidity: Have we arrived at a Minsky Moment?, 2007, p. 7). Magnus defines Minsky moment as "the point where credit supply starts to dry up, systemic risk emerges and the central bank is obliged to intervene" (Magnus, What this Minsky moment means, 2007)

The term Minsky moment is sometimes used very confusedly with a meaning that differs from Magnus's definition as quoted above (Vercelli, 2009). The Minsky moment is sometimes also connected with the debt-deflation process describing the timing of Ponzi schema's collapse. Therefore, the "Minsky moment" (the certain point in time – Magnus definition above) and the "Minsky process" (process or chain of events leading to the collapse and debt-deflation, which started at "Minsky moment") should be distinguished.

Edward Chancellor (2007) stresses the fact that the best place for comparing Minsky´s hypothesis with reality is the U.S. residential real estate market. The behavior fitting to Minsky's hypothesis can be seen there; because of the boom of housing market, the households ran into debts, and the lending standards were lowered. "The margin of safety has declined both for borrowers and lenders" (Chancellor, 2007) but these behavioral patterns were not only limited to the housing market: "A deflationary bust was avoided by the authorities in 2002.

But the very success of central bankers' easy-money policies has encouraged people to play with fire. Debt has escalated. Competition among financial institutions has contributed to looser lending standards. New entrants into the credit markets and financial innovations have eroded the power of old regulations to protect the credit system. In many financial transactions the margin of safety has been whittled away" (Chancellor, 2007)

For Paul McCulley "the explosion of exotic mortgages – sub-prime; interest only; pay-option with negative amortization, et al. – in recent years, has been textbook examples of Minsky's speculative and Ponzi units" (McCulley, 2007, p. 3) As he points out, this boom cannot last forever and must reach its end. Holders of Ponzi units will get into financial troubles and will have to sell out of position to survive. According to McCulley, this is what could be seen on the financial market during the financial crisis.

Some commentators stress Minsky's ideas about the stabilization policy of avoiding the financial market inclination to fragility. For example, John Cassidy advises: "Rather than waging old debates about tax cuts versus spending increases, policymakers ought to be discussing how to reform the financial system so that it serves the rest of the economy, instead of feeding off it and destabilizing it" (Cassidy, 2008)

It is obvious that commentators link the current financial crisis with the Minsky's financial instability hypothesis. However, the connection is not so straightforward as it looks at first sight. "The commentators were right to draw attention to the fact that the current crisis has all the attributes of a Ponzi financing scheme that risks turning into a full-scale debt deflation. However, it is clear that the crisis is not the result of a traditional endogenous Minsky process in which narrowing margins of safety lead to fragility" (Kregel, Minsky´s Cushion of Safety, 2008, p. 21). The problem of margins of safety should be focused on because the important difference between the Minsky's hypothesis and the events occuring during the crises lays there.

According to Minsky, the crises occur because of the lowering margin of safety that becomes inadequate. This is caused by optimistic expectations about the future which are based on the successful present experiences. What Kregel suggests is that the present fragility is not rooted in declining margins of safety but in the way of credit

evaluation. According to Minsky, bank evaluate borrower‘s credit history and bank officers‘ good experience with a borrower leads to the reduction of the margin of safety because they expect sufficient past experiences to persist also in the future. The collapse occurs when expectations about future worsen, and the margins of safety become insufficient because they were linked to different conditions in the past. Kregel points out that nowadays, the way of credit evaluation is different. Credit evaluation is no longer taken by banks (in the U.S.), but is taken by the credit rating agencies. Kregel states that "this system has produced a new form of bank operations now known as "originate and distribute", in which the bank seeks to maximize its fee and commission income from originating assets, managing those assets in off balance-sheet affiliate structures, underwriting the primary distribution of securities collateralized with those assets, and servicing them. Under this system, the banker has no interest in credit evaluation, because the interest and principal on the loans originated will be repaid to the final buyers of the collateralized assets" (Kregel, Using Minsky‘s Cushions of Safety to Analyze the Crisis in the U.S. Subprime Mortgage Market, 2008, p. 4). This is a crucial difference from Minsky‘s analysis; in his times, banks were interested in the credit evaluation because they were also the holders of the loans. In this new system, banks generally let credit agencies do risk management instead of them. If we realize banks are also not holders of the various assets (mortgages etc.) – they sell them to final owners –, it is more comprehensible why they give up credit evaluation and let credit agencies do the job. It means banks also do not bear risk which is linked to the holding of problematic assets. But credit rating agencies do not look into the borrowers‘ history and do not have any personal knowledge about the borrower. According to Kregel, "bank assets are no longer represented by ‘trust‘ but by a number, generated by an algorithm that represents the statistical probability that the borrower will have the same creditworthiness as other borrowers with the same score" (Kregel, Using Minsky‘s Cushions of Safety to Analyze the Crisis in the U.S. Subprime Mortgage Market, 2008, p. 5). Banks statistically analyze time-series which do not represent an individual borrower‘s credit history but represent the credit history of previous borrowers from a certain group to predict future behavior of a borrower.

The margins of safety were simply insufficient from the very beginning. The credit rating done by credit rating agencies did not take into account the credit history of the borrowers; therefore, the credit evaluation was from the beginning very vulnerable to the unexpected events. "the fragility and insufficient safety margin had always been present" (Kregel, "Using Minsky's Cushions of Safety to Analyze the Crisis in the U.S. Subprime Mortgage Market", 2008, p. 11) The crisis just revealed the true conditions.

Although there is a different process behind the deterioration of margin of safety than in case of the Financial Instability Hypothesis, Minsky provides an important inspiration for understanding the current financial crisis. Minsky stresses the fact that any stability is destabilizing the whole system through speculative or less careful behavior which occurs during the time of euphoria.

If we look at the real estate market, one can analyze financial positions of borrowers (takers of mortgages), whose sustainability relied on the expectations that prices of their houses would only rise. This was the situation of the mortgages with an adjustable rate. They were fixed at low rate only for the first few years. Then, the rate of these mortgages was assessed by market. The borrower appeared in the Ponzi schema because if he wanted to repay the loan, he would have generally three possibilities. At first, his income would have to rise in order to balancing the movements of the adjustable rate in future. Secondly, the rates would have to remain at sufficiently low level, which would enable a borrower to repay the debt with respect to the level of income at the moment of taking loan. Finally, the last possibility would be that the price of the property would be during the existence of mortgage so high, that in case of default the borrower would be able to sell the property in order to fulfilling his financial commitments. In all cases, borrowers speculate about future development and do not know at the moment of taking loan whether they would be able to repay it in the future.

Generally, the Financial instability hypothesis help us explain why the financial crisis occur so suddenly. Nobody expected it to happen because the market with securitized mortgages and other financial assets were rising. Minsky explains it is the boom or the euphoria that prepares the crisis to come; it is the period when businesspersons are lowering their cautiousness (therefore, lowering margins of safety);

when financial institutions are innovating and creating new and more difficult financial instruments to avoid regulation and gain the maximum profit. It is important to realize that this sort of behavior is from their point of view considered rational. They do not know what is going to happen in the future, and the past experience validates their present decisions (to engage in more speculative positions, to avoid regulation etc.).
Minsky (1987) argued that securitization reflected two developments. First, it was part and parcel of the globalization of finance, as securitization creates financial paper that is freed from national boundaries. German investors with no direct access to America's homeowners could buy a piece of the action in US real estate markets. As Minsky was fond of pointing out, the unparalleled post-WWII depression-free expansion in the developed world (and even in much of the developing world) has created a global glut of managed money seeking returns. Packaged securities with risk weightings assigned by respected rating agencies were appealing for global investors trying to achieve the desired proportion of dollar-denominated assets. It would be no surprise to Minsky to find that the value of securitized American mortgages now exceeds the value of the market for federal government debt, nor that the subprime problems quickly spread around the world—from a German bank (IKB) that required a bailout in 2009, to problems in BNP Paribas (France's biggest bank), and to a run on Northern Rock in the UK. Therefore, it can be heard from many commentators and economists that the boom of financial instruments and their innovation is an example of Ponzi scheme, and why Jan Kregel states that they were right with the connection of the Minsky´s hypothesis and the current crisis.

The Minsky phenomenon of loosening credit and lending standards during a credit bubble included both the corporate borrowers and financial institutions. First, there are clear parallels between the mortgage market and the leveraged loan markets. These include corporate borrowers' high leverage ratios, declining credit standards ("cov-lite" loans instead of subprime), PIK (or payment-in-kind) deals (variants of negative amortization), insufficient monitoring by lenders due to the "originate and distribute" model (loans repackaged into CLOs instead of CDOs), banks' retained exposure (bridge loans as opposed to CDO equity tranche). In the financial system, margin

requirement for hedge funds and other leveraged speculators became lower and lower as the competition for prime brokerage services for hedge funds among lenders became fierce.

Housing bubble, mortgage bubble, credit bubble, debt bubble and asset prices (equities, housing, prices of corporate debt and other risky loans) rising well below what could be justified by the economic and credit fundamentals. It certainly looked like a typical Minsky Credit Cycle. The first crack in this cycle was the bust of housing and of subprime mortgages in the US. The second crack was the spread of the subprime carnage to near prime and prime mortgages and to subprime credit cards and auto loans. The third crack is the most recent repricing of risk in a variety of credit markets and the beginning of a credit crunch in the LBO and corporate credit markets.

Note also that, as Minsky - as well as more recently the BIS – have warned the deflation of such credit-driven asset bubbles is historically painful and associated with economic downturns and recessions. So "Have we reached a Minsky moment?" It certainly looks like it.

8. CRITICAL REACTION

a. Mainstream economics

Having searched extensively the academic literature, we were not able to spot any structured critique on Minsky by the mainstream economists. In contrary as we will state in a latter section of this thesis there is a growing number of academic papers where mainstreamers try to incorporate Minsky's ideas in a neo-classical or new-Keynesian frame of analysis.

Perhaps a more serious problem with Minsky's theory is that the previous financial booms (at the end of the twentieth century) were characterized more by equity than debt finance, and even featured the issue of equity to pay off debt (Toporowski 2005 p.143). The conventional wisdom in the finance professions is that equity affords companies cheap and secure finance. Its expansion in recent stock market booms would therefore, in principle, stabilize rather than undermine corporate finances.

Minsky's view that financial instability is inherent in financial market was not the liking of equilibrium theorists. At conference in Bad Homburg, in May 1979, critics sought to bring out inconsistencies in

his analysis. The faults attributed to that analysis that were rhetorical ("irresponsible...demagoguery" in the view of Raymond Goldsmith), or addressed to the Kaleckian or Keynesian apparatus that Minsky employed in determine the cash flows out of which payments to financial intermediaries are made, may be left aside here. The remaining criticisms may be reduced to three points. The first was the cash flow concept of income that Minsky used to identify the point at which corporate balance sheets start to deteriorate because additional financing is required to pay current expenses. The second was that of an economic boom that causes deterioration of corporate balance sheets or financial asset portfolios. This may occur simply because some outgoings may be 'lumpy' in relation to income. Finally, it was argued that there are sufficient distinctions between systems of financial intermediation, and their lender of last resort support, to make Minsky's thesis of increasing financial risk as economic expansion proceeds less general than he supposed.

These criticism have to be assessed with care. Their implicit starting point was a general equilibrium model subjected to stochastic shocks, which would clearly have to balance sheet effects that Minsky envisaged, but not in a systematic or cumulative way. This is the classical model in which, according to Slutsky, random shocks create apparently cyclical disturbances. Indeed, providing refinancing facilities are available at all times, then deficient cash flows can always be overcome by additional borrowing. However, this is just a way of saying that all financial crises are caused by illiquidity rather than insolvency. By showing how assets depreciate with the onset of a crisis, Minsky showed that illiquidity can lead to insolvency. Since the 1930's , the liquidity of banking systems has not been in question, except in markets on the periphery of the capitalist world affected by Hawtrey's 'unstable credit' . In more financially advanced countries, the accommodation of banks' liquidity need by central banks and wholesale money markets ensures that banks do not fail, at least in their domestic business. However, this does not mean they will advance money to illiquid companies, or should even be encouraged to do so. Furthermore, the social underwriting of bank balance sheets has now been overtaken by increasing financing in long-term securities markets. Securing bank liquidity therefore still leaves at risk the liquidity of the corporate sector, which is now increasingly dependent

upon financing and refinancing in markets for long-term securities that do not have assured liquidity. Here the expansion of long-term financing during a stock market boom can have disastrous effects on companies that use that boom to make profits out of balance sheet restructurings (changing their financial liabilities and engaging in merger and takeover activity) and on banks experiencing disintermediation. But there are features of capital market inflation rather than of Minsky theory.

The most serious gap in Minsky's analysis therefore emerged after he had published his 'financial instability hypothesis'. This gap concerns the model of corporate financing that developed in the USA and the UK during the 1980s and the 1990s. As the economic and financial booms of the 1980s and the 1990s proceeded, it was not corporate debt that increased, but equity (share or common stock) finance. From an orthodox finance point of view, such equity finance stabilizes corporate cash flows because dividend payments are, in theory at least, at the discretion of the company. Such an arrangement should, again in theory, prevent the 'deterioration in company balance sheets', that Minsky viewed as the forerunner of financial crisis (Toporowski 2005 p.144). This is because payments by a company on its equities could be matched to its income. However, this presupposes that companies invest only in productive capital assets, such as plant and equipment. In fact with the financial booms of the last decades of the twentieth century, companies were increasingly using their equity capital to take speculative positions in the financial markets that required further refinancing to be profitable. Among large corporations, merger and takeover activity requires subsequent resale of subsidiaries to profit from rising equity prices. Among medium-sized corporations, high-interest debt must eventually be refinanced in a liquid equity market (Toporowski 2005 p.144)

The increasing dependence of corporations on the liquidity of equity markets in fact arises when equity market liquidity is profoundly ephemeral. Such equity market liquidity not only loosens central banks' control over money and credit in the economy. It is also less amenable to regulation by interest rate policy (lower interest rates can rarely stimulate demand in a falling stock market). Lender of last resort facilities, by which Minsky and Kindleberger set great store, are also less likely to place a safety net under the resulting financial

fragility. This is because only the most reckless or desperate Ponzi financiers are likely to borrow even at the lowest rates of interest to refinance assets whose market value is falling.

Regarding the efforts of new-Keynesians to include Minsky's ideas in their analytical frame Palley (2009 p. 15) notes: "Minsky was an avowed Keynesian and his approach is consistent with Keynesian economics that takes as its point of intellectual departure that capitalist economies are susceptible to crisis and are not automatically self-adjusting. New Keynesians (Bernanke et al., 1996, 1999; Kiyotaki and Moore, 1997) have also tried to incorporate Minsky's thinking into their models through the notion of a financial accelerator". The new Keynesian financial accelerator succeeds in creating a financially driven business cycle but it is fundamentally different from Minsky's financial instability hypothesis. Whereas Minsky's approach is one of evolutionary instability, the new Keynesian approach is one of stable equilibrium, which by definition cannot incorporate the financial instability hypothesis.

Instability is not possible in new Keynesian models with rational agents who form expectations that peer into the future. These agents would recognize the economy is headed on an unstable path, and immediately bring those implications to the present forcing in place alternative stable arrangements. In the new Keynesian model the structure of the world is known and future outcomes can be predicted subject to the caveat of white noise disturbances. This new Keynesian construction of the economic process fundamentally contradicts Minsky's construction which is about the gradual evolution of instability that agents are blind too yet is inherent in their behaviors. This is not a matter of irrationality or bounded rationality. In Minsky's world agents can be completely rational but their actions cause the economy to evolve in a way that predictably tends to instability, but agents do not recognize this.

"The implication is that the neo-classical agent based rational expectations modeling methodology that now dominates macroeconomics is methodologically incapable of representing Minsky's financial instability hypothesis. This is because neoclassical methodology has in mind a different construction of the economic process – one that is stable and fixed. Cycles can be generated by adding mechanisms like the financial accelerator, but Minsky is about

more than cycles. Likewise instability can be created by adding stochastic disturbances – "shocks" – but that completely misrepresents Minsky's instability which is rooted in evolutionary process. In the neo-classical world crises can only occur because of shocks: hence the emphasis on fat tailed probability distributions, perfect storms, black swans and other metaphors of chance. That is a fundamentally different construction of crisis from that contained in Minsky's financial instability hypothesis" Palley (2009 p. 16).

b. Marxists

There is a more than obvious effort from many scholars to combine Marx's and Minsky's views of the cycle and economic crisis.

James R Crotty (1992) writes that "The goal of this paper is to reformulate Marxian investment theory so that it can provide an organic explanation of key "stylized facts" describing capital accumulation in US goods-producing industries in the past fifteen years. This reformulation requires two innovations. The first is a demonstration that Keynesian-Minskian ideas about uncertainty and financial fragility follow logically from the core assumptions used by Marx to construct his theory of accumulation…" while Steve Keen (The Minsky Thesis: Keynesian or Marxian?) states that "The conventional understanding of Marx's theory of money is derived from Marx's commodity money model in Volume I of *Capital*, and there is nothing which such a vision of money could add to Minsky's analysis. However I contend that, not only is there much in Marx's analysis of cycles which is consonant with Minsky, but also that Marx's dialectics provides a philosophical foundation for a key aspect of Minsky's theory, the proposition that there are two price levels in capitalism" (p 17), and in this same paper (p. 23) "Marx's dialectical analysis of the commodity is clearly consonant with Minsky's theory of systemic fragility, and it provides a unified basis for Minsky's analysis of capitalism's two price levels". Keen elaborates further in an effort to promote a new paradigm in economics "A key factor in the struggle to ensure that, this time, the new vision is not bastardized, is the recognition of its firm roots in the decidedly non-neoclassical antecedents of Kalecki, the non-equilibrium Fisher, Keynes "with the Prince", and Marx. If we recognize our common roots, then we are less

likely to fall prey to the 21st century's equivalent of the Keynesian-neoclassical synthesis (p. 24).

Palley (2009 p. 2) argues that "Hyman Minsky's financial instability hypothesis weaves together a medium term Keynesian approach to the business cycles in the spirit of Samuelson (1936) and Hicks (1950) with long cycle thinking of economists such as Schumpeter (1939) and Kondratieff" puts emphasis on the psychological aspects of the Financial Instability Hypothesis "Minsky's theory of the basic cycle involves important psychological influences. The move between financing stages is in part driven by agents becoming progressively more optimistic, and that optimism manifests itself in increasingly optimistic valuations of assets and assessments of revenue streams, combined with increased willingness to take on more risk in the belief that good times are here forever. This optimistic psychology afflicts both borrowers and lenders, and not just one side of the market. That is critical because it means market discipline is removed" (p. 6) and bridges Minsky with institutionalists, neoMarxists and the French regulationist school recognizing the importance and the power of Minsky's ideas "Minsky's thinking about the economic process has broad and wide appeal, making it attractive to many different schools of thought. The Minsky super-cycle describes the economy as passing through stages in which thwarting institutions are eroded and the process eventually ends in crisis. This emphasis on institutions makes it consistent with institutionalist economics. The "stages plus crisis" framework also resonates with the social structures of accumulation (SSA) school articulated by neo-Marxists such as (see for instance Kotz et al., 1994). It also resonates with the French regulationist school (see for instance Boyer and Saillard, 2002) that sees capitalism as organized by different regimes of production. Minsky is a natural complement to both SSA and regulationist. First, Minsky sharpens the focus on finance which until recently was relatively under-emphasized in SSA and regulationist thinking. Second, Minsky can be thought of as introducing a "double stage" approach that includes both long and short stages. Viewed in this light, regimes can be thought of as defining the long stage. Within that long stage, regimes undergo short stages of evolution (success breeds excess breeds failure), and these short stages eventually end in crisis that becomes the occasion for creation of a new regime" (Palley (2009 p. 14)

In a recent (April 2010) article titled "The Limits of Minsky's Financial Instability Hypothesis as an Explanation of the Crisis", Palley wonders whether Minsky's theory really explain the crisis "…Recognition of Minsky's intellectual contribution is welcome and deserved. Minsky was a deeply insightful theorist about the proclivity of capitalist economies to financially driven booms and busts, and the crisis has confirmed many of his insights. That said, the current article argues that his theory only provides a partial and incomplete account of the current crisis. In making the argument, I will focus on competing explanations of the crisis by progressive economists. On one side, Levy Institute economists Jan Kregel, Charles Whalen, and L. Randall Wray have argued the economic crisis constitutes a classic Minsky crisis, being a purely financial crisis that is fully explained by Minsky's financial instability hypothesis. On the other side are the new Marxist view of Foster and McChesney, the social structure of accumulation (SSA) view of Kotz, and the structural Keynesian view of Palley. These latter views interpret the crisis fundamentally differently, tracing its ultimate roots back to developments within the real economy" (p. 2), and ends up again with a bridge with Minskian ingredients "…Putting the pieces together, orthodox Marxists are fundamentally divided from new Marxists and SSA theorists at the theoretical level. So too are neo-Keynesians and structural Keynesians. However, once financial forces are incorporated (including Minsky's financial instability hypothesis), new Marxists, SSA theorists, and structural Keynesians appear to share a broadly similar theoretical framework. If there is a difference, it may well be a difference of degree of optimism" (p.15).

Furthermore Itoh and Lapavitsas in their book "Political Economy of Money and Finance" (Palgrave Macmillan (1999) note that although Minsky doesn't incorporate accumulation in his theory, his ideas should be studied carefully by Marxists and, since they lack themselves a consistent theory of the cycles, an effort should be undertaken targeting for a promising unification.

c. The Austrians

Recognizing the value of Minsky, the main effort of the Austrian school of thought seems to be the proof that his ideas either exist already in the writings of Austrians, mainly Veblen's, Commons and Schumpeter's, or are minor extensions.

Prychitko (2010) evaluates the Minsky hypothesis and discusses the Austrian theory of the business cycle against his theory from the

perspective of the theory and with reference to the current crisis. "Minsky offers some of the theoretical details of speculation during the boom phase, which is a positive feature of his hypothesis and allows us to see more clearly how the recent financial crisis played itself out, but in the end his cycle theory remains incomplete. The Minsky moment, a feature of the recent housing bubble, is something that the Austrian theory of the cycle is already fit to explain" (p. 1). He acknowledges some "common ground" between Minsky and the Austrians and underlines the fact that Minsky's Harvard thesis advisor, was Joseph Schumpeter. He then states that Minsky's view of the capitalist system is compatible with the Austrian one "…A Post Keynesian, Minsky himself departs from his professor (Schumpeter). He rejects the idea that capitalism tends toward something like general economic equilibrium, let alone can ever enjoy such a state. The system is non-ergodic. He prefers to borrow Joan Robinson's substitution of general equilibrium for "periods of tranquility" and with good reason. Capitalism does have its periods of well-coordinated long run growth, which need not be squeezed into the Walrasian model, with its tight prior commitments and barter-money contradictions. The Austrian School agrees with this particular point" (p. 3).

Prychitko recognizes the capability of Minsky's FIH to explain the current crisis but he states that the Austrian theory explains it too "The "Minsky moment", I shall now argue, is indeed a feature of the current recession, but one that the Austrian theory of the business cycle is already fit to explain" (Prychitko 2010 p. 14) and he concludes "The financial instability hypothesis does not provide a general theory of the cycle. It offers instead a particular theory of financial market breakdowns in the post-Great Depression era. But make no mistake. I believe we are likely to witness more Minsky moments in the future, especially if Big Players remain enmeshed within financial markets and the monetary order. In that economy, in our economy, "stability" is indeed destabilizing upward, particularly when the good times are caused by the inflationary policies of the nation's central bank" (Prychitko 2010 p. 22).

Whalen (2001) bridges Minsky with the Austrians, especially Veblen and Commons "Because Minsky's theory centers on the economy's evolving institutional structure, it should be of particular interest to evolutionary economists-especially now, an era in which even

mainstream economists are beginning to ask whether the economy has changed in fundamental ways. Both Thorstein Veblen and John R. Commons saw the need for a theory of capitalist development. In many respects, Minsky's work provides an extension of their forays into this realm. Minsky's theory is also a valuable complement of the more recent institutionalist literature on American economic structure, a fact capable of injecting additional strength into what is already an impressive research tradition" (p. 1). And in page 15 "To be sure, Minsky's theory is not the only possible extension of the analyses of Veblen and Commons. But as indicated by this brief discussion, there is more that unites the approaches of these three scholars than their view that capitalism is "an evolutionary concept," not "a single or static concept" (Commons 1934, 766). There are, in fact, numerous similarities between the early stages contained in Minsky's theory and the analyses of Veblen and Commons. There are also shared beliefs, including the notions that financial gain is the system's driving force and that the financial system is an important determinant of business structures and practices. Finally, Minsky's attention to the financial system makes his work an important complement to institutionalist writings on the structure of the American economy".

The above are representative of Austrians views on Minsky from which it becomes quite clear that there is room for further digging in search for a unified view.

Argitis (2009) makes an interesting point proposing an Institutionalist-Post Keynesian (IPK) alternative to the New Consensus Macroeconomics (NCM) based on Minsky "… Our belief is that the current crisis raises serious reservations upon the NCM, which is the prevailing mainstream analytical framing that provides the foundations for the implemented policy, especially monetary policy. Besides, we argue that in the context of the possible limits of the NCM, the return of Keynesianism is vital for both theoretical explorations and policy formulations. However, we pinpoint that it is worth setting forth an Institutionalist-Post Keynesian (IPK) analytical framing, which might provide the foundations for a more realistic macroeconomic analysis and policy guidelines. Hyman Minsky's financial Keynesianism is invaluable in this setting" (p.2). He criticizes the mainstream Neoclassical theory and in particular its failure to deal with the current crisis "The episodes of instability and crisis throughout the 1990s and

2000s, with the August 2007 credit crunch in the US financial system to be the most severe since the 1930s, put forward the question of the aptness of the interest rate policy for eliminating the incoherence so evident in both financial markets and the markets determining output and employment. The NCM does not deal with the full set of relations that must be satisfied for a capitalist economy with complex financial system and practices to be coherent and it does not offer a basis for modeling investment in a manner that made financing a principal variable. This would require the price of capital assets and financial markets to be taken into account in effective demand considerations. Nevertheless, the neoclassical foundations of the NCM inflict into the analysis a price theory that is limited to explaining how relative prices of currently produced goods adjust (or not) and markets are cleared (failed); the financial and capital-asset-price validating relations that must be satisfied if the economy is to be coherent are ignored. The NCM seems to ignore what Arrow and Hahn (1971) have proposed few decades ago that decentralized markets cannot yield a coherent result for an economy where money contracts created by banks and external finance are required for investment" (p. 12-13) and proposes an alternative IPK theory based in a monetary production economy in Hyman Minsky's Wall Street variant. "… the focus of an IPK theory should be upon the institutionalization of the following pieces of Minsky's Wall Street paradigm, as central pivots in developing a macroeconomic theory corresponding to the current state of capitalist evolution:

a) the capital development of an economy, which shows that the endogenous workings of the price system in an economy with sophisticated financial markets and practices do not always operate to achieve and sustain a coherent result.

b) the deals making by bankers and businessmen over money contracts in evolving financial markets.

c) the proposition that a capitalist economy is at best 'conditionally coherent'.

d) the flaws that a capitalist economy exhibits are to a significant extent due to time-dependent financial linkages and processes among markets.

e) the actual path an economy traverses depends upon institutions, financial relations and policies.

This set of conceptions and assertions could not be more at odds with the major perceptions and assertions made by the NCM. Their theoretical foundations are provided by Minsky's (i) two sets of price; (ii) financial theory of investment; and (iii) endogenous instability, with significant implications for economic policy" (p. 13-14). Argitis elaborates and analyzes in more detail the invaluable contribution of Minsky's ideas towards an IPK theory and concludes "…that an Institutionalist-Post Keynesian framework provides a better starting point to understand the inner working of capitalist economies. In this framing, financial considerations and not price stabilization and fine-tuning of economic activity must be the primary preoccupation of a central bank and of monetary policy. The Institutionalist-Post Keynesian framing considers the impact that monetary policy has on both the production side (economic growth, unemployment, output-price inflation) and the financial side (financial structure, financial stability, asset prices) of an economy that suffers from deficient demand and chronic unemployment and financial instability. It is proposed that central banks should concern about the smooth financing and funding of asset positions" (p. 22).

It is a known fact that Marx, Schumpeter, Keynes and Minsky are the economists who openly discussed the problem of the stability and instability of the economic and financial capitalist system. This caused a real gap among economists and publications as regards the approach to the matter: those who further trusted the traditional thought, called orthodox, and those who joined without reserve the new trend called the new economics. The fact is that both groups – although they made important scientific contributions – ignore one another, which is quite harmful. Paying attention to the conceptual and methodological contribution of both groups, beyond any ideology, for explaining and interpreting financial instability means more opportunities to expand the knowledge horizon and more theoretical and practical approaches and solutions.

Section B.
MODELLING MINSKY'S FIH

According to Sheila Dow (Dow: 2009) Minsky himself argued against the suggestion that he capture his theory within a single large model (rather than the illuminating collection of partial models he offered), on the grounds that structural cycles follow a general path which is predictable but that their timing is not determinate. This follows from the absence of true asset prices by which to judge actual prices, the role of conventional judgment, and the scope for that judgment to shift. Market sentiment plays a fundamental role in the valuation of assets, and can cause price increases, which are the unintended consequences of others' asset purchases, to be exaggerated and a euphoric boom to build up. Similarly falls in valuations which are the unintended consequences of others' sales can fuel panic selling.
This behavior is not purely rational in the mainstream sense, nor purely emotional, but the way in which individuals in a social market setting act under uncertainty. But because market sentiment is not determinate, neither the forces which ultimately cause it to change, nor the timing and severity can be predicted. According to this approach, therefore, focusing attention on (albeit more sophisticated) mathematical models to the degree that policy-makers relied on models before the crisis, could distract attention from other sources of knowledge and create a false sense of security. Effective macroprudential regulation designed to reduce systemic risk would need to be supported, not only by partial models of different aspects of the system, but also by attention to the indicators of fragility within a particular institutional environment. It would also require attention to new developments (in products and practices) which might create financial stress in the future. Above all macroprudential regulation would therefore require vigilance.
As Minsky (and Keynes) argued, models are good ways of depicting and analyzing mechanisms within parts of the economic system segmented off for analytical focus.

The generations of models based on the financial equilibrium concept are too limited to provide satisfactory explanations and viable solutions. The transition to a new category of models based on the

instability hypothesis means the interpretation of phenomena and processes according to a new concept that considers the aleatory behavior of contemporary financial markets, their complexity and fragility, the strong financialization and globalization of the contemporary economy.

Keynes's and Schumpeter's works and the critical comments made on Asian countries, the USA and European countries were important sources for Minsky and his followers for a new approach and interpretation of financial crises within economic cycles. Minsky developed the financial instability hypothesis as an interpretation, as he said, of the substance of Keynes's General Theory and as an attempt to confirm the significant characteristic of modern capitalism. The financial instability hypothesis, as a theoretical argument of crises, is based on the following important findings:

1. Modern capitalist economy is based: a) on investments in assets and capital (accumulation) that follow a real schedule b) on a sophisticated and complex financial system that is linked to the investment process and the real economy process.
2. Capital assets, able to produce income/profit, determine the economic agents to provide at present several amounts (including money borrowed from banks) for investments in order to obtain future return. Therefore, the present demand for investment goods depends on the size and intensity of expectations for future incomes, which expectations change rapidly, that is they have a high elasticity level. But the supply of investment goods is inelastic on short term. It changes only on long term. The highly optimistic expectations for future profit in conditions of widening gap between supply and demand raise the price of investment assets. The considerable rise in asset price is stimulated by the financial agency of banks and other financial institutions through loans, derivates, and sub primes, which threaten financial stability.
3. There is a general trend in the financial system to become increasingly indebted especially during periods of prosperity, which causes increasing vulnerability because of the debt deflation crisis in conditions of tolerance of both debtors and

creditors for the high leverage of the public and the private sectors.

4. To present realistically different financial situations in which economic units (households, companies, governmental units, banking and non-banking institutions and, by extension, national economies) are because of the contradiction between expectations and current realities, Minsky takes into account the way the funding sources, on one hand, and fund utilization in terms of cash flows, on the other hand, are managed, in other words, in what proportion they are:
   - Internal sources (profit) and external sources (loans), and
   - Debt service payment (interest + debt rate) and the new investment:

     Profit + loan = new investment + debt service.

To classify economic units, Minsky also considers the three types of cash flow:

- from income (return),
- balance sheet flow (existing and inherited obligations or debts),
- portfolio flow (resulted from transactions in which capital and financial assets change hands or the owner).

Cash flows from incomes are at the basis of balance sheet flows and portfolio flows.

Considering these important findings, Minsky classifies economic units (including national economies) into the following three categories:

- *hedge units* for which the cash flows from realized and expected incomes are enough to meet any time the main payment obligations (debts) and make investments;
- *speculative units,* when existing and inherited payment obligations (debts) are bigger than collections from realized and expected incomes, so that the only way to meet the payment obligations is debt rollover or even debt increase. To refund debts a good functioning of financial markets is required;
- *Ponzi units* represent the situation when, in most of the future moments, the payment obligations of the units exceed incomes, and these units have to increase debts to be able to pay the debt service. The Ponzi units (but less the

speculative one) resort also to portfolio transactions to meet their payment obligations, i.e., selling assets or debts. The success or the failure of these transactions depend on the economic cycle phase when the price of assets rises (the prosperity phase) or it decreases (the crisis phase when the assets bubble blows up).

The degree of financial instability or exposure of the economic system to the financial crises is closely linked to the share of each of the units mentioned above. A high share of hedge units ensures the robustness of the economic system. But a high share of speculative units and, especially, Ponzi units – in conditions of changes in the financial market (increasing interest or decreasing price of assets) – endangers the financial stability of the entire economic system and may stir up a financial crisis and economic recession.

There have been several prior attempts either to model Minsky's Hypothesis, or to generalize Goodwin's model to include financial variables, using a range of analytical foundations. Although familiar with mathematics, Minsky developed his theory mostly by descriptive means. Minsky's own attempts to devise a mathematical model of his hypothesis were unsuccessful, arguably because the foundation he used, the multiplier-accelerator model, was itself flawed (Keen 2000, p. 84-89). The first step towards the mathematical formalization of Minsky's theory, which characterizes the crisis in a macromodel for a closed economy, was made by Taylor and O'Connell (1985). Taylor and O'Connell (1989) built an elaborate model which attempted to capture Minsky's commodity and asset price dynamics in a one-commodity model, but which made some questionable assumptions about the pricing of capital goods (p. 4) and employed some behavioural concepts derived from rational expectations (p.7) and IS-LM analysis with exogenous money (p.9,11) which are antithetical to Minsky's method. More analytically the Taylor-O'Connell (T-O) model is a Minskian macro-model that pertains to a closed, developed capitalist economy. The model stresses two assumptions. First, total wealth in the system changes with confidence and with the position of the system in the business cycle. Second, in certain settings asset substitutability in portfolios becomes high,

increasing the potential for capital flight or a shift into money from claims to real assets (Taylor-O'Connell 1989, p. 9). What role does financial fragility of firms play in the T-O model? The authors argue firms' net worth changes over an expansion. A firm's net worth is defined as assets minus liabilities; assets consist of the capitalized value of its plant and equipment, and liabilities consist of the value of its equity. According to T-O, net worth is negatively related to the interest rate and positively related to the rate of profit. As the early part of a boom is characterized by a rising rate of profit and a falling interest rate, the net worth of firms is increasing (i.e., they are in a hedged position). They borrow against new net worth in order to expand their businesses. At the top of an expansion, the ratio of debt to net worth ("gearing" or "leverage") rises as growth in net worth slows, and, so, firms shift from hedged to speculative to Ponzi. After the peak, the exuberance component of the total rate of profit, which represents overall state of confidence, begins to fall, and, in turn, slows capital accumulation and raises the ratio of money to debt (provided the government holds the growth of money supply constant). Price of capitalized assets falls, leading to a decline in investment and a further decline in profit. As long as the rising money-debt ratio stimulates a drop in the interest rate, causing the exuberance factor and the total profit rate to rise, then investment will pick up and stimulate a recovery. In an environment of high asset substitutability, however, the money-debt ratio is likely to fall, not rise, implying that the interest rate will increase instead of decrease. Hence, the reversal of the exuberance factor component of the total profit rate and the pickup in investment are stymied. A recovery is hampered so long as the profit rate declines and rentiers are further driven towards holding money. Taylor and O'Connell indicate that bankruptcies can replace high asset substitutability in the generation of unstable dynamics in a monetary contraction (p.14-15). The authors argue the lack of coordination of firms' independent portfolio decisions triggers changes in total wealth, generating financial crises via a Fisherian debt-deflation process (p. 3-4). Crisis in this model occurs when the economy is in a phase of the business cycle where asset substitution is high relative to that found in the earlier stages of the cycle. Note, the expansion and contraction is intensified by the presence of financial intermediaries, whose assets and liabilities

expand and contract with the expansion and contraction of the economy; expansion is characterized by rising rate of profit and falling interest rate, and contraction is characterized by falling rate of profit and rising interest rate The model could not be simulated, and Jacobian analysis gave ambiguous results concerning the possibility of a debt-deflation, with the outcome depending upon the relative values of wealth holdings and share purchase to interest rate elasticities.

Asada (1989) constructed a quite elaborate model incorporating an investment function, variable capacity utilization, money and a government sector. However this model also employed an IS-LM framework in which the goods and money markets were assumed to clear (p. 148-149), and in which the money supply was exogenously determined. Unsurprisingly, this model demonstrated a separation of real and monetary variables (p. 151, 153) prior to the introduction of a variable capitalist propensity to save which depends inversely upon the expected rate of inflation.

Jarsulic (1989) generalised Goodwin's model to include a Post Keynesian treatment of finance, but at the expense of assuming constant income shares (p. 39). With the loss of one degree of freedom, Jacobian analysis showed that the model would generate a limit cycle, but it could not of course generate phenomena akin to a debt deflation.

Andresen (1996) applied a systems dynamics approach to economic modeling to argue via simulations that a debt deflation was an inevitability in a capitalist economy with finance. His method was to proceed from general principles of the behavior of financial flows within and between production, consumption and finance entities to a dynamic flow chart simulation without the intermediate step of reduced form equations

Important steps in modelling a financial crisis in a Minskyan tradition have been made by Vercelli (1999, 2000, 2009a, 2009b), Sordi & Vercelli (2003, 2006, 2010), Dieci, Sordi & Vercelli (2005) and others. Vercelli and his collaborators reinterpret Minsky’s financial instability hypothesis, moving from the description of so-called moments to the description of dynamic processes and considering as analysis

instruments the balance of net financial flows and the liquidity and solvency coefficients (rates) at unit level and aggregate level. Also, they explain cyclical fluctuations, redefine the financial instability states and the expectation extrapolation, and reconsider the Minskyan classification of units and economies according to their financial state. Sordi, Dieci and Vercelli describe the complex dynamic behavior of units and economies and the conditions of discontinuities, bifurcations and the chaos state of the economies, using a simple aggregate model with equations containing differences, as well as an amended and generalized version of the discrete-time non-linear multiplying-accelerating model built by Goodwin.
The above-mentioned authors based their approaches on the Keynesian idea that the explanation of fluctuations and instability should consider dynamic incongruities between certain current realities and long-term expectations for a low-level probability of investments of their rate of return and of other factors and ingredients. Moving from the real economy to the nominal economy we may come to the same explanation of the cause of instability, i.e., that one represented by the interaction between the evolution of current cash flows and the evolution of anticipated (intertemporal) cash flows considered at the unit level and aggregate level.

An important step in the theoretical and empirical approach to financial instability was made by Foley (2001) by changing the Minskyan Model of the crises formalized by Taylor and O'Connell. According to critical comments made by Foley, the Taylor-O'Connell model, preserving the closed economy hypothesis, had to keep the Kaleckian relation of equality between the asset increase rate (g) and the saving rate (s), from return (r), namely, $g = sr$. This relation implies a sub-unit saving coefficient, $s < 1$, and, at the same time, a Minskyan regime of hedge units in which the rate of return is higher than the asset increase rate, $r > g$, which is contradicted by reality.
The adoption of the open economy hypothesis for the inflows (imports) of capital from abroad allows that the asset increase rate (investment rate) exceed the rate of return, $g > r$, which implicitly means that Minsky's speculative regime is accepted as a real and natural fact.
Foley analyses in his model the financial fragility not only at the company level, but also at the national economy level, as national

economies are considered the totality of companies or their aggregate mean. He uses, on one hand, Minskyan criteria to comply with the three financial situations of the companies and national economies (hedged, speculative and Ponzi) while passing through the stages of the economic cycle (revival, boom, collapse) by comparing some specific indicators expressed either in absolute figures or in relative figures computed in two ways: by average rates and by marginal rates.

Foley uses cash flow balance sheet method, according to which the total of funding sources should be equivalent to total utilization of funds. The specific indicators, expressed in absolute figures, refer, on one hand, to the funding sources and represent the net operational returns, R, and net loans, D, and, on the other hand, they refer to fund utilization and represent investments (accumulations), I, and debt service, V. The two categories of funds, expressed through the above indicators, have the form of the following equivalence relation:

$$\mathbf{R+D=I+V}$$

where R is profit and V is debt service payment. A firm's debt contract is simply the finance it receives in exchange for debt service (stream of interest and principal payments); bankruptcy occurs if a debt service payment is missed. The path of a firm's financial health, and solvency, can be described by the growth and profit rates of its assets and by the interest rate. To see why start with the above equation ,subtract R from both sides, divide I and R by the firm‛s assets (A), and divide V by the firm‛s stock of debt (B):

$$\boldsymbol{D = (g-r)A + iB}$$

where r is the profit rate (R/A), i is the interest rate (V/B), and g is the rate of growth of firm's assets (I/A). For the economy as a whole, or for the representative firm, a similar equation results where the capital stock (K) is used in place of A as the denominator for r and g and where the current account deficit is taken to be new external borrowing (D). (Recall, if the balance of payments is to equal zero, then the current account is essentially the negative of the capital account.) Thinking of the economy in terms of a representative firm, then, financial fragility of the system evolves along a path traced by the combination of the rates of interest (i), profit (r), and growth (g).

What are the Minskian classifications for an economy's financial state according to the Foley framework? The economy is called "hedged"

when the rate of profit (r) is greater than the rate of accumulation (g) and the rate of interest (i): r > g > i or r > i > g. Under these conditions, debt service is paid out of profit and new investment is covered by a combination of profit and borrowing. The economy is in the speculative state when the rate of accumulation is greater than the profit rate: g > r > i. If the interest rate rises, debt service payments can still be made, as long as they do not exhaust profit obtained from productive investments. As soon as the interest rate becomes greater than the profit rate, the economy passes into the Ponzi state: i > r. In this state, the economy is vulnerable to financial crisis or is financially fragile. Solvency is now entirely dependent upon creditors' confidence in the economy's ability to generate revenue. If this ability is perceived to be impaired, creditor confidence will diminish (Foley 2001, 4-7).

The above description of the evolution of financial fragility suggests that monitoring the trends in g, r, and i, and the relationships between the trends, could assist the assessment of a country's vulnerability to financial crisis. For instance, the transition from the hedged regime to the speculative regime suggests that rate of profit is falling relative to the rate of accumulation, enabling the switch from r > g to g > r. Likewise, the shift from the speculative regime to the Ponzi regime suggests that the rate of profit is falling relative to the interest rate, enabling the shift from r > i to i > r.

Further accuracy in such an assessment could be achieved by incorporating the presence of speculative investment. As a boom progresses the rate of profit on productive investment has a natural tendency to fall and to become more uncertain. Capital is diverted from away from productive investment towards speculative investment as firms attempt to offset increasingly uncertain, lower expected returns on productive investment with relatively higher, seemingly more secure expected returns on speculative investment in the stock market and in real estate, "more secure" due to the short-term nature of the investment. This diversion tends to inflate asset prices.

Capital inflows that specifically seek short-term gains will exacerbate this tendency. Increased speculative investment, relative to productive, enhances the system's vulnerability to financial crisis as it relies on investors' confidence, which can shift quickly.

Steve Keen (1995) used Goodwin's growth cycle model (Goodwin, 1967), which generates a trade cycle with growth out of a simple deterministic structural model of the economy. The foundation of his model is Goodwin's model of cyclical growth, which was itself based upon the Lotka-Volterra predator-prey model of species interaction on the one hand, and Marx's income-distribution/employment model of the trade cycle on the other. Over one century later, his arcane language notwithstanding, the best expression of this model is still that given by Marx: "a rise in the price of labor resulting from accumulation of capital implies ...accumulation slackens in consequence of the rise in the price of labor, because the stimulus of gain is blunted. The rate of accumulation lessens; but with its lessening, the primary cause of that lessening vanishes, i.e. the disproportion between capital and exploitable labor power. The mechanism of the process of capitalist production removes the very obstacles that it temporarily creates. The price of labor falls again to a level corresponding with the needs of the self-expansion of capital, whether the level be below, the same as, or above the one which was normal before the rise of wages took place ...To put it mathematically, the rate of accumulation is the independent, not the dependent variable; the rate of wages the dependent, not the independent variable". Goodwin showed that this could be modeled as a predator-prey system in which workers share of output played the role of predator, and the rate of employment the role of prey First stage: Goodwin's model (of Marx's cyclical growth theory) causal chain

- Capital (K) determines Output (Y)
- Output determines employment (L)
- Employment determines wages (w)
- Wages ($w \times L$) determine profit (P)
- Profit determines investment (I)
- Investment I determines capital K
- chain is closed

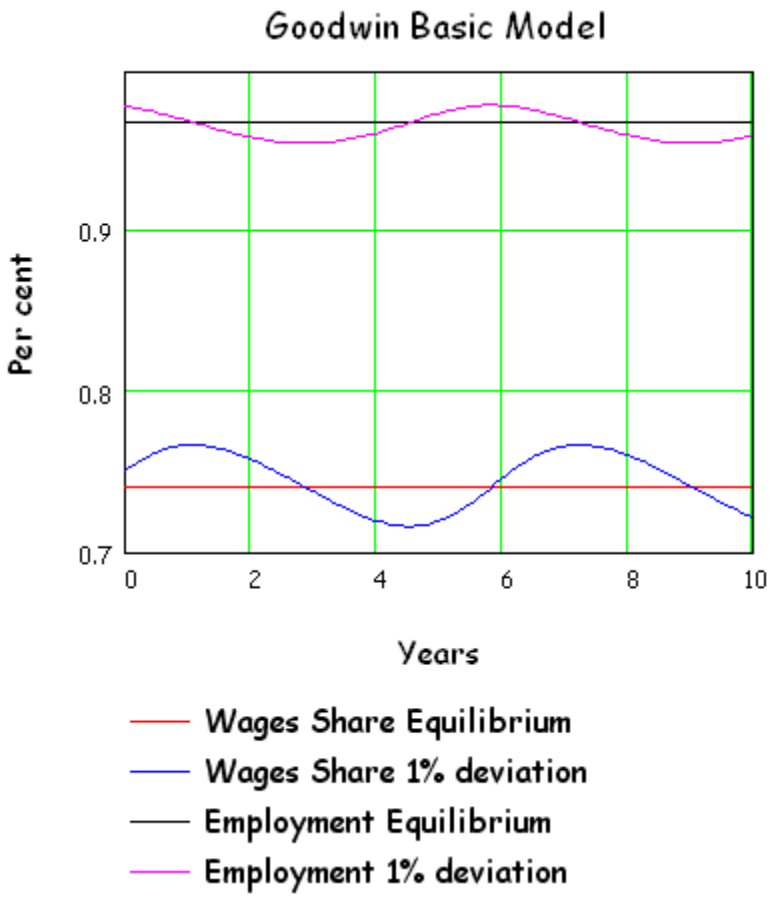
Goodwin assumed constant growth in labor force productivity (at α% p.a.) and population growth (at β % p.a.) The sole nonlinearity in Goodwin's model was a "Phillip's curve" relation between the level of employment λ and the rate of increase of wages *w*

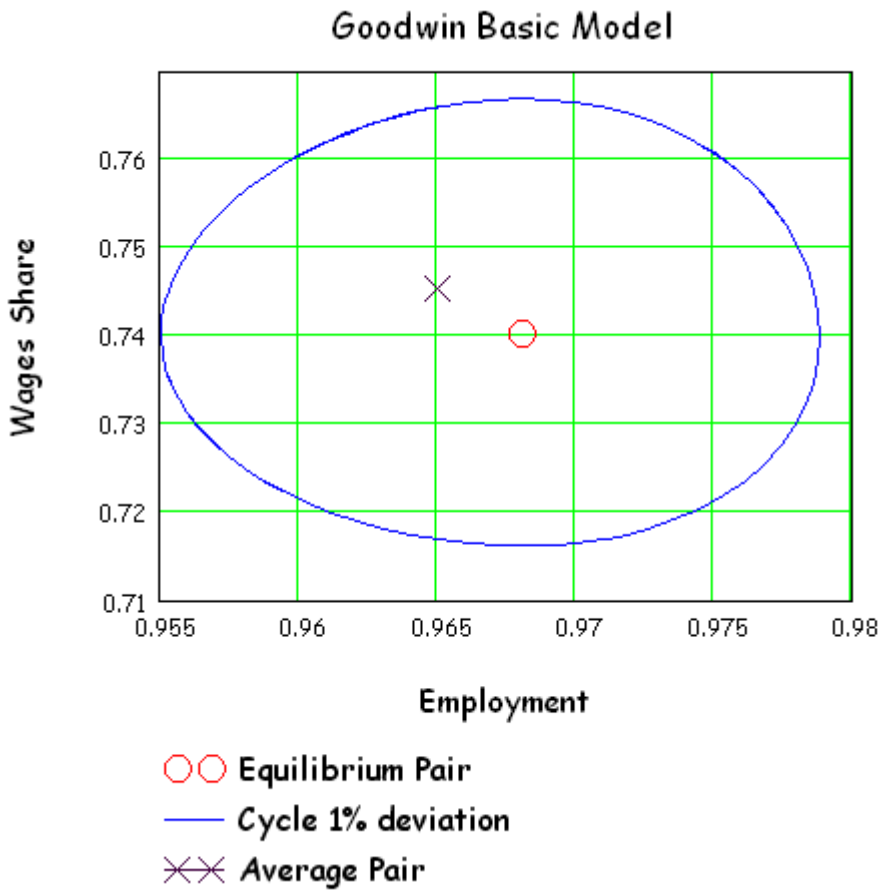
$$\begin{aligned} \frac{d\omega}{dt} &= \omega \cdot (P(\lambda) - \alpha) \\ \frac{d\lambda}{dt} &= \lambda \cdot \left(\frac{1-\omega}{v} - \alpha - \beta \right), \end{aligned} \qquad (1)$$

where ω is the wage to output ratio, is a nonlinear relationship between the rate of change of wages *w* and the rate of employment (known as the "Phillips curve''), λ the rate of employment or employment to population ratio , α the rate of growth of labor productivity, the rate of population growth, and v the capital to output ratio . As is well known, this model generates a stable limit cycle. The model also has an easy verbal explanation. The first equation says that workers' share of output will grow if their wage demands (which are based on the level of employment) exceed the rate of growth of labour productivity; the second that the level of employment will grow if the rate of economic growth exceeds the sum of population and productivity growth. Properties of this simple model illustrate why nonlinear systems are so different to linear ones

- Like predator-prey system, equilibrium is *neutral*: model neither converges to nor diverges from equilibrium;
- Deviations above & below equilibrium don't "cancel each other out": equilibrium is **NOT** the average
    - Property not a result simply of "quirky" functions (like Phillips curve) but nature of nonlinear system

Simulating the above simple model Keen gets


Goodwin Basic Model
Per cent
0.9
0.8
0.7
0
2
4
6
8
10
Years
Wages Share Equilibrium
Wages Share 1% deviation
Employment Equilibrium
Employment 1% deviation



The models specified above still contain one glaringly unrealistic element: capitalists are assumed to invest all their profits. While this assumption accords with conventional Kaleckian practice, it is inappropriate in a truly dynamic analysis of capitalism, for two reasons. Firstly, it takes no account of capitalist behavior in the determination of investment which, in Kaleckian analysis, is of fundamental importance in determining the performance of the capitalist economy. This assumption stands in marked contrast to Minsky's own analysis of the cyclical nature of capitalist expectations and their role in the determination of investment, and he was aware of this, despite his later reliance upon Kaleckian identities (see for example Minsky 1982 p.81-82, where he describes these assumptions as "heroic").

Secondly, the assumption that capitalists invest all their profits makes investment a linear function of the rate of profit. As Figure 18 indicates, such a function of course predicts negative investment

when profits are negative. In the context of Goodwin's model, this assumption also has the result that capitalist investment is lowest when the economy is booming, since the profit share of output reaches its perigee when the rate of growth of output has absorbed most of the available labor, thus leading to a blowout in the real wage. According to Keynes, investment is a function of capitalist expectations of profit, and in a world of fundamental uncertainty these expectations are inordinately influenced by the present performance of the economy. A high current level of profit will thus inspire a high rate of investment, and vice versa. As Minsky emphasizes, capitalist expectations will become "euphoric" (Minsky 1982 p. 120-124) when high profits are sustained, which motivates them to seek out debt to finance those investments which cannot be financed out of retained earnings. Conversely, when profits slump, so too do capitalist expectations, and profits are used to retire debt, rather than to finance new investment. This nonlinear relationship between investment and the rate of profit can be modeled using the asymptotic form used for the wage change function, with parameter values that generate zero investment at zero or lower profits, rising to investment exceeding profits for some level of the rate of profit. This nonlinear investment relation replaces the equation $I=\Pi$ in Goodwin's model with a non linear investment function k(п) (п is the profit rate) we get

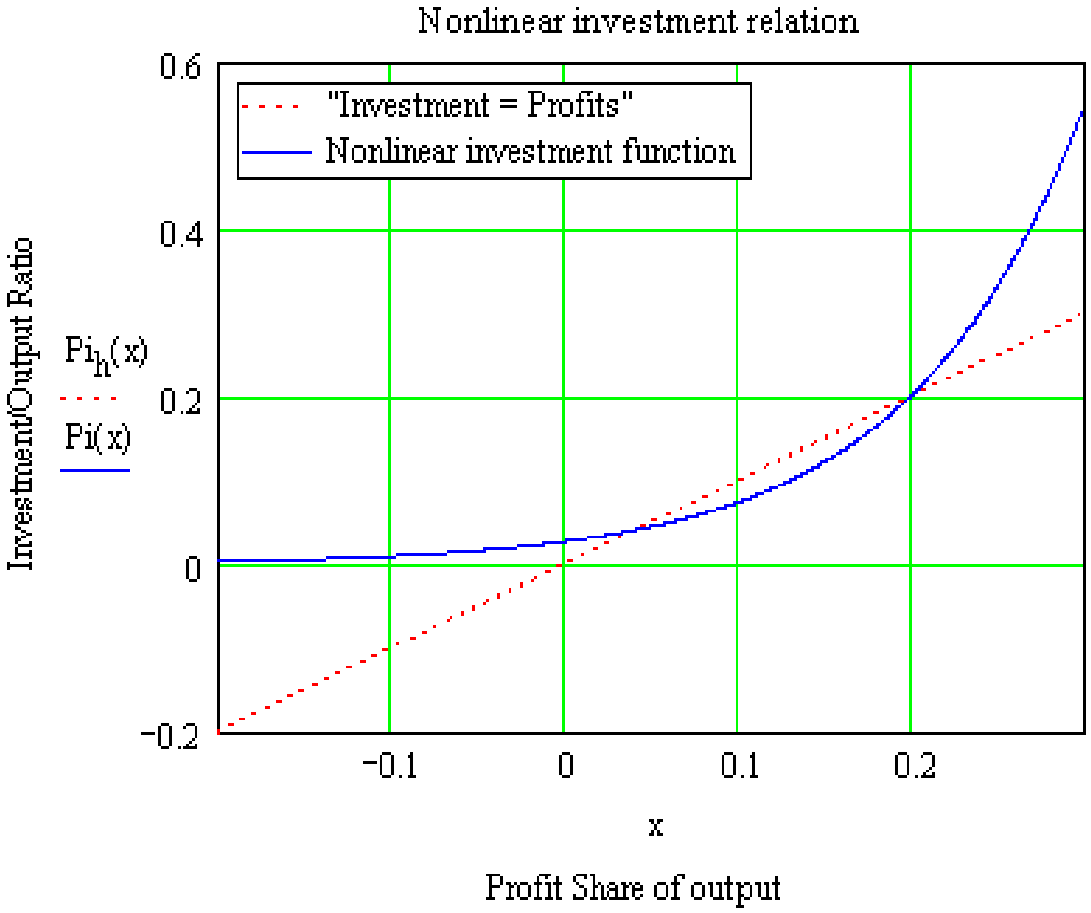
$$\frac{1}{\lambda}\frac{d\lambda}{dt} = \frac{k(\pi)}{v} - \alpha - \beta$$

$$\frac{1}{\omega}\frac{d\omega}{dt} = w(\lambda) - \alpha$$

There are many possible forms for the non linear investment function k(п), but a basic property should be that d(k[п])/dt is an increasing function of п. Keen uses

$$k(\pi) = E \times e^{F \times \pi} - G$$

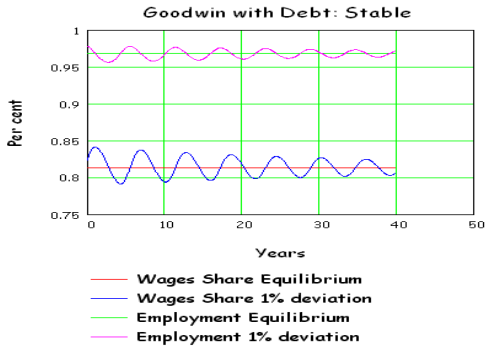
- Nonlinear investment function means
  - desired (and executed) investment during boom exceeds profits
  - desired (and executed) investment during slump is less than profits

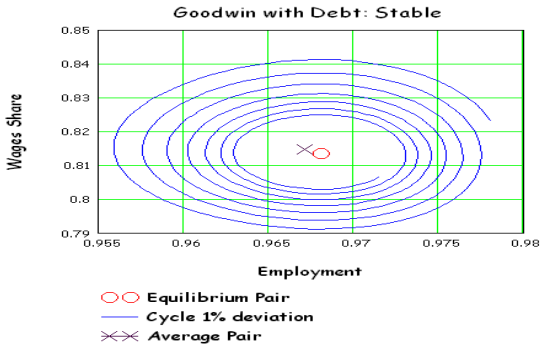


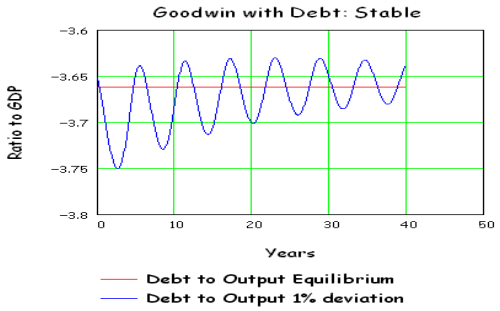
- Nonlinear investment function makes little change to nature of basic model: Still closed cycle But asymmetry much more obvious

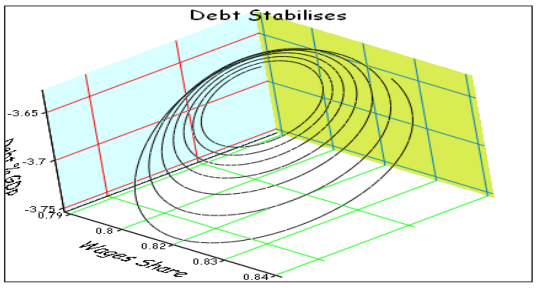
Elaborating further Keen introduces a banking sector into the model (for details check Keens site http://www.complexity.org.au/ci_louise/vol06/keen/keen.html

Simulating the model near its equilibrium, he gets



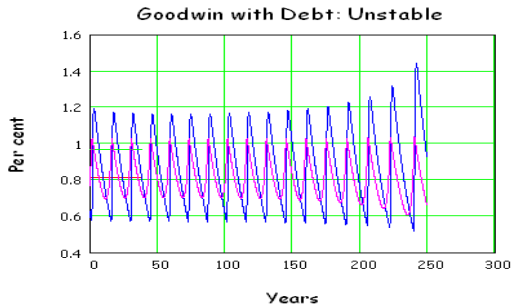


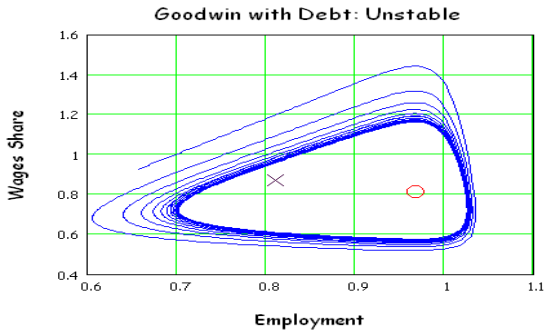


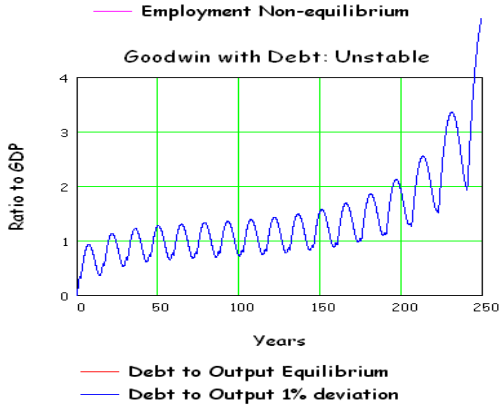


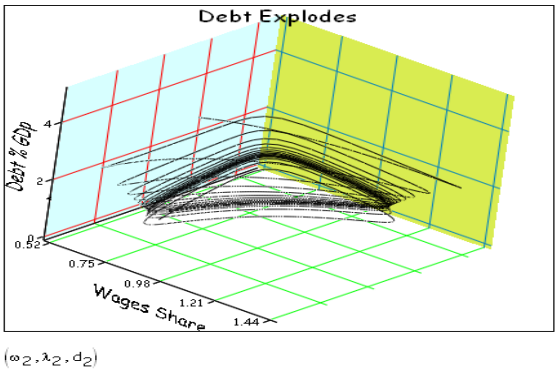
$(\omega_1, \lambda_1, d_1)$

While with different initial conditions









Keen then introduces a government sector which taxes and spends counter-cyclically and shows that such a policy prevents the development of a debt deflation in all relevant variants of the model (Keen1997p.138-165)and
http://www.complexity.org.au/ci_louise/vol06/keen/keen.html)

Keens modeling which forms his PHd dissertation (Keen 1997) concludes "Minsky's ambition in constructing the Financial Instability Hypothesis was to build a theory which "makes great depressions one of the possible states in which our type of capitalist economy can find itself" (Minsky 1982, p. xi). His purpose was to find "an apt economic theory for our economy" (Minsky, 1982 p. 68), since it was a manifest fact that capitalist economies periodically find themselves in such a

state. These models of a capitalist economy with finance, which have been constructed via "stylized fact" extensions to Goodwin's growth cycle model, are able to demonstrate the Fisherian essence of Minsky's Hypothesis, that capitalist expectations of profit during booms can lead them to incur more debt than the system is capable of financing during slumps. The breakdown which occurs is analogous to a debt-induced Depression in an actual economy. When such an event occurs, the model indicates a forever-increasing level of capitalist indebtedness. In the real world, however, the system continues but with some form of breakdown: some capitalists go bankrupt, many lenders write-off bad debts and suffer capital losses, and debt moratoria are often enforced".

Both the model and real world breakdowns follow paths predicted by Minsky, capturing his propositions (Minsky 1995 p. 198) that

> In a heavily indebted economy
>
> 1. even minor declines in profits and wages can lead to increases in nonperforming assets in the portfolios of financial institutions.
>
> 2. even minor increases in interest rates can lead to increases in nonperforming assets in the portfolios of financial institutions.
>
> 3. even minor increases in wages can lead to pressure on profit flows and therefore to an increase in nonperforming assets.

In these simulations, booms, which were unproblematic initially, become destabilizing later because of the increased debt to output ratios that develop over time. This corresponds with Minsky's predictions of a secular trend towards rising debt to equity ratios as the memory of the previous major crisis recedes, which makes the system more fragile. Income distribution effects are also important. The fall in workers share interacts with rising bankers share (at a slightly slower rate) to lead to a sequence of minor booms of increasing magnitude, until one occurring at a time of greatly increased debt leads to a runaway blowout in debt. In effect, a rise

in income inequality (between workers and capitalists) leads to a period of instability and then collapse, a concept explored in Minsky 1986. Argitis (2003) introduces a political-economy framework to investigate the role of finance in economic instability and crisis. Argitis argues that a rise in financial profits is likely to cause three fundamental problems in capitalism, namely income redistribution, deficient demand and financial instability. Argitis uses the terms Marx, Keynes and Minsky problem to name each of these problems respectively and he introduces a three class framework namely workers, industrial capitalists and financial capitalists which is more close to real economic activity. The three-class framework developed in his paper is an attempt to build a post-Keynesian perspective that is relevant for a capitalist economy dominated by financial interests and to show why such an economy is unstable. This perspective builds upon Marx's, Keynes', Minsky's and Kalecki's ideas and allows for the multiplicity of capitalist institutions, structures and practices in today's world. It is argued that the rise in income of rentiers, private bankers and other groups of financial capitalists merits responsibility for the economic and financial instability, unemployment and an increasing risk of deflation and crisis that many capitalist countries face today. The paper considers a Marx, Keynes and Minsky problem associated with a rise in financial profits and argues that the impact of finance on economic activity is, to a large extent, determined by institutional and structural factors.

And Keen (1997) continues: "In all these simulations, a long period of apparent stability is in fact illusory, and the crisis, when it hits, is sudden—occurring too quickly to be reversible by changes to discretionary policy at the time. The conventional policy response of governments to an overheated economy—increasing the interest rate with the intention of dampening investment and thus tempering the boom—acts not only upon the incentive to invest, but also upon the level of outstanding debt. If this level is already high, then increasing the interest rate may turn boom into crisis. The subsequent attempt to revive the economy by reducing interest rates—and thus stimulating investment, according to IS-LM analysis—amounts to trying to force the economy back down into the stable section of the vortex, when it has already passed into its catastrophic region. However, the centripetal forces which exist in

that region—the direct weight of accumulated debt upon a depressed economy, and the indirect weight of depressed capitalist expectations—are so great that any government action at that time may be too little, too late. This emphasizes the essential policy message of the Financial Instability Hypothesis, that we should avoid crises in the first place, by developing and maintaining institutions and policies which enforce "a good financial society" in which the tendency by businesses and bankers to engage in speculative finance is constrained" (Minsky 1982p. 69). These institutional arrangements include close and discretionary supervision of financial institutions and financial arrangements, fiscal policy which restrains the development of euphoric expectations during upswings and supplements capitalist cash flows during slumps, and a general bias towards income equity rather than inequality".

Keen is a very active member of the Minskian modelling approach and we believe that his research worths a close attention. Most recently (Jan 2011) he presented an extension of his model which combines the above results with the Stock Flow Consistent approach (see below) and we believe that this is going to be the basis for future development.

THE SFC MODELING APPROACH

> "The structure of an economic model that is relevant for a capitalist economy needs to include the interrelated balance sheets and income statements of the units of the economy" (Minsky 1996, p. 77).

> "I have found out what economics is; it is the science of confusing stocks with flows".
>
> A verbal statement by Michal Kalecki,*circa* 1936, as cited by Joan Robinson, in 'Shedding darkness', *Cambridge Journal of Economics*, 6(3), September 1982, 295–6.

The Stock Flow Consistent (SFC) method is rooted in the fact that every transaction by one sector implies an equivalent transaction by another sector (every purchase implies a sale), while every financial balance (the difference between a sector's income and its outlays)

must give rise to an equivalent change in the sum of its balance-sheet (or stock) variables, with every financial asset owned by one sector having a counterpart liability owed by some other. Provided all the sectoral transactions are fully articulated so that 'everything comes from somewhere and everything goes somewhere' such an arrangement of concepts will describe the activities and evolution of the whole economic system, with all financial transactions (including changes in the money supply) fully integrated, at the level of accounting, into the processes which generate factor income, expenditure and production.

All entries in the flow-of-funds sections of describe changes in stock variables between the beginning and end of the period being described. Thus the evolution of historic time is introduced into the basic system of concepts. The transactions in asset stocks imply the existence of an interlocking system of balance sheets.

These balance sheets measure the levels of all stock variables at some given point of time. And it is the configuration of stock variables which is providing the link between each period of time and that which follows it.

The evolution of the entire system may be characterized (at the level of accounting) by saying that at the beginning of each period, the configuration of stock variables (i.e. all physical stocks together with the interlocking system of financial assets and liabilities) is a summary description of (relevant) past history. Then the transactions described in tables heave the stock variables from their state at the beginning of each period to their state at the end, to which capital gains will have to be added.

The method will be to write down systems of equations and accounting identities, attribute initial values to all stocks and all flows as well as to behavioral parameters, using stylized facts so well as we can to get appropriate ratios (e.g. for the proportion of the national income taken by government expenditure).We then use numerical simulation to check the accounting and obtain a steady state for the economy in question. Finally we shock the system with a variety of alternative assumptions about exogenous variables and parameters and explore the consequences. It will be our contention that via the experience of simulating increasingly complex models it becomes possible to build up

knowledge, or "informed intuition", as to the way monetary economies must and do function.

The use of logically complete accounts (with every row and every column in the transactions matrix summing to zero) has strong implications for the dynamics of the system as a whole. This completeness carries the implication that once $n-1$ equations are satisfied then the nth equation will be found to be satisfied as well and for this reason must always be dropped from the computer model to avoid overdetermination. If the accounting is less than complete in the sense we use, the system dynamics will be subverted – rather as though we were trying to operate a hydraulic machine which had leaky pipes.

A relatively small group of authors in the past have suggested that such a coherent financial stock-flow accounting framework be part of macroeconomic theory. In broad terms, one can identify two schools of thought which actively developed a series of models based on the stock-flow consistent approach to macroeconomic modeling, one located at Yale University and led by the Nobel Prize winner James Tobin, and the other located at the Department of Applied Economics at Cambridge University and led Wynne Godley.

Both research groups faded in the middle of the 1980s, as their funding was cut off, and their ideas, whatever their importance or their relevance, were put on the back-burner, and overtaken by research based on the representative agent, as in New Classical and New Keynesian economics. But these new models are devoid of the comprehensive outlook that characterizes the approach advocated by the Yale school and the CEPG, as could be seen from a reading of Tobin (1982) and Godley and Cripps (1983) respectively, or by the reading of other outstanding individual contributions to the stock-flow consistent approach, such as that of Turnovsky (1977) or Fair (1984).

This revival is exemplified by the works of Godley (1996, 1997, 1999a,b) and Godley and Shaikh (2002), but also those of Dos Santos (2002a,b, 2005, 2006), Lavoie and Godley (2001–2), Lavoie (2003), Taylor (2004a,b), Foley and Taylor (2004), Zezza and Dos Santos (2004), who all explicitly refer to a social accounting matrix (SAM) approach or to stock-flow consistency (SFC). One may also include as part of this revival the works of Willi Semmler, also partly located at

the New School, and his associates (Flaschel, Franke and Semmler 1997; Chiarella and Flaschel 2000;)

Table 5.2 Transactions flow matrix of Model *LP*

	Households	Production	Government	Central bank		Σ
				Current	Capital	
Consumption	$-C$	$+C$				0
Government expenditures		$+G$	$-G$			0
Income=GDP	$+Y$	$-Y$				0
Interest payments on bills	$+r_{b-1} \cdot B_{h-1}$		$-r_{b-1} \cdot B_{-1}$	$+r_{b-1} \cdot B_{cb-1}$		0
Interest payments on bonds	$+BL_{-1}$		$-BL_{-1}$			0
Central bank profits			$+r_{b-1} \cdot B_{cb-1}$	$-r_{b-1} \cdot B_{cb-1}$		0
Taxes	$-T$		$+T$			0
Change in money	$-\Delta H$				$+\Delta H$	0
Change in bills	$-\Delta B_h$		$+\Delta B$		$-\Delta B_{cb}$	0
Change in bonds	$-\Delta BL \cdot p_{bL}$		$+\Delta BL \cdot p_{bL}$			0
Σ	0	0	0	0	0	0
Memo: Capital gains	$-\Delta p_{bL} \cdot BL_{-1}$		$+\Delta p_{bL} \cdot BL_{-1}$			0

Links with the post-Keynesian school

In contrast to neo-classical economics, the adjustment processes towards the steady state is based on simple reaction functions to disequilibria. There is no need to assume that firms maximize profit or that agents optimize some utility function, nor will there be any need to assume that agents have perfect information or know perfectly how the macroeconomic system behaves. In other words, there is no need nor room for the rational expectations hypothesis. Still agents in SFC models are rational: they display a kind of *procedural rationality*, sometimes misleadingly called *weak rationality* or *bounded rationality,* or more appropriately named *reasonable rationality*.

They set themselves norms and targets, and act in line with these and the expectations that they may hold about the future. These norms, held by agents, produce a kind of autopilot. Mistakes, or mistaken expectations, bring about piled-up (or depleted) stocks – real

inventories, money balances, or wealth – that signal a required change in behavior. With stock-flow norms, the exact way in which expectations are formed generally is not crucial. In addition, except in the simplest models, agents are assumed to know only the values taken by the various key variables of the previous period, and not those of the current period. This information about the past allows them to make predictions about future values, but in a world of uncertainty. The required behavioral assumptions are not very strong. What is needed is an appropriate knowledge of the structure of the economy and the functioning of its main institutions.

This kind of epistemology, that is, this theory of available knowledge, is quite in line with Post Keynesian economics. Post-Keynesian economics is associated with a fundamentalist reading of John Maynard Keynes's *General Theory* but it is also associated with the work of the Polish economist Michal Kalecki.

Stock-flow relations and the post-Keynesians

In her survey of post-Keynesian economics, Chick (1995) considers that stock-flow analysis is among its achievements. Chick refers to the works of Hyman Minsky, who she says was always concerned by the gap between flow analysis and its stock implications.

The influence of Minsky can also be felt in Wray (1990: ch. 9), where a balance sheet approach including firms, banks and households is being proposed to explain the appearance of endogenous money. Chick (1995) also refers to the balance-sheet approach of Godley and Cripps (1983), which elsewhere, in Chick (1992: 81), she called "a very successful integration of stocks and flows".

Another post-Keynesian author who is clearly concerned with stock-flow consistency is Alfred Eichner (1987), in his synthesis of post-Keynesian economics. Eichner (1987: ch. 12) also presents the endogeneity of money, the creation of loans, as well as clearinghouse and central bank operations through a balance-sheet approach, where he makes a distinction between the financial sector and two non-financial sectors.

Eichner explicitly ties this approach to the flow-of-funds approach of Godley and Cripps (1983). The post-Keynesian theory and the flow-of-funds approach also intersect in a paper by Alan Roe (1973). Roe is particularly concerned with brisk attempts at changing the composition

of portfolios, when cash flows or expectations return to normal values. This sounds very much like Minskyan economics, and indeed it is, as Roe explicitly refers to the work of Minsky on financial fragility, showing that a stock-flow consistent framework is certainly an ideal method to analyse the merits and the possible consequences of Minsky's financial fragility hypothesis.

Minsky himself certainly paid attention to stock-flow consistency. This is not surprising since he underlined the fact that stocks of assets and debts led to cash flows and debt payments through time. Minsky, just like Eichner, had a clear understanding of the relationships between the various sectoral balance sheets. "The structure of an economic model that is relevant to a capitalist economy needs to include the interrelated balance sheets and income statements of the units of the economy. The principle of double entry bookkeeping, where financial assets and liabilities on another balance sheet and where every entry on a balance sheet has a dual in another entry on the same balance sheet, means that every transaction in assets requires four entries" (Minsky 1996 p.77).

The literature on the SFC modeling approach of Minsky's ideas is growing exponentially and we believe that this method in combination with nonlinear models of the kind that Steve Keen has developed is promising and could form the basis of a deeper understanding and formalization of Minsky's FIH and its policy implications.

Section C.
Empirical works

Direct empirical scrutiny of the FIH is largely absent from the literature. Fazzari (1999) notes that there is, however, a wealth of indirect evidence to be found in the financial economics and macroeconomics literature. There are however several statistical-econometrics papers which investigate various crisis like Argentina's and Asian under a Minskian view where the time evolution of certain macroeconomic ratios like debt to GDP shows implicitly the relevance of FIH to the crisis. Further indirect evidence can be derived from the voluminous literature on the external financing premium which debtors have to pay and which varies according to the Minskian phase (hedge, speculative, Ponzi) of the cycle.

Minsky's financial instability theory was mainly developed in the context of a closed economy. Its extension to the open economy, however, gave rise to stimulating interpretations of the crisis that took place in Southeast Asia in 1997–98. According to Arestis and Glickman (2002), the possibility of borrowing abroad fuels both the upward instability and the tendency towards financial fragility of open, liberalized, developing economies.

In the absence of capital controls – and especially if interest rates are low in the major financial centres – liquid funds will switch into these economies, reinforcing their upward instability. Through the increase in domestic deposits and in domestic security prices, capital inflow will also stimulate both the availability of credit and the propensity to borrow, strengthening the tendency to a higher indebtedness. In addition, units which borrow abroad will have to fulfil their debt commitments in foreign currency and thus will also become vulnerable to movements in the exchange rate. The increase in indebtedness, together with the denomination in foreign currency of part of it, will stimulate the tendency towards financial fragility.

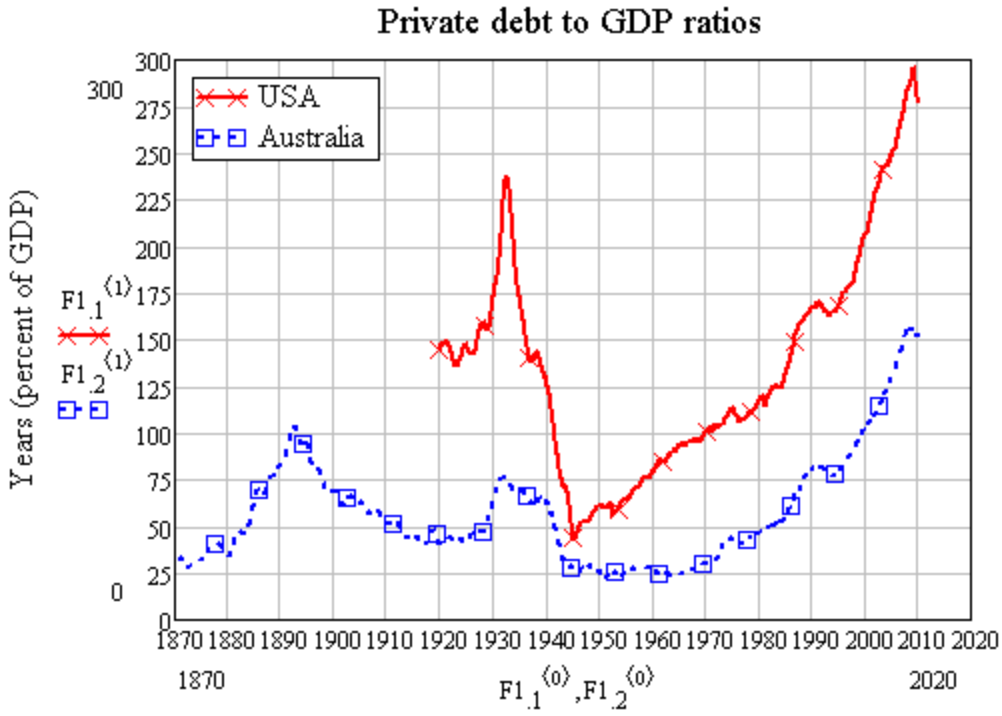
Kregel (2001) also offers a Minskyan interpretation of the Asian financial crisis. Both directly and through its effects on the exchange rates, a rise in foreign interest rates increases the debt commitments in the indebted developing countries. Whether this greater fragility turns into instability and crises will depend on the willingness of foreign banks to extend foreign currency lending. If foreign banks are unwilling to do so, the "normal functioning" of the financial system will be compromised. The result will be a Minskyan debt-deflation process. Firms and banks will try to liquidate their stocks of goods and assets in order to fulfil their debt commitments and reduce their debts. The consequent fall in the price of their products, in the price of their assets and in the value of the domestic currency, however, will further diminish their ability to fulfil debt commitments and to reduce debts.

Schroeder (2002) provides a framework for examining developing-country financial crisis. It is based upon Hyman Minsky's financial fragility thesis and applied to the case of Thailand 1984-1999. There is empirical evidence for the evolution of the Thai economy through the Minskian regimes (hedged through speculative to Ponzi) in the period prior to the onset of the 1997 Asian crisis. Evidence also suggests that

the Ponzi regime has two stages and that the rate of return on nonproductive speculative investment turns negative as the country entered the Ponzi regime. The diversion of foreign capital inflows to speculative investment played an important part in the deterioration of the Thai financial position. These results, if general, have strong implications for the field of country risk analysis, in particular, for the design of early warning models of financial crisis for developing countries.

The framework was examined using annual and quarterly data for Thailand prior to and during its crisis. The same author (Schroeder 2004) in her PhD thesis titled "Political Economic Forecasting of Financial Crises" proposes that one can assess a country's state of financial fragility by examining the average rates of interest, growth and profit and by examining the composition of debt stocks, their rate of increase, and changes in debt service payments (p. 119, 120). She then applies the method to Thailand and South Korea, prior to Asian crisis, to United Kingdom prior to the ERM crisis in 1992, and the United States as of 2003 with encouraging results on Ponzi phase detection.

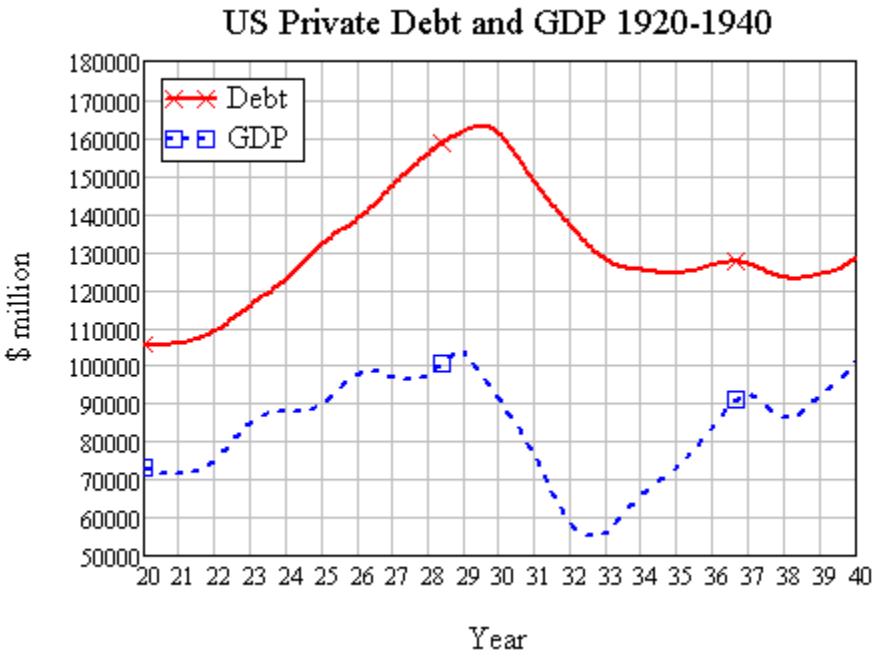
Keen(http://www.debtdeflation.com/blogs/2010/07/03/are-we-it-yet/) uses also macroeconomic US data like private debt to GDP ratios, aggregate demand and debt by sector and compares the current with the Great Depression ones in order to show the evolution of fragility in the US economy. "As Vicki Chick so succinctly put it, Minsky the Cassandra was an optimist ((Chick 2001)). The stabilizing mechanisms that Minsky initially felt would help prevent "It" from happening again (Minsky 1982) have been overwhelmed by a relentless accumulation of private sector debt, which have reached levels that dwarf those which caused "It" eighty years ago". A comparison of 1930s data to today emphasizes that the same debt- deflationary factors that gave the Great Depression are active now; the only differences are that both the private sector deflationary forces and the government reaction are much greater today. Private sector debt is far higher today than in the 1930s, both in the USA and elsewhere in the OECD. The data shown in following figure for the USA and Australia is replicated to varying degrees by most OECD nations

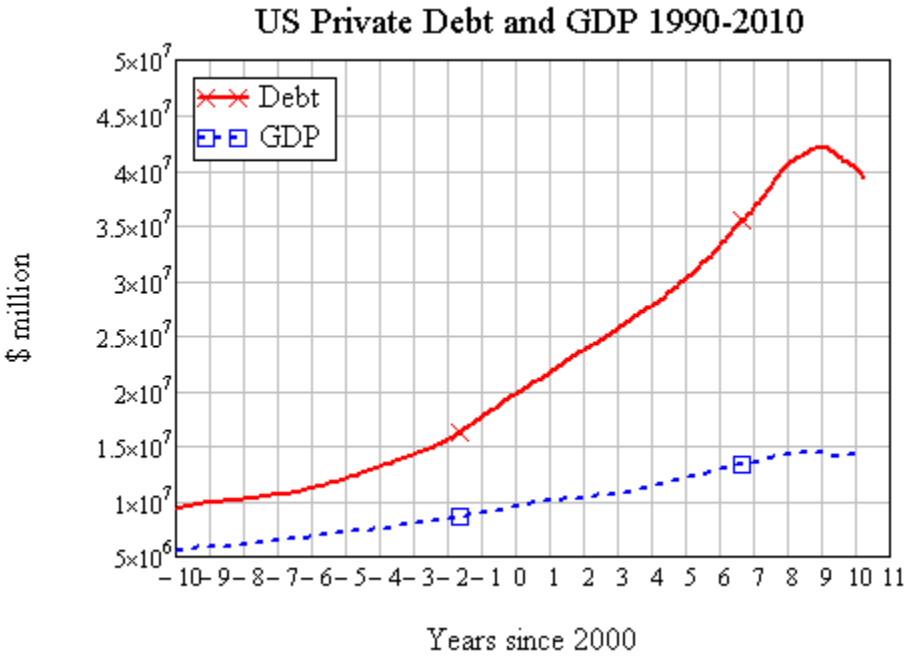


Flow of Funds Table L1+Census Data; RBA Table D02

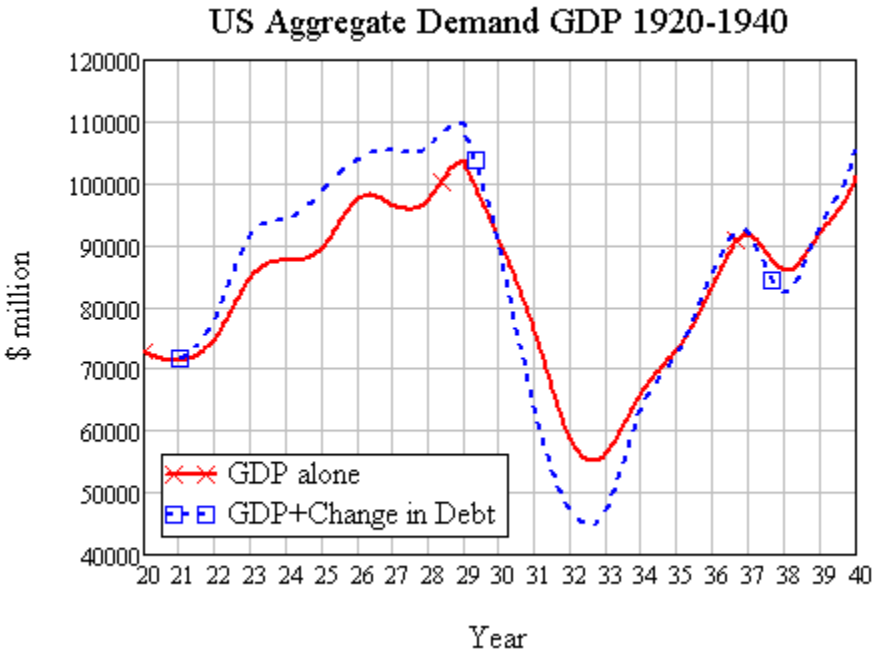
So too is the impact of debt-financed economic activity, both as an engine of apparent prosperity during the "Great Moderation", and as the force causing the "Great Recession" now. Following Minsky, Keen regards aggregate demand in our dynamic credit-driven economy as the sum of GDP plus the change in debt: "If income is to grow, the financial markets … must generate an aggregate demand that, aside from brief intervals, is ever rising. For real aggregate demand to be increasing, … it is necessary that current spending plans, summed over all sectors, be greater than current received income and that some market technique exist by which aggregate spending in excess of aggregate anticipated income can be financed. It follows that over a period during which economic growth takes place, at least some sectors finance a part of their spending by emitting debt or selling assets" (Minsky 1982, p. 6) That debt-financed component of demand (where that demand is expended upon both commodity and asset markets) was far greater during the false boom after the 1990s recession than it was during the 1920s, and the negative contribution today is also larger than for the comparable time in the 1930s.

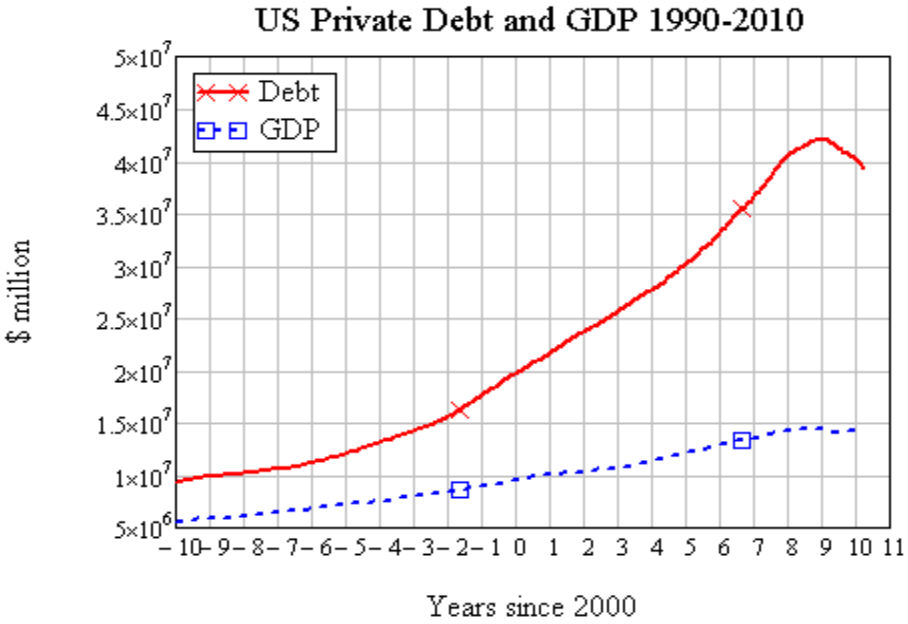
The following charts show the levels of debt and GDP in the periods of 1920-1940, and 1990-2010





The two charts below, show how much debt added to demand during the 1920s, and subtracted from it during the 1930s and compares it with the debt contribution to demand during the boom years till 2008. As shown, the debt dominates GDP even more now than it did when "It" happened.





Gebhardt (2005) in his thesis ("A Minskian Model of Firm Failure Prediction" MA Thesis, University of Missuri, 2005) develops a promising Minskyan framework to detect Corporate Financial Distress and Bankruptcy as an alternative to the well known Altman's Z-Score for Predicting Bankruptcy which published in 1968. Using US firms' balance sheet data and proper financial ratios Gebhardt shows that his model outperforms Altman's in early prediction (3 to 4 years before failure) while it falls behind in closer to failure time (1 to 2 years before a firm's failure). We believe that this field deserves further research.

Tymoigne (2010) applies the Minskyan approach and shows that, with the use of macroeconomic data, it is possible to detect financial fragility, especially Ponzi finance. The methodology is applied to residential housing in the U.S. household sector and is able to capture some of the trends that are known to be sources of economic difficulties. Notably the paper finds that Ponzi finance was going on in homeownership from at least 2004 to 2007.

A very interesting approach for a systematic and structured econometric study on Minsky's FIH has been recently undertaken by Greenwood-Nimmo (2009). Nimmo uses state of the art econometric tools and methodology and we believe that his efforts could contribute to a modern empirical investigation of Minsky's ideas and propose further research based on this approach. The model may be represented by a system of four equations: an aggregate demand function, an interest rate rule, an investment function and one of price- andwage-inflation.

Aggregate demand is modelled as follows where y denotes real output, r denotes the base rate, p is the logarithmic approximation to the rate of inflation (hence r − p is the real interest rate), i is real gross investment, y* represents real potential output and t = 0, 1, 2, . . . , T − 1 is a deterministic time trend

$$y_t = b_{10} + b_{11}t + \phi_{11}\left(r_t - \Delta p_t\right) + \phi_{12}i_t + \phi_{13}y_t^* + \xi_{1,t}$$

Imposing φ13 = 1 allows one to interpret the above in terms of the output gap rather than aggregate demand *per se*. In this form, the equation represents an IS curve.

The interest rate rule (Monetary Policy Reaction Function)
The central bank is assumed to follow a Taylor-type interest rate rule p* denotes the desired rate of inflation and r* the natural rate of interest.

$$r_t = \widetilde{b}_{20} + \widetilde{b}_{21}t + \varphi_{21}r^* + \varphi_{22}\Delta p_t + \varphi_{23}\left(\Delta p_t - \Delta p^*\right) + \varphi_{24}\left(y_t - y^*\right) + \xi_{2,t}$$

For simplicity, r* and Δp* are assumed constant over the period under study. The constancy of these terms allows one to re-write

$$r_t = b_{20} + b_{21}t + \phi_{21}\Delta p_t + \phi_{22}\left(y_t - y^*\right) + \xi_{2,t}$$

The Investment Function

The investment function is specified as follows

$$i_t = \phi_{30} + \phi_{31}f_t + \phi_{32}\left(r_{l,t} - \Delta p_t\right)l_t + \phi_{33}q_t + \phi_{34}\left(y_t - y^*\right) + \xi_{3,t}$$

where f denotes real internal funds (which proxies real cash-flow), r_l the rate of interest on bank-lending, l the real stock of outstanding corporate debt (and hence $(r_{l,t} - \_p_t)\, l_t$ denotes the inflation-adjusted cost of servicing real debt) and q is Tobin's (1969) average q.

Price and Wage Inflation

The model is completed by the equations characterizing price and wage inflation. Following Minsky and Ferri (1984, pp. 491-2) the author after some manipulations comes to the forth equation

$$\Delta p_t = b_{40} + b_{41}t + \phi_{41}\left(\Delta w_t - \Delta z_t\right) + \phi_{42}\left(y_t - y^*\right) + \xi_{4,t}$$

where w is the nominal wage and z is average labor productivity

All ξ's in the above equations are considered stationary zero mean processes.

Through a process of trial and improvement the author develops the following over-identified structure and proceeds to dynamic tests.

$$
\begin{aligned}
y_t &= b_{10} + b_{11}t + \phi_{11}\left(r_t - \Delta p_t\right) + \phi_{12} i_t + \phi_{13} y_t^* + \xi_{1,t}\ , \quad \phi_{13} = 1 \\
r_t &= b_{20} + \phi_{21}\Delta p_t + \xi_{2,t} \\
i_t &= b_{30} + b_{31}t + \phi_{31} f_t + \phi_{32} d_t + \phi_{33} q_t + \phi_{34} y_t + \phi_{35} y^* + \xi_{3,t} \\
\Delta p_t &= b_{40} + \phi_{41}\left(\Delta w_t - \Delta z_t\right) + \phi_{42} r_t + \xi_{4,t}\ , \quad \phi_{41} = 1
\end{aligned}
$$

The purpose of Dr. Nimmo's paper is testing the central proposition of the FIH that the central bank may exacerbate financial fragility by pursuing anti-inflationary monetary policy. To this end, he plots the orthogonalized impulse response functions (OIRFs) following a unit positive interest rate shock.
The OIRFs provide strong evidence that a positive interest rate shock is associated with an increase in the real cost of debt servicing for up to 6 quarters coupled with a longer-term reduction in the internal funds of firms.
The results suggest that the manipulation of the interest rate by the central bank in order to achieve an inflation target may generate increasing financial fragility among leveraged firms. Raising the interest rate reduces the cash inflows of firms while increasing their debt-burden, thereby undermining their ability to service existing debt.
The paper concludes that the central bank must acknowledge that conditions in financial markets may impose constraints on its freedom to pursue anti-inflationary interest rate policy and that it must remain mindful of its fundamental responsibility to maintain financial stability.
Furthermore, by setting heterogeneous countercyclical capital requirements,

the central bank would gain the ability to target overheated markets in a manner that would strengthen the balance sheets of financial institutions while simultaneously reducing the speculative excesses that are among the main drivers of financial fragility.

Section D.
AN à la KUHN PARADIGM SHIFT?

Praise for the prescient work of Hyman P. Minsky

"Mr. Minsky long argued markets were crisis prone. His 'moment' has arrived." ***-The Wall Street Journal***

"Twenty-five years ago, when most economists were extolling the virtues of financial deregulation and innovation, a maverick named Hyman P. Minsky maintained a more negative view of Wall Street; in fact, he noted that bankers, traders, and other financiers periodically played the role of arsonists, setting the entire economy ablaze." -**John Cassidy, *The New Yorker***

"The journey from subprime mortgages to a major credit crisis, a weak economy and broken business models in finance could all have been foreseen through Hyman Minsky's perspectives. His work remains essential to understanding the ground beneath us and the path ahead."
-George Magnus, Senior Economic Adviser, UBS Investment Bank

"It is time to revive an old issue: Just how inherently unstable are economies? But instead of getting much guidance these days from contemporary economists, we need to turn to some of the giants from the past. The work of Hyman Minsky . . . is especially on the mark." **-Jeff Madrick, *The New York Times***

"Hyman Minsky's work has never been more valuable. His financial instability hypothesis, complete with hedge, speculative and ponzi units, has played out to a T in the U.S. property and mortgage markets over the last half decade." **-Paul McCulley, Managing Director, PIMCO**

"As it happens, Minsky is enjoying something of a revival. Two of his books, *John Maynard Keynes*, and *Stabilizing an Unstable Economy* were just republished by McGraw-Hill, and his contention that stability is inherently unstable seems more relevant than ever in the aftermath of the period of low market volatility that ended in the current crisis. "In the latter of those books, published in 1986, Minsky wrote, 'If the institutions responsible for the lender-of-last resort function stand aside and allow market forces to operate, then the decline in asset values relative to current output prices will be larger than with intervention; investment and debt financed consumption will fall by larger amounts; and the decline in income, employment and profits will be greater. In other words, without government bailouts, there can be a downward spiral." ***--The New York Times***

A scientific revolution occurs, according to Kuhn, when scientists encounter anomalies which cannot be explained by the universally accepted paradigm within which scientific progress has thereto been made. The paradigm, in Kuhn's view, is not simply the current theory, but the entire worldview in which it exists, and all of the implications which come with it. It is based on features of landscape of knowledge that scientists can identify around them. There are anomalies for all paradigms, Kuhn maintained, that are brushed away as acceptable levels of error, or simply ignored and not dealt with. Rather, according to Kuhn, anomalies have various levels of significance to the practitioners of science at the time. When enough significant anomalies have accrued against a current paradigm, the scientific discipline is thrown into a state of *crisis,* according to Kuhn. During this crisis, new ideas, perhaps ones previously discarded, are tried. Eventually a *new* paradigm is formed, which gains its own new followers, and an intellectual "battle" takes place between the followers of the new paradigm and the hold-outs of the old paradigm. Kuhn said, using a quote from Max Planck: "a new scientific truth does not triumph by convincing its opponents and making them see the light, but rather because its opponents eventually die, and a new generation grows up that is familiar with it." After a given discipline has changed from one paradigm to another, this is called, in Kuhn's terminology, a *scientific revolution* or a *paradigm shift*. It is often this final conclusion, the result of the long process, that is meant when the

term *paradigm shift* is used colloquially: simply the (often radical) change of worldview, without reference to the specificities of Kuhn's historical argument.

After the first intuition of a new paradigm, the underlying theory is made fully rigorous and explicit only through the systematic work of generations of scholars. The invisible hand argument put forward by Adam Smith is a case of implicit theorizing. Walras and Pareto made a crucial step towards explicit theorizing about the working of a competitive market model a century later, but only with Arrow and Debreu the theory has been fully axiomatized after almost two centuries of efforts on the part of generations of economists. Therefore, since we believe that in Minsky's contributions there are important insights that we should not ignore, we have to invest in their development and clarification in order to make them more explicit and operational.

What Schumpeter calls "preanalytic vision" (Schumpeter 1954) plays a crucial role in science, even in hard scientific disciplines such as physics (Kuhn 1970). This role is particularly important in a discipline such as economics that has to deal with the complexity of human motivations. What is really important in Minsky's original version of the FIH is the powerful preanalytic vision of the working of a sophisticated financial economy, rather than the fragments of economic analysis in which he tried to translate it; see, in particular, Minsky (1975, 1982, 1986). We believe that Minsky's vision proved to be increasingly relevant for an economy in which finance has been playing a growing role.

The sudden popularity enjoyed by Minsky's FIH during the subprime financial crisis (and in other similar episodes before) reveals a widespread dissatisfaction with received economic wisdom, at least as far as financial crises are concerned. In recent crises there has been a revival of Minsky's contributions that have been rapidly dismissed and denigrated in periods of apparent calm. Many mass-media economists, practitioners (both in management and government), and even many academic economists often speak, write, and act as if orthodox economics were the true theory in most moments, with the only exceptions of Minsky moments considered as extremely rare states of

affairs (that, as Greenspan said, "happen once in a century"). They reason as if the laws of economics were temporarily and locally suspended in proximity of Minsky meltdowns.

The expression "Minsky moment" was coined in 1998 in occasion of the crisis of Russian debt by Paul McCulley, manager of bond funds at PIMCO, an investment company that runs one of the largest bond funds. This neologism became a fashionable catch word during the subprime crisis as it was soon adopted by other top-level practitioners and analysts such as George Magnus, senior economic adviser at UBS Investment; by leading financial journalists, such as Martin Wolf of the *Financial Times*; Justin Lahart of the *Wall Street Journal,* and John Cassidy (2008) of *The New Yorker.*

Many commentators recently maintained, even in leading mass media, that mainstream economics proved to be unable to predict and suggest efficacious policy interventions to prevent, thwart, and mitigate financial crises. We maintain that this depends on the postulate of the regularity of economic phenomena underlying mainstream economics and justifying its reductionist focus on stable equilibria, while ignoring disequilibrium, instability, bounded rationality, and strong uncertainty (Vercelli 1991,2005, 2009a, 2009b)

The prevailing point of view is that while orthodox theory is good enough in normal conditions (believed to apply most of the time) it is unsatisfactory in abnormal times characterized by severe financial instability (Minsky moments). Conventional theory is believed to be impotent to forecast, avoid, or mitigate a generalized and particularly deep financial crisis such as the subprime one. We contend that in order to understand financial crises and learn how to avoid or mitigate them, we need an approach much more general than that of mainstream economics. The inadequacy of orthodox theory in times of financial crisis does not depend on details that can be easily added or mended, but on its vision of the working of a monetary economy and, in particular, on a fundamental assumption that underlies its approach. This is the postulate of *regularity* of economic phenomena that is considered by many orthodox economists as a necessary requisite for economics as a "science." Much of empirical analysis and econometric work has already transcended neoclassical economics in that to fit the data in a statistical sense, much of the work is explicitly dynamic. It is also nonlinear when using ARIMA and ARCH-GARCH type models.

Some progress has also been made in modeling *endogenously* generated cyclical growth and fluctuations. The interest in chaotic dynamics and complexity all indicate that the empirical reality observed by the everyday applied economist is that the deep structure of the data is simply inconsistent with the neoclassical model. It is the empirical anomalies that have led the search, first for dynamics and then to nonlinearities.

This is of course a far cry from the neoclassical world of general equilibrium. It is therefore clear that the Kuhnian crisis has now arrived in economics. Further research in nonlinear dynamics and complexity can only increase the Kuhnian anomalies. Therefore the crisis can only deepen. However, there is a deep ideological commitment to general equilibrium as it justifies "free enterprise" with only minimal state intervention. This is called "neo-liberalism" in Europe and "neo-conservatism" in North America. It is this pre-commitment to a political ideology that may still sustain neoclassical economics despite the growing evidence of Kuhnian anomalies. But the fact that the Kuhnian crisis is here seems difficult to deny.

According to Kuhn, a crisis is followed by a paradigm "shift." In econometric practice, the evidence presented above suggests that the paradigm has already shifted. Nevertheless orthodox textbook theory continues to ignore this fact and static neoclassical theory remains a wistful dogma not unlike a belief in a superstition for which there is no evidence.

We need a theory that accounts for the whole life cycle of financial conditions to explain how they periodically change color and, under given circumstances, may become dark black. This is what Minsky did with his FIH.

Although Minsky's financial instability hypothesis (FIH) has been discussed and extended by many scholars since its inception, it is not yet a full-fledged theory, as a precise specification of the relationship between some of the crucial variables is still missing or remains largely implicit (a critical survey of much of the literature may be found in Tymoigne [2006a, 2006b, and 2006c]). For that reason Minsky has been often accused of "implicit theorizing"; see, in particular, Tobin

(1989). In this view, the theoretical axioms are not clearly spelled out and their implications for explanation and prediction are insufficiently argued (Toporowski 2005 and 2008). For that reason most academic economists dismissed the FIH, although a few high-level practitioners continued to consider it quite relevant for their choices. In our opinion, this is a *non sequitur* (Latin for "it does not follow"). We have to take seriously the criticism of implicit theorizing, but we should draw from it conclusions quite different from those of many of Minsky's critics. Implicit theorizing is typical of new revolutionary theories (in the sense of Kuhn 1970).

The financial instability hypothesis is an alternative to the neoclassical synthesis, i.e., to today's standard economic theory. It is designed to explain instability as a result of the normal functioning of the capitalist economy. Instability of financial markets—the periodic credit crunches, squeezes, and debacles—is the observation. The theory is constructed so that financial instability is a normal

functioning internally generated result of the behavior of a capitalist economy (1982, p. 92).

Better stated, Minsky pushes aside Hicks–Hansen and the neoclassical synthesis and develops a Post Keynesian route by offering an investment theory of the business cycle backed by a finance theory of investment. Financial instabilities generate gross business investment instabilities, which in turn create swings in aggregate demand and movements away from full employment. Changes in financial practices and optimism—rather than monetary disequilibrium—are the fundamental source of capitalism's boom and bust cycle.

Minsky's vision is able to cope with financial crisis because it clearly rejects the regularity assumption and is able to articulate an alternative vision in which disequilibrium, instability, limited rationality, and subjective features play a crucial role (Vercelli 2009b).

Some facts that fit the Kuhnian frame follow:

-Minsky's book "Stabilizing an Unstable Economy" became a best seller soon after its new published edition (April 14, 2008) and remains as such.

-His name and relevant search in internet search engines brings more than 80,000 of results.

-There is an increasing number of books and articles collections published during the last decade with Minsky's ideas as their central theme.
-The number of academic researchers who are active on Minsky's theory research is growing exponentially as does the number of papers that refer to Minsky's work.
-Several academics who are considered as Post Keynesians put less emphasis (and effort) on attacking the mainstream paradigms (neo classical, new classical, new Keynesian) and propose openly the Post Keynesian approach supporting it both analytically and empirically while they campaign for adoption of its policy implications. The financial part of the Post Keynesian approach is mostly based on Minsky's ideas. Minsky's Post Keynesian reasoning is clearest in the following: The crisis—in economic theory—has two facets: one is that "devastating logical holes" have appeared in conventional theory; the other is that conventional theory has no explanation of financial crises. The logical flaw in standard theory is that it is unable to assimilate capital assets and money of the kind we have, which is created by banks as they finance capital asset production and ownership. The major propositions of neo-classical theory, which are that a multi-market full employment equilibrium exists and that this equilibrium will be sought out by market processes, has not been shown to be true for an economy with capital assets and capitalist financial institutions and practices (Minsky 1982, p. 91).
-There are several conferences on Minskian and Post Keynesian ideas (most of them international)
-There are research organizations like the Levy Economics Institute of Bard College dedicated to relative research. Even the Economics department at University of Bergamo, is officially named "Hyman P. Minsky" ("Dipartimento di Scienze Economiche "Hyman P. Minsky") Università degli Studi di Bergamo Bergamo, Italy http://www.unibg.it/struttura/en_struttura.asp?cerca=en_dse_intro
-Several so called "orthodox" and mainstream economists who are aware of the Financial Instability Hypothesis, and its relevance to the current crisis, have started to recognize its value and mention it frequently while it seems that they study it more carefully. For example mainstream economist Nouriel Roubini refers frequently to Minsky both in his site (http://www.roubini.com/) and in articles while

his recent (May 11, 2010) best selling book "Crisis Economics: A Crash Course in the Future of Finance" refers to Minsky in four chapters and in more than twenty pages.
Paul Krugman, another well known mainstream economist refers extensively to Minsky in his New York Times column and blog (http://krugman.blogs.nytimes.com/), participates and speaks in relevant conferences while in his recent academic work (Eggertsson G, Krugman P., " Debt, Deleveraging, and the Liquidity Trap: A Fisher-Minsky-Koo approach" attempts to incorporate Minsky's Financial Instability Hypothesis into a New Keynesian-style model of debt driven slumps (that is, situations in which an overhang of debt on the part of some agents, who are forced into rapid deleveraging, is depressing aggregate demand)

The above facts support the Kuhnian description of the paradigm shift process and we propose a more systematic investigation of these developments

CONCLUSIONS

Minsky's ambition in constructing the Financial Instability Hypothesis was to build a theory which "makes great depressions one of the possible states in which our type of capitalist economy can find itself" (Minsky, 1982 p. xi). His purpose was to find "an apt economic theory for our economy" (Minsky p. 68), since it was a manifest fact that capitalist economies periodically find themselves in such a state, and yet neoclassical economics argues that such a state is an aberration.

In Minsky's economics, "the future is unknown also in its probabilistic dimension. Expectations are uncertain. The degree of confidence placed in them (myopically based on the recent past) performs a crucial role both in microeconomic decisions and at the aggregate level. The limits of individual and collective rationality feed each other, generating deviation-amplifying mechanisms. As a consequence, advanced capitalist economies assume a cyclical behaviour that drives them from the torrid summers of speculative booms to the gloomy

winters that start with a financial crisis and end in debt deflations and deep depressions" (De Antoni, 2007)

For Minsky, "…turbulence is normal in a capitalist economy…. (T)he inherent instability of capitalism is due to the way profits depend upon investment, the validation of business debts depends upon profits, and investment depends upon the availability of external financing. Capitalism is unstable because it is a financial and accumulating system with yesterdays, today, and tomorrows (Minsky 2008, p.327). Minsky was a reformist. Because the hypothesis views capitalism as fundamentally unstable, it does not regard escaping from a collapse as an easy matter. The essential lesson of the Financial Instability Hypothesis is that we should avoid debt deflations in the first place, by developing and maintaining institutions and policies which enforce "a good financial society' in which the tendency by businesses and bankers to engage in speculative finance is constrained" (Minsky 1982 p. 69). These institutional arrangements include close and discretionary supervision of financial institutions and financial arrangements, non-discretionary countercyclical fiscal arrangements, and a bias towards income equity rather than inequality. If one turns to the concluding chapter in *Stabilizing an Unstable Economy*, one will find a good summation of his main notions as to a reasonably adequate reform program for a modern capitalist economy. Without going into details, these reforms are classified under four areas: "Big Government" (size, spending, taxation), employment (and in several papers, Minsky specifically spoke to the need for what some in this room call the Employer of Last Resort program), financial reform, and market power (Minsky 2008 p. 328). The main objectives of reform are to reduce inequality, inefficiency, and instability (Minsky 2008 p. 329).

Minsky did not believe that reforms could ever eliminate instability. As instability is a necessary characteristic of capitalism, one could never eliminate it; the best that could be done would be to contain it. But, if instability is contained in one period, the seeds are laid for a growth in instability in ensuing periods. Thus, constant attention to reforming the economy, including reforming the reforms, is called for. Minsky's

closing words in *Stabilizing an Unstable Economy* read: "What is needed is a restructuring of the economy…. Such a restructuring will enjoy only transitory success. After an initial interval, the basic disequilibrating tendencies of capitalist finance will once again push the financial structure to the brink of fragility. When that occurs, a new era of reform will be needed. There is no possibility that we can ever set things right, once and for all; instability, put to rest by one set of reforms will, after time, emerge in a new guise" (Minsky 2008 p. 370).

During his lifetime, Minsky himself found confirmation of his analysis. The financial instability of the American economy, which he had previously denounced (Minsky, 1963), surfaced in the mid-1960s, giving rise to the crises of 1966, 1970, 1974-5, 1979, and 1982 (Minsky 1986). Financial instability had, however, characterized also the periods preceding the two world wars. This implies that financial crises are systemic and not idiosyncratic (Minsky 1991). Looking ahead, Minsky wondered whether 'It' can happen again (Minsky 1982a). 'It' is the Great Depression and his answer is affirmative. Since Minsky's death, his theory has continued to influence the profession. It has inspired analyses of the financial imbalances currently characterizing the American economy (Godley, Izurieta and Zezza 2004), of the instability of the international financial system (Sawyer 2001), of the crisis that took place in Southeast Asia in 1997-8 (Kregel 2001, Arestis 2001, Arestis and Glickman 2002) and so on. And his analysis is so far the best suited frame for explaining and understanding the current crisis.

From a Minskian point of view, the prospects for capitalist economies in the 21st century are gloomy. Both governments and capitalists have failed to learn the lessons of the past. If American and European governmentscontinue to live up to their current "ideals" in the midst of such a collapse, then the fetish for Small Government may well keep the economy in a Depression for a considerable time. Ultimately, only a completely different approach to economic theory and policy can save us from a future of financially-driven cycles and the threat of long term stagnation. Minsky's analysis showed that capitalist financial instability is not only unavoidable, but intrinsic: instability arises from within, without requiring external disturbances or "shocks". There is no such thing as an equilibrium growth path,

indefinitely sustained. Short of changing the system, the public responsibility is to regulate financial behavior, limiting speculation and stretching out for as long as possible the expansionary phase of the cycle.

Criticism of the neoclassical orthodoxy is not enough. An alternative edifice must also be offered. Minsky's success in developing such an apt theory was mixed. His verbal model of the Financial Instability Hypothesis successfully blended the insights of Kalecki, Fisher and Keynes into a coherent theory of the financial dynamics of a developed capitalist economy. However, he was unable to derive a meaningful mathematical model of the FIH. This failure was attributable in part to his reliance on the Hansen-Samuelson linear multiplier-accelerator model, which is not proper. The Financial Instability Hypothesis is fundamentally nonlinear, and could not thus be successfully constructed upon these linear foundations. The modeling efforts based on nonlinear models of capitalism akin to those presented and reviewed in this thesis along with further empirical research indicate an increased progress which will establish more solid foundations to FIH. The number of researchers on the subject, their experience and background along with increased grants available, guarantee a fruitful future.

REFERENCES

Altman, Edward I. (1968) "Financial Ratios, Discriminant Analysis and the Prediction of Corporate Bankruptcy"". *Journal of Finance*: 189–209

Anderson P. & Tushman M. 1990 "Technological Discontinuities and Dominant Designs: A Cyclical Model of Technological Change" Administrative Science Quarterly, Vol. 35, No. 4 (Dec., 1990), pp. 604-633

Arestis, P. (2001). "Recent banking and financial crises: Minsky versus the financial liberalizations", in Bellofiore, R., and Ferri, P., (eds), *Financial Keynesianism*, p.159-179.

Arestis, P. and Glickman, M. (2002), "Financial crisis in South East Asia: dispelling illusion the Minskyan way", *Cambridge Journal of Economics*, 26(2), 237-260.

Arestis, P. & De Antoni 2007 "Rediscovering Fiscal Policy Through Minskyan Eyes" Discussion Paper No. 31, 2007

Argitis G., 2003. "Finance, Instability and Economic Crisis: The Marx, Keynes and Minsky Problems in Contemporary Capitalism," Working Papers 0307 Paper presented in the Conference 'Economics for the Future', Celebrating 100 Years of Cambridge Economics, 17-19 September 2003, Cambridge, UK

Argitis G. 2009 "An Institutionalist-Post Alternative to the New Consesus Macroeconomics" paper prepared for presentation at the 13thConference of the Research Network 'Macroeconomics and Macroeconomic Policies', The World Economy in crisis – The return of Keynesianism?, in Berlin, October 30-31, 2009.

Asada, T. (1989) "Monetary stabilization policy in a Keynes-Goodwin model of the growth cycle" In W. Semmler, *Financial Dynamics and Business Cycles* (pp. 145-162). New York: M.E.Sharpe.

Asada, T. (2006) "Stabilization policy in a Keynes–Goodwin model with debt accumulation". *Structural Change and Economic Dynamics* (17), pp. 466–485.

Bellofiore, R., & Ferri, P. (2001) "*Financial Fragility and Investment in the Capitalist Economy: The Economic Legacy of Hyman Minsky", Volume II.* Edward Elgar.

Bellofiore, R., & Ferri, P. (2001). "*Financial Keynesianism and Market Instability".* Edward Elgar.

Bhaduri A. 2009 "Financial and Real Economy: Modelling the Crisis" Paper presented in Centro Celso Furtado, Rio de Janeiro, 2009 http://vsites.unb.br/face/eco/seminarios/2009/FINANCE_AND_THE_REAL_ECONOMY.pdf

Boyer, R. and Y. Saillard, Regulation Theory: The State of the Art, Routledge: London, 2002.

Carter, M. (1989, September). "Financial Innovation and Financial Fragility". *Journal of Economic Issues , 3* (23), pp. 779-793.

Cassidy, J. (2008, February 4). "The Minsky Moment". *The New Yorker*

Chancellor, E. (2007, February). "Ponzi Nation" . *Institutional Investor*

Charles, S. (2008). "A Post-Keynesian Model of Accumulation with a Minskyan Financial Structure". *Review of Political Economy , 3* (20), pp. 319 — 331.

Charles, S. (2008). "Corporate debt, variable retention rate and the appearance of financial fragility". *Cambridge Journal of Economics* (32), pp. 781–795.

Chiarella, C. and P. Flaschel (2000) *The Dynamics of Keynesian Monetary Growth:Macrofoundations* (Cambridge: Cambridge University Press).

Chiarella, C., Flaschel, P., & Semmler, W. (2001). "The macrodynamics of debt deflation". In R. Bellofiore, & P. Ferri, *Financial Fragility and Investment in the Capitalist Economy* (pp. 133-184). Cheltenham,UK / Northampton,USA: Edward Elgar.

Chick, V. (1992) 'Financial counterparts of saving and investment and inconsistency in a simple macro model', in P. Arestis and S.C. Dow

(eds), *On Money*, *Method and Keynes:Selected Essays* (London: Macmillan), pp. 81–94

Chick, V. (1995) 'Is there a case for Post Keynesian economics?', *Scottish Journal of Political Economy*, 42 (1) (February), pp. 20–36

Crotty J. 1990 "Owner-Manager Conflict and Financial Theories of Investment Instability: A Critical Assessment of Keynes, Tobin, and Minsky" Journal of Post Keynesian Economics, Vol. 12, No. 4 (Summer, 1990), pp. 519-542

Crotty J. 1992 "Rethinking Marxian Investment Theory: Keynes-Minsky Instability, Competitive Regime Shifts, and Coerced Investment" Working paper Department of Economics University of Massachusetts Amherst, Massachusetts Third Revision: June 1992

De Antoni E. 2006 "Minsky on financial instability" in A HANDBOOK OF ALTERNATIVE MONETARY ECONOMICS edited by Arestis & Sawyer Edward Elgar pp 154-171

Deleplace, G. & Nell, E.J. (eds.), 1996, *Money in Motion: The Post Keynesian and Circulation Approaches*, Macmillan, London

Dos Santos, C.H. (2002a) 'Notes on the stock-flow consistent approach to macroeconomic modelling', *Three Essays in Stock-Flow Consistent Macroeconomic Modeling*, PhD Dissertation, New School University.

Dos Santos, C.H. (2002b) 'Cambridge and Yale on stock-flow consistent macroeconomic modelling', *Three Essays in Stock-Flow Consistent Macroeconomic Modeling*, PhD Dissertation, New School University

Dos Santos, C.H. (2005) 'A stock-flow consistent general framework for formal Minskyan analyses of closed economies', *Journal of Post Keynesian Economics* 27 (4) (Summer), pp. 711–36.

Dos Santos, C.H. (2006) 'Keynesian theorising during hard times: stock-flow consistent models as an unexplored "frontier" of Keynesian macroeconomics', *Cambridge Journal of Economics*, 30 (4) (July), pp. 541–65.

Dos Santos, C.H. and G. Zezza (2005) 'A simplified stock-flow consistent Post-Keynesian growth model', Working Paper No. 421, The Levy Economics Institute of Bard College

Dow S. 2009 "Market Sentiment and Minskian Financial Crisis: a Keynesian/agency-structure/psycology analysis" For presentation to the 'World Economy in Crisis-the Return of Keynesianism?" Conference,Berlin 2009

Dymski, G., & Pollin, R. (1992). "Hyman Minsky as Hedgehog: The Power of the Wall Street Paradigm". In S. Fazzari, & D. B. Papadimitriou, *Financial Conditions and Macroeconomic Performance: Essays in Honor of Hyman P. Minsky.* M.E.Sharpe.

Eggertsson G., Krugman P. 2010 "Debt, Deleveraging, and the Liquidity Trap: A Fisher-Minsky-Koo approach" Working paper http://www.princeton.edu/~pkrugman/debt_deleveraging_ge_pk.pdf

Eichner, A.S. (1987) *The Macrodynamics of Advanced Market Economics* (Armonk, NY:M.E. Sharpe).

Fair, R. (1984) *Specification*, *Estimation and Analysis of Macroeconometric Models* (Cambridge: Harvard University Press).

Fazzari, S., & Papadimitriou, D. B. (1992). "*Financial Conditions and Macroeconomic Performance: Essays in Honor of Hyman P. Minsky".* M.E.Sharpe.

Fazzari, S., Ferri, P., & Greenberg, E. (2008). "Cash flow, investment, and Keynes- Minsky cycles". *Journal of Economic Behaviour and Organization* (65), pp. 555-572.

Fisher, I. (1933). "The Debt-Deflation Theory of Great Depressions". *Econometrica , 4* (1), pp. 337-357.

Flaschel, P., R. Franke and W. Semmler (1997) *Dynamic Macroeconomics: Instability*, *Fluctuations and Growth in Monetary Economics* (Cambridge MA: MIT Press).

Foley, D. K. (2001). "Hyman Minsky and the dilemmas of contemporary economic method". In R. Bellofiore, & P. Ferri, *Financial Keynesianism and Market Instability: The Economic Legacy of Hyman Minsky, Volume I* (pp. 47-59). Edward Elgar.

Foley, D. and L. Taylor (2004) 'A heterodox growth model', Working Paper, CEPA, New School University (June).

Foster J. & McChesney R., "Monopoly-Finance Capital and the Paradox of Accumulation" *Monthly Review* 61, no. 5 (October2009), p. 1-20

Gatti, D. , & Gallegati, M. (2001). "Financial instability revisited: aggregate fluctuations due to changing financial conditions of heterogeneous firms". In R. Bellofiore, & P. Ferri, *Financial Fragility and Investment in the Capitalist Economy: The Economic Legacy of Hyman Minsky, Volume II* (pp. 185-200). Cheltenham, UK / Northampton, USA: Edward Elgar.

Gatti, D., Gallegati, M., & Gardini, L. (1993). "Investment confidence, corporate debt and income fluctuations". *Journal of Economic Behavior and Organization* (22), pp. 161-187.

Gebhardt. 2005 "A Minskian Model of Firm Failure Prediction" MA Thesis, University of Missuri

Godley, W. and F. Cripps (1983) *Macroeconomics* (London: Fontana).

Godley, W. (1996) 'Money, finance and national income determination: An integrated approach', Working Paper No. 167, The Levy Economics Institute of Bard College.

Godley, W. (1997) 'Macroeconomics without equilibrium or disequilibrium', Working Paper No. 205, The Levy Economics Institute of Bard College.

Godley,W. (1999a) 'Money and credit in a Keynesian model of income determination', *Cambridge Journal of Economics*, 23 (4) (July), pp. 393–411.

Godley,W. (1999b) 'Open economy macroeconomics using models of closed systems', Working Paper No. 285, The Levy Economics Institute of Bard College.

Godley, W. and A. Shaikh (2002) 'An important inconsistency at the heart of the standard macroeconomic model', *Journal of Post Keynesian Economics*, 24 (3) (Spring),
pp. 423–42.

Godley, W., Izurieta, A., and Zezza, G. (2004). "Prospects and policies for the U. S. economy: why net exports must now be the motor for U. S. growth", *Strategic Analysis - Prospects and Policies for the U. S. Economy*, Levy Economics Institute of Bard College

Goodwin, R. M. (1967). "A Growth Cycle". In C. H. Feinstein, *Socialism, Capitalism and Economic Growth* (pp. 54-58). Cambridge: Cambridge University Press.

Greenwood-Nimmo M. 2009 "An Empirical Examination of the Financial Instability Hypothesis" working paper Leeds University Business School

Hannsgen G. 2003 "Minsky's Acceleration Channel and Role of Money" Working Paper No. 384 The Levy Economics Institute of Bard College

Isenberg, D. L. (1988). "Is there a Case for Minsky's Financial Fragility Hypothesis in the 1920s?" *Journal of Economic Issues , 4* (22), pp. 1045-1069.

Ito M., Lapavitsas K. 1999 "Political Economy of Money and Finance" Palgrave Macmillan "Πολιτική Οικονομία του Χρήματος και του Χρηματοπιστωτικού Συστήματος" Μετάφραση, Πολύτροπον 2004

Jarsulic M. 1988 "Financial Instability and Income Distribution" Journal of Economic Issues, Vol. 22, No. 2 (Jun., 1988), pp. 545-553

Jarsulic M. 1989 "Endogenous Credit and Endogenous Business Cycles" Journal of Post Keynesian Economics, Vol. 12, No. 1 (Autumn, 1989), pp. 35-48

Kalecki, M. (1971). "The Determinants of profits". In M. Kalecki, *Selected essays on the dynamics of the capitalist economy.* Cambridge University Press.

Keen, S. 1995. "Finance and economic breakdown: modelling Minsky's financial instability hypothesis". *Journal of Post Keynesian Economics* (17), pp. 607-635.

_____. 1997, "Economic Growth And Financial Instability" PHd Thesis

_____. 1998. "The Nonlinear Dynamics of Debt Deflation". *Complexity international* (6).

_____. "The Minsky Thesis: Keynesian or Marxian?" Department of Economics and Finance, University of Western Sydney Australia. http://www.debunkingeconomics.com/DebtDeflation/keynesian%20or%20marxian.pdf

_____. "Developing a Monetary Model of Financial Instability" www.debtdeflation.com/blogs

_____. "Household Debt: The Financial Stage in an Artificially Extended Ponzi Bubble" THE Australian Economic Review, Vol. 42, no. 3, pp. 347-57

_____. 2010 "Are We "It" Yet?" Monthly Review / april 2010

Keynes, J. M. (1960). "*The General Theory of Employment, Interest and Money'.* London: Macmillan and Company Limited.

King J. E. 2002: "A History of Post Keynesian Economics" Edward Elgar, 2002

Kotz, D.M., McDonough, T., and Reeich, M. (eds),1994 "Social Structures of Accumulation:The Political Economy of Growth and Crisis", Cambridge University Press: Cambridge, 1994.

_____. 2009 "The Financial and Economic Crisis of 2008" *Review of Radical Political Economics* 41, no. 3 (2009), 305-17

Kregel, J. (2001). "Yes, 'it' did happen again - the Minsky crisis in Asia", in Bellofiore, R. and Ferri, P. eds, *Financial Keynesianism*, op. cit., 194-213.

_____. 2008. "Minsky´s Cushion of Safety". *Public Policy Brief , No. 93*.

_____. 2008. "Using Minsky's Cushions of Safety to Analyze the Crisis in the U.S. Subprime Mortgage Market". *International Journal of Political Economy , 1* (37), pp. 3–23.

Kregel J., Burlamaqui L. 2005: "Banking and the Financing of Development: A Schumpetarian and Minskian Perspective" in Dymski G., De Paula S, eds: "Reimagining Growth" Zed Books 2005

Kuhn, T.S. 1970. *The Structure of Scientific Revolutions*, 2nd edition. Chicago: Chicago University Press.

Lavoie, M. (2003) 'A fully coherent post Keynesian model of the euro zone', in P. Arestis, M. Baddeley and J. McCombie (eds), *Globalisation*, *Regionalism and Economic Activity* (Edward Elgar), pp. 98–126.

Lavoie, M. and W. Godley (2001–2) 'Kaleckian Growth Models in a Stock and Flow Monetary Framework: A Kaldorian View', *Journal of Post Keynesian Economics*, 24 (2) (Winter), pp. 277–312.

Magnus, G. (2008, October 13). "Is there time to avert a Minsky meltdown? *The Financial Times"* .

Magnus, G. (2007, March 6). "The Credit Cycle and Liquidity: Have we arrived at a Minsky Moment?" *Economic Insights – By George* . UBS Investment Research.

Magnus, G. (2007, July 3). "The Credit Cycle: Getting Closer to a Minsky Moment?" *Economic Insights – By George* . UBS Investment Research.

Magnus, G. (2007, 08 22). "What this Minsky moment means". *The Financial Times* .

McCulley, P. (2007, March). "The Plankton Theory Meets Minsky". *Global Central Bank Focus* .

Mehrling, P. (1999, June). "The vision of Hyman P. Minsky". *Journal of Economic Behavior & Organization , 39*, pp. 129-158.

Minsky, H. P. 1975. "*John Maynard Keynes".* New York: Columbia University Press.

_____. 1982. "The Financial Instability Hypothesis: A Restatement". In M. Hyman, *Can "It" Happen Again? Essays on Instability and Finance.* New York: M.E.Sharpe.

_____. 1982. "Can 'It' Happen Again? A Reprise." *Challenge* (July-August). 5-13.

_____. 1986. "*Stabilizing an Unstable Econom".* New Haven and London: Yale University Press.

_____. 1986. "Money and Crisis in Schumpeter and Keynes." In H. J. Wagener and J. W. Drukker, Eds., *The Economic Law of Motion of Modern Society: A Marx-Keynes-Schumpeter Centennial*. Cambridge, UK: Cambridge University Press. 112-122.

_____. 1991, "Financial crises: systemic or idiosyncratic?" *Working Papers Series N. 51, Levy Economics Institute of Bard College*.

_____. 1996. "Uncertainty and the Institutional Structure of Capitalist Economies: Remarks upon Receiving the Veblen-Commons Award." *Journal of Economic Issues*. Vol. 30, No.2. June. 357-368.

_____. 2008 [1986]. Stabilizing an Unstable Economy. New York: McGraw Hill.

Nasica E. & Raybaut A. 2005 "Profits, Confidence and Public Deficits: Modeling Minsky's Institutional Dynamics" Journal of Post Keynesian Economics Volume 28, Number 1 / Fall 2005 pp. 136 – 154

Palley T., 2009 "A Theory of Minsky Super-Cycles and Financial Crises" Paper prepared for a conference on "The Political Economy of Central Banking" held at Ryerson University, Toronto, Canada, 27 – 28 May, 2009

————. , 2010 "The Limits of Minsky's Financial Instability Hypothesis as an Explanation of the Crisis" Monthly Review, April 2010

Papadimitriou D., Wray R. 1997 "The Economic Contributions of Hyman Minsky: Varieties of Capitalism and Institutional Reform" Working Paper No. 217 The Levy Economics Institute.

Papadimitriou, D. B., & Wray, L. R. (1999). "Minsky´s analysis of financial capitalism". *Working Paper No. 275* . The Levy Economics Institute.

Prychitko D. 2010 "Competing explanations of the Minsky moment:The financial instability hypothesis in light of Austrian theory" Rev. Austrian Econ (2010) 23:199–221

Raines, J. P., & Leathers, C. G. (2008). "*Debt, Innovations, and Deflation: The Theories of Veblen, Fisher, Schumpeter, and Minsky".* Edward Elgar.

Robinson, J. (1982) 'Shedding darkness', *Cambridge Journal of Economics*, 6 (3) (September), pp. 295–6.

Roe, A.R. (1973) 'The case for flow of funds and national balance sheet accounts', *Economic Journal*, 83 (June), pp. 399–420.

Santos, C. H. (2005). "A stock-flow consistent general framework for formal Minskyan analyses of closed economies". *Journal of Post Keynesian Economics , 4* (27), pp. 711-735.

Schroeder S., 2002 "A Minskian Analysis of Financial Crisis in Developing Countries" CEPA Working Paper 2002-09

————. 2004 "Political Economic Forecasting of Financial Crises" PhD Thesis New School University

Schumpeter, J.A. 1954. *A History of Economic Analysis.* Oxford: Oxford UniversityPress (reprinted by Allen and Unwin, London, 1982).

Sordi S., Vercelli A. 2006 "Financial fragility and economic fluctuations Journal of Economic Behavior & Organization Volume 61, Issue 4, December 2006, P. 543-561

Taylor, L. (2004a) 'Exchange indeterminacy in portfolio balance, Mundell-Fleming, and uncovered interest rate parity models', *Cambridge Journal of Economics*, 28 (2), pp. 205–28.

Taylor, L. (2004b) *Reconstructing Macroeconomics: Structuralist Proposals and Critiques of the Mainstream* (Cambridge, MA: Harvard University Press).

Taylor, L., & O´Connell, S. A. (1985). "A Minsky Crisis". *The Quarterly Journal of Economics* (100), pp. 871-885.

Tobin, J. (1982) 'Money and finance in the macroeconomic process', *Journal of Money*, *Credit*, *and Banking*, 14 (2) (May), pp. 171–204.

Tobin J. I989 Journal of Economic Literature, Vol. 27 No 1, pp. 105-108

Toporowski, J. 2005. *Theories of Financial Disturbance.* Cheltenham, UK: EdwardElgar.

————. 2008. "Minsky's 'Induced Investment and Business Cycles'." *Cambridge Journal of Economics* 32(1): 725–737.

Turnovsky, S. (1977) *Macroeconomic Analysis and Stabilization Policy* (Cambridge: Cambridge University Press).

Tymoigne, E. 2006a. "The Minskyan System, Part 1." Working Paper 452 The Levy Economics Institute of Bard College.

————. 2006b. "The Minskyan System, Part 2." Working Paper 453 The Levy Economics Institute of Bard College.

————. 2006c. "The Minskyan System, Part 3." Working Paper 455 The Levy Economics Institute of Bard College.

————. 2010 "Detecting Ponzi Finance: An Evolutionary Approach to the Measure of Financial Fragility" Working Paper No. 605 Levy Economics Institute

Vercelli, A. 1983. "Is Instability Enough to Discredit a Model?" *Economic Notes* 3(3): 173–189.

————. 1991. "*Methodological Foundations of Macroeconomics. Keynes and Lucas"* Cambridge, UK: Cambridge University Press.

————. 2000. "Financial Fragility and Cyclical Fluctuations." *Structural Change andEconomic Dynamics* 11(1): 139–156.

————. 2001. "Minsky, Keynes and the Structural Instability of a Sophisticated Monetary Economy." in R. Bellofiore and P. Ferri (eds.), *Financial Fragility and Investment in the Capitalist Economy*. Cheltenham, UK: Edward Elgar.

————. 2005. "Rationality, Learning and Complexity." in B. Agarwal and A. Vercelli (eds.), *Psychology, Rationality, and Economic Behaviour: Challenging Standard Assumptions.* London: Palgrave Macmillan.

————. 2009a. "A Perspective on Minsky Moments: The Core of the Financial Instability Hypothesis in Light of the Subprime Crisis". *Working Paper No. 579* . The Levy Economics Institute

———. 2009b " Minsky Moments, Russell Chickens, and Gray Swans: The Methodological Puzzles of the Financial Instability Analysis" Working paper No. 582 The Levy Economics Institute

Variato A., 2001: "Hyman Minsky: what kind of (post-) Keynesian?" In "Financial Keynesianism and Market Instability" edited by Bellofiore R., Ferri P., Edward Elgar 2001

Whalen C. 1999 "Hyman Minsky's Theory of Capitalist Development" Working Paper No. 277 The Levy Economics Institute

———. 2001. "Integrating Schumpeter and Keynes Hyman Minsky's Theory of Capitalist Development" *Journal of Economic Issues , 4* (35), pp. 805-823.

Wolf, M. 2007 . "In a world of overconfidence, fear makes a welcome return". *The Financial Times* .

———. 2008. "Keynes offers us the best way to think about the crisis". *The Financial Times* .

Wray, L.R. 1990 *Money and Credit in Capitalist Economies: The Endogenous Approach* (Aldershot: Edward Elgar).

———. 2008. "Financial Markets Meltdown: What Can We Learn from Minsky?" *Public Policy Brief No. 94* The Levy Economics Institute of Bard College.

———. 2009: "The Rise and Fall of Money Manager Capitalism: A Minskian Approach" Cambridge Journal of Economics 2009, 33, 807-828

Wray, L. R., & Tymoigne, É. 2008. "Macroeconomics Meets Hyman P. Minsky: The Financial Theory of Investment". *Working Paper No.543* . The Levy Economics Institute.

Zezza, G. and C.H. Dos Santos (2004) 'The role of monetary policy in post-Keynesian stock-flow consistent macroeconomic growth models',

in M. Lavoie andM. Seccareccia (eds), *Central Banking in the Modern World: Alternative Perspectives* (Edward Elgar), pp. 183–208