5-20-1985

Innovations in Technology, Labor and Finance: An Integrated Approach to Instability

Hyman P. Minsky Ph.D.

PRIORS

Efficiencies

The Formal Theory & The Mathematics

Conjectures & Theorems.

Institutions & the behaving Complex Systems

Innovations in Technology, Labor and Finance: An Integrated Approach to Instability

By

Hyman P. Minsky
Professor of Economics
Washington University

add: Technology of innovation in capitalism (1) competition among capitals for profits (2) "Equity market" transforms results expected Imputation of capitals for profits in to capital gains

A paper prepared for an International Joint Seminar on The Impact of Technology, Labor Markets and Financial Structures on Economic Progress and Stability, Washington University, St. Louis, U.S.A.

Paper to be delivered Monday, May 20, 1985.

"But coherence doesn't mean 'equilibrium'", Alice objected.
"When I use mathematics", Humpty Dumpty said, in a rather scornful tone, "it means what I choose it to mean - neither more nor less."
The question is", said Alice, "whether you can make mathematics mean so many different things."
The question is", said Humpty Dumpty, "which is to be the master - that's all."

--A corruption of an exchange in
Lewis Carrol's Through the Looking Glass

I. Introduction: Crossfertilization

The purpose of an international seminar is the cross fertilization of ideas and analysis. The institutional structures that determine how activity is actually financed, how innovations and technical changes take place, and how labor compensation and shop floor systems function are simultaneously different and similar in Italy and the United States. Because the institutions and market processes are different the ideas and the analytical frameworks that explain how the system behaves differ, because the institutions and market processes are similar the two economies give us a laboratory test of how institutional details matter.

A meeting such as ours should not only report on research but what is more important should look to open doors to new or further research. The main success of this seminar will not come from the results and work reported but from the intellectual activity that it triggers. Thus in our discussions, formal and informal, the question of "What questions are opened?" is always "on the table".

What we hope we are doing is starting a research group that can identify problems, carry out the indicated research, resolve difficulties and go on to new research problems. However if this week is to be the beginning of a successful research program, our priors - the viewpoint with which we approach these problems - has to have points in common. It is my function as the "first at bat" to start the discussion of "our priors".

Any effort such as we are undertaking can be either conservative or radical - to paraphrase Gilbert and Sullivan. Whether it is one or the other depends upon the maintained view about established questions, the common answers and orthodox theory. The conservative accepts the established theory,

answers and questions as being adequate, the radical is critical of the state of the discipline; doubts the theory, rejects orthodox answers and proposes new or different questions. They, principal item on our agenda is "What are the questions?"

Both Italy and the United States are advanced capitalist economies that are characterized by governments that not only have a large fiscal (taxing and spending) effect but also intervene in market processes in various ways. Although the industrial structure of Italy and United States differ, both countries are technically dynamic. Similarily, the labor market in both countries is affected by government interventions and the trade unions in these countries are involved in quite different ways in determining compensation and the organization of the shop floor. Both Italy and the Unites States have modern sophisticated banking systems and a spectrum of non-bank financial organizations which engage in the external finance of business, but the structures of financial institutions and financial usages are quite different. An implicit main question in any conference such as this is whether identifiable institutional differences matter and if they do, "How do they matter?". What variables that measure system performance are affected by the institutional structure?

Our research agenda must go beyond formal theory. The mathematics of theory and the sharp analysis of the literature can be carried out within our "home disciplines": such research programs do not need meetings such as this. There is no question, such as there might have been forty years ago, that an advanced discipline is carrying seed - corn to a backward discipline. There are differences in how Italian and American economists approach some problems, but one is not more advanced than the other. Our interactions will be fruitful as they cast light on "How institutions affect narrowly defined

efficiency and the progress of an economy through historical time?" To cast light on the particular questions this brings forth, institutions should be of the same family, even if they are quite distinctively different. This I believe is true of our two countries.

II. Efficiencies

In an article on multinational banking, Jean and Peter Gray distinguished between the stabilization and allocational efficiency of an economy.[1] They argued that it is possible for an economy with a particular institutional structure to be superior in its stabilization efficiency properties as compared to an economy with a different institutional structure, even as if inferior in its allocational efficiency properties. For example, within a Kaleckian framework if business is heavily indebted then a big government capitalism is superior in its stabilization properties to a small government capitalism even as it is inferior in its allocation efficiency. This is so because government deficits will stabilize profits even as taxes and spending drive "price wedges" between buyers and sellers on various markets. In a capitalist economy with a modern banking system there is a trade-off between the two efficiencies.

We can go beyound the Gray and Gray dichotomy of allocation and stabilization efficiency and add growth, inflation, distribution and technical dynamism to our list of "efficiencies". In the light of our concerns with innovations in technology and finance - with what we can call the Schumpeter connection - it may very well be true that an industrial and financial structure that is conducive to innovation in technology is susceptible to debt deflations. Furthermore there are compensation systems as well as shop

floor organizations that affect the costs of technical change. The quick response of wages to rising prices in institutional structures that lead to de facto or de jure indexation of wages may affect the viability of liability structures and the risk-return relation for technical change.

Perhaps the biggest failure of interventionist capitalism has been due to the lack of understanding how institutional arrangements accepted for good reasons - such as trade union power - can abet inflation and retard technical progress. Fiscal and monetary policy actions always have a structure and the structure implies a particular set of impacts that affect the various efficiencies. Thus a tax system that is progressive, so that sharp declines in revenue occurs when income and employment declines, is likely to be stabilization enhancing even as it may retard the risk taking associated with technical innovation.

When economists consider innovation all too often the focus is on technical change, however, innovations also occur in labor and in finance. Innovations in labor take place in the compensation system or in the way work is organized. Because of the impact of the tax structure and the power of group insurance in lowering rates a major change in the compensation system took place in the United States and fringe benefits rose relative to taxable compensation. In a sense some of the fringe benefits took the form of income in kind - the compensation system is to deliver a particular level of coverage as far as medical care is concerned. The fringe benefit innovation in compensation systems often led to a rise in the market power of the suppliers of the fringe benefit and therefore a rise in the price per unit of the fringes. The system of third party medical payments that was designed to avoid the socialization of medicine has had destabilizing impacts upon the general level of prices.

There is one efficiency-inefficiency trade off in finance where the differences between Italy and the United States is dramatic. Both countries have done rather well in the past several years, both countries are sophisticated in their financial practices. After all, even though Lombard Street is no longer the main citadel of capitalist finance, the term still invokes the centrality of sophisticated financial practices in capitalist economies. However, whereas the larger or giant multi-billion dollar corporations whose shares are publically traded is the backbone of the private American economy, this variety of publically owned corporations is not a dominant - perhaps not even a prominent - part of the Italian scheme. In part this is due to the greater extent of public ownership in Italy, in part this greater extent of public ownership reflects the absence of markets and institutions which can finance a divesture of enterprises owned by state financial institutions.

In the United States about the time the second World War ended an implicit agreement on a "socially responsible" corporate form emerged. The newly "legitimized" corporation was to earn substantial profits, however these profits were not to be used to support "excessive" compensation for corporate management or "large" dividends for stockholders; this corporation could be in debt, but debt is not to absorb a heavy part of the gross flow of funds to the corporation. This socially responsible corporation was not to "sweat" its labor, whether it was unionized or not, and the large cash flow retained within the firm was to go to finance technical progress and investment. Although the stock bonus arrangements made management conscious of the price of the stock in the market, operating so as to manipulate stock prices was frowned upon.

Over the past several years - and at an apparently increasing pace over the past several months - a series of leveraged "buyouts" and takeovers have occurred. An ostensible aim of these buyouts is to give the shareholders "value" for their shares. The techniques is to raise the indebtedness of the surviving corporation. As a result of the change the surviving corporation is so heavily in debt that a large part of its cash flow is committed to debt payments. The resulting corporation has little in the way of an uncommitted cash flow that can finance investment and innovative technologies. Furthermore, because the margin between cash receipts and payment commitments is much diminished any fall in revenues below anticipated will force the company to try to reduce "wage costs"; the financial restructuring may make it necessary to "sweat labor". The post-war concensus about the way corporations are to go about their business has broken down, and with it the question as to how innovative technologies that require the hazarding of large amounts is to be financed. A paradox may emerge in that the financial restructuring during the Reagan years, during an administration that is determined to diminish the role of government in business, may lead to a greater government involvement in the structure of innovations and the financing of investment than has hitherto been true.

Once the various efficiencies are identified then the question theory has to address is how they are related so that we can address the question of how institutional structures affect the relations among the efficiencies. The questions that theory need be concerned with changes: to address the allocation vs. stabilization efficiency question the "model" need be capable of generating allocational inefficiencies as well as instability and it needs to be able to evaluate the impact of alternative institutional specifications.

The Gray and Gray insight opens up many issues, which I hope we will address during this week.

III. The Formal Theory and the Mathematics

With many apologies to the ghosts of D.H. Robertson and Lewis Carrol, I prefaced this paper with a corruption of an exchange between Alice and Humpty Dumpty. Although we are not mainly concerned with making advances in pure theory, we need to work within a theory in which institutional arrangements matter, in which the nature of the path through time of the system depends upon institutions. Because theory nowadays is often mathematical in its language - and theorems are proven in a formal way - we have to examine how the way problems are formulated affect the theorems that are proven. The mathematical formulation constrains the theorems that are demonstrated.

It is agreed that an economy is a multidimensional system and it has long been known that well behaved linear n-dimensional systems will have a solution. Given this knowledge and by identifying the solution as an equilibrium, the way in which the economics must be forced if the analysis is to be mathematically tractable is known. But the world is more complicated then simple linear systems would allow. In order to study accumulation, the system has to be time dependent. If the system is capitalist then monetary and financial considerations cannot be ignored, and these introduce non-linearities. The question is "What do we know of such complex, multidimensional, time-dependent and non-linear systems?"

The basic answer is that they are in general not nice in that the time series of the variables that endogenous processes would generate do not fall into a damped, exponential growth or well behaved cycles pattern. Such systems explode or exhibit chaotic or hysterical behavior and can be conducive

to catastrophe. Our world does not exhibit "chaos" often - there seems to be a good deal of coherence to economies and catastrophies are scarce. The problem is to achieve an apparent coherence even though the underlying system if left to "itself" would degenerate in time to an incoherent state, i.e., the underlying system needs to be "dominated". We need to get observed coherence out of a system whose internal processes yield incoherence.[2]

There is a paper by Blatt[3] that indicates how a system whose endogenous reactions yield incoherence - in his case explosive cycles - can be constrained to generate numbers which if analysed econometrically lead to the proposition that the endogenous relations must be "damped", i.e., tends toward an equilibrium value.

What Blatt did is set up an accelerator multiplier model whose parameters are known to yield an explosive time series. He also introduces well behaved flows and ceilings. He allowed the endogenously explosive accelerator multiplier and the ceilings and flows to generate numbers. He then used these numbers to determine the parameters of a fitted accelerator multiplier model.

Instead of recapturing the parameters that lead to the known explosive interactions, Blatt's econometrics yields a set of parameters that would make for a damped cycle. The world being analyzed is known to be endogenously explosive, with constraints that contain the tendencies to explode, to become incoherent, the econometrics say the world is an equilibrium seeking apparatus. It is the constraints that "dominate" the thrust towards endogenous incoherence so that the system yields a "pseudo-coherence".

The system therefore consists of endogenous processes and constraints. To see what is going on we can turn to the simple accelerator-multiplier model plus constraints: a model that without the constraints is approaching its fiftieth birthday and with the constraints its thirtieth birthday.[4] As is

well known it takes the form of

$$1) \quad C_t = a_0 + \alpha Y_{t-1}$$

$$2) \quad I_t = b_0 + \beta(Y_{t-1} - Y_{t-2})$$

$$3) \quad Y_t = C_t + I_t$$

so that

$$4) \quad Y_t = a_0 + b_0 + (\alpha + \beta) Y_{t-1} - \beta Y_{t-2}$$

$$\text{or} \quad Yt - (\alpha + \beta) Y_{t-1} + \beta Y_{t-2} = \alpha_0 + b_0$$

The equilibrium value of this system where $Y_t = Y_{t-1} = Y_{t-2} =$

$$5) \quad \bar{Y} = \frac{ao + bo}{1 - \alpha}$$

The equation 4 has a solution which takes the form

$$6) \quad Y_t = \bar{Y}_t + A_1\mu_1^t + A_2\mu_2^t$$

where μ_1 and μ_2 are derived from the parameters α and β and A_1 and A_2 are derived from the initial conditions. We assume values of α and β such that $\mu_1 > \mu_2 > 1$.

If the system has a "ceiling" given by $Yt = Yo + \mu_g^t$ and a floor given by $Y_t = Y_o + \lambda\mu_g^t$ $(0 < \lambda < 1)$, then if $\mu_1 > \mu_g > \mu_2$ both A_1 and A_2 are positive and if $\mu_1 > \mu_2 > \mu_g > 1$, then $A_1 < 0$ and $A_2 > 0$, but $|A_1| < |A_2|$. If $\mu_g > \mu_1$, then the ceiling never becomes operative, the time series is an unconstrained explosive accelerator model that migrates to a growth rate given by μ_1.

If the system has real $\mu > 1$ (i.e., 1.05 is a 5% growth rate) and if $\mu_1 > \mu_g > \mu_2$, then the observed "path" will be a constant rate of growth. If $\mu_1 > \mu_2 > \mu_{g_c} > \lambda\mu_{g_b}$, then the observed path will be a constant amplitude cycle that bounces between the ceiling and the floor.

It is possible therefore to get an acceptable time series (monatonic growth and a constant relative amplitude cycle) out of a process which is

endogenously "explosive" by the impact of ceilings and floors on the combined process.

The system of the accelerator multiplier process with floors and ceilings is piecewise linear with switching points when the floors and ceilings become effective. In economic terms an endogenous process that leads to unacceptable values is constrained by institutions, policy interventions, and social or technical rigidities so that acceptable values are the result. In terms of the formal model [recall that the solution equation $Y_t = A_0\mu_1^t + A_2\mu_2^t$ is a transformation of a second order difference equation $Y_t = a_1Y_{t-1} + a_2Y_{t-2}$] the ceilings and floors impose new initial conditions.

A word about recursive processes of solution equations and initial conditions may be in order. Given the parameters (α and β of equation 4) two values of $Y - Y_{t-1}$ and Y_{t-2} - need to be known to set the process as given by equation 4 in motion.

In equation 6 the two initial conditions are handled as follows:

$$6.1 \quad Y_{t-2} = Y_0 = A_1\mu_1^0 + A_2\mu_2^0$$

$$= A_1 + A_2$$

$$6.2 \quad Y_{t-1} = Y_1 = A_1\mu_1^1 + A_2\mu_2^1$$

Y_0 and Y_1 being the initial conditions. If we take two "generated values" Yn, Y_{n-1} from equations 4 or 6 and use these as initial conditions for determining A_1 and A_2, we would get

$$6.3 \quad Y_{n-1} = \bar{A}_1\mu_1^0 + \bar{A}_2\mu_2^0$$

$$6.4 \quad Y_t = \bar{A}_1\mu^1 + \bar{A}_2\mu_2^1$$

and $\bar{A}_1$ will equal $A_1\mu_1^{n-1}$ and $\bar{A}_2 = A_2\mu_2^{n-1}$; the two "sets" 6.1, 6.2 and 6.3, 6.4 will generate identical values for Y_{n+1}, Y_{n+2}, ...

Thus we could "conceive" of the dynamic processes as "one step at a time" processes in which the recent values of the variable are initial conditions for the next value of the variable. A process can be said to be "unconstrained" when the initial conditions for the "next step" are generated by the process and "constrained" when the initial conditions for the "next step" differ from those that the process would have generated. Constrained "processes" reflect either institutions or policies which impact upon variables whose future is determined by the past in such a way that bounds are put on the variables the system realizes.

Thus in models I explored well nigh thirty years ago constraints that reflected the behavior of monetary variables or productive capacity were used to transform endogenously explosive processes into generators of acceptable time series. The monetary variables and productive capacity were modeled as imposing new initial conditions upon the process.

A more overtly non-linear process would have the parameters of the model - the α and β of equation 4 - vary with system behavior or with some external constraint. Thus in an early model R. Goodwin had investment determined by an accelerator such as equation 2, but placed a ceiling on investment capacity, there exists an I_t max.[5] Because of his lag structure ΔY persisted in increasing after I_{max} was achieved, in effect reducing the realized β. By lowering β in this way the explosive process was turned into a damped process. In effect β became a function of ΔY such that if $\Delta Y > \Delta\bar{Y}$ then $d\beta/dr < 0$.

The problem is not in devising a "game" or a "model" that yields apparent coherence out of processes that would endogenously yield incoherence, the problem is to give economic significance to the devices that are used to get these transformations.

In a number of places Prof. Richard Day has explored properties of models that endogenously generate incoherence. These models cannot in general be solved analytically, but runs with varying parameter values and initial conditions are possible. These runs can be studied and ideas about the structures of these relations can be derived. In the case of these models - just like the piecewise linear model, a semblance of coherence can be achieved by appropriate intrusion of initial conditions or institutional arrangements that change parameters. Incoherence can be thwarted by an apt series of interventions.

IV. Conjectures that can be Transformed into Theorems

If the internal dynamics of the complex system that is an economy imply that incoherence or a catastrophe will occur, then the on the whole coherence and rarity of catastrophe that are observed implies that the internal dynamics are thwarted. The study of such systems becomes the analysis of the "thwarting systems" - "What is there about the economy that does not allow unbridled scope to the internal dynamics?" becomes the question. The thwarting mechanism is an institutional characteristic. Almost always we can assume the institutional characteristic or intervention either leads to values of the recursed variable that differs from the generated value or effects one of the reaction parameters. Sometimes it becomes merely a game by the analyst to determine whether initial conditions or parameter values are changed.

Two theorems (or conjectures) emerge out of the view that the internal dynamics will in time lead to unacceptable system states (catastrophy or incoherence) which differ from the accepted views. The first is an

anti-laissez faire theorem and the second is a "limitations upon the attainable" theorem.

The basic "aim" of orthodox allocation theory is to establish Adam Smiths invisible hand "Theorem", that each agent "...intends only his own gain, and he is in this, as in many other cases, led by an invisible hand to promote an end which was no part of his intention" [Wealth of Nations 1b bk IV, ch. 2]. This theorem, much modernized, becomes through the intellectual history of economics the proposition that a competitive equilibrium is a Pareto optimum. The "invisible hand" proposition leads to laissez-faire - where laissez-faire does not unleash successful predators motivated by greed but where market conditions force powerless agents to serve a "social good".

The Anti-Laissez Faire theorem is that "In a world where the internal dynamics imply that coherence will break down (or a catastrophe will occur) a semblance of coherence can be achieved by constraints and interventions. These constraints and intervention can take the form of imposing new initial conditions or affecting market reactions so that parameters change". This is of course what floors and ceilings do in the piecewise linear systems. The theorem is that analogues to floors, ceilings and frequency limitations exist in real world economies and transform the systems that generate incoherence into generaters of well behaved or coherent economies.

The second, or limitation upon performance theorem follows from the first. If the pursuit of individual gains or well being in the market leads the system to "rush off" into inflation, deflation or rapid oscillatory systems that throws off disparate signals that exceed computation capabilities, then the economy will be moving rapidly away from any well defined notion of "allocation" or "stabilization" efficiency. If there is an

observation time and less than perfect adjustment for interventions the system can never be in an optimal alignment. This implies that there is a "practical best" for the economy that can fall short of any abstract best.

These two theorems imply that any success in sustaining coherent growth depends upon the institutional structure and that because the institutional structure and the source of incoherence change or evolve, success will be transitory. A "revolution" like that of Roosevelt's or the "Age of Keynes" from 1946 to 1967 will be successful even as the seeds of future failure are ripening within the economy. There is no automatic pilot for the economy.

Secondly because in each epoch the practical best will fall short of a theoretical best, there always seems room for improvement. All too often the "room for improvement" will be along "one" on the efficiency dimensions - and success means that one or more of the other efficiencies is compromised.

V. Institutions and the Behavior of Complex Systems

The proposition that emerges from considering complex, non-linear time dependent systems is that observed coherence is due to the interaction of the endogenous dynamic process, that on its own would lead to incoherent behavior, and institutional structures which, at apt times, dominate the endogenous processes in determining what takes place. We know from the mathematics that endogenous interactive processes will, in general, lead to incoherence. We now need to pay attention to institutional structures that contain thrusts toward incoherence so that fully realized breakdowns are scarce.

In the modern American economy the only reduction of the system to incoherence took place in 1929-33. In other countries breakdowns toward incoherence have been mainly in the form of inflations. However we may call for a reinterpretation of history. To the extent that the interpretation of

history is influenced by the theoretical priors of the economic historian, our knowledge of the past would minimize the extent of breakdowns and how institutional structures and interventions contained threatened breakdowns. Economic history through the eyes of a conventional economist is a story of shocks, disturbances and equilibrating processes. An implication of the "endogenous instability contained" view of economic processes is that economic history is a story of how institutions and interventions bring "coherence" out of a system that on its own would degenerate into incoherence.

In considering how institutional arrangements affect system behavior it is necessary to accept that inept or inappropriate institutional arrangements or interventions can adversely affect the coherence of the economy. The various indexing arrangements - whether of transfer payments or of wages - may abet the inflationary process. The "need" to protect the dollar in the aftermath of Britain's going off gold in 1931 led to monetary constraint that further destabilized the system. The recognition that the endogenous generation of instability is a deep characteristic of our economy implies that policy interventions bsed upon an economic theory in which endogenous processes are always equilibrium seeking can be perverse. Interventions and institutional structures need to reflect the view that policy needs to "stabilize unstable systems".

In this section I want to take up three aspects of institutional structures in the United States and how these structures and systems of intervention affected the behavior of the economy. These aspects are the Piore-Sabel conjecture with respect to Labor Markets, Market Power and Financial Structures, and Lender of last resort interventions.

A. Piore-Sabel Conjectures with respect to Labor Markets

In their recent book, The Second Industrial Divide, Piore and Sabel argued that the United States post World War II wage policy consensus was a significant factor in creating the era of apparent tranquil progress that ruled until the late 1960's-early 1970's. The wage policy concensus was that hourly wages should increase each year by a factor that reflected productivity gains plus realized inflation - i.e. the purchasing power of wages should increase by 3% each year. This consensus made for tranquil progress because it held "underconsumption" in check - and to Piore and Sabel underconsumption was one of the causes of the great depression; buoyant worker demand characterized this system. Piore and Sabel also intimated that this trade union settlement forced the banking system to be properly accommodating.

The productivity plus inflation rule for nominal wage changes reflected a view that it was inefficient to rely on competitive market forces to transform falling unit labor costs into lower prices. After all if money wages were constant and product markets were competitive then productivity increases would be translated into falling money prices. The argument has to draw on a proposition that market prices will not adjust to decreasing unit labor costs or that if such adjustments took place there would be adverse consequences.

In practice the wage consensus led to a rule - such as 3% plus inflation - which would transform a shortfall of productivity increase into a rise in product prices. If, for any reason, wage increases exceeds the rate given by productivity and inflation in any one year, then supply conditions would make for further inflation. If inflation takes place, the consensus rule has it the banking system would be accommodative, so that "next" year the inflation plus wage increase would tend to increase.

Thus the institutional structure put in place in the General Motors contract immediately after World War II did no harm and may have done some good in the first era after World War II, but after burst of wage increases in excess of productivity plus inflation rates in 1968-69 the wage process became an engine of inflation. Escalator clauses tend to amplify the dangers of an inflationary instability being built into the system. An institutional structure may be a stability enhancing system in one set of circumstances and instability enhancing in another.

B. Market Power and Financial Structures

In our modern world, successful production, administration, communication distribution and transportation processes often use very expensive and long-lifed capital assets. Often does not mean always. What we may call the "Emelian Way" can coexist with and prosper alongside operations that require expensive capital because of technology or the scale of operations.

Expensive, long-lifed capital assets require financing. In some capitalist economies - such as Italy - many of the industries that require expensive, long-lifed capital assets are publically owned and externally financed by means of government debts. In the United States almost all such industries are private and in many cases there are alternative suppliers of the services or goods.

In the case of the Railroads - when J. P. Morgan was riding high - it was discovered that for capital intensive industries intense competition that forces price to marginal cost will not yield enough cash to validate bonds or the prices paid for building the asset. This intense competition would result from either "overinvestment" in a regime of decentralized markets or from the

impact of recessions upon the demand for the industries output.

The banker's interest in business is for the cash flows to be large enough to validate debts, debts in "nominal" terms. Such debt validation is possible for productions with constant or diminishing marginal costs if and only if price exceeds marginal costs. Intense competition, in periods of excess supply, must not be allowed to push price to marginal cost. Bankers who take their responsibilities to the holders of instruments they put out or sell seriously will not finance industries which require expensive capital assets unless there is some believable guarantee that price will not fall to marginal cost.

Such a guarantee can take two forms: one is to guarantee that significant excess capacity will not arise and the second is to possess market power either because of the non-competition nature of the market (monopoly, oligopoly) or because the industry is regulated. Individual units cannot guarantee that aggregate demand will be adequate, therefore bankers insist on market power.

Thus monopoly and regulation of industry reflect bankers' needs for devices that limit their borrowing clients exposure to downside profit risks. The question is whether the financing efficiency thus gained - which facilitates capital intensive investment - more than offsets the allocational inefficiency of non-competitive industries and regulated monopolies. In Schumpeter's vision of accumulation and innovation, technical dynamism requires that bankers and business men cooperate in forcing the economy out of the path that leads to simple reproduction. In the view that ignores the processes by which accumulation is financed, the market interference of regulation and oligopoly leads to allocational inefficiency.

The market power - whether through oligopoly or regulation - solution to the problem of protecting finances against downside exposure loses some of its force when fiscal and monetary intervention succeeds in maintaining aggregate demand and aggregate profits. With demand maintained and prices stabilized through regulation or oligopoly interactions, profits are higher than anticipated and unused market power exists. As a result of the unusued market power, rising costs will not decrease profits. A situation in which the unused market power can be used as a basis of wage increases is brought into being.

The American automobile and steel industries are examples of shared monopolies in which unused market power was translated into worker wages and benefits. This led to a cost structure which is untenable in a world with trade. The problem of how to meet competition when market power is eroded may require a reconsideration of the standard "force trade argument". The institutional structure that emerged when the issue was the financing of capital intensive productions in a world where finance required protection through market structures against aggregate demand failures can be counterproductive in a world where such demand failures do not occur and the monopoly power that supported favorable wages is eroded.

C. Lender of Last Resourt Interventions

Both monetarism and the orthodox Keynesianism that ignores the historical period in which The General Theory was written are alike in that they emphasize the Central Bank as the creator of money rather than the Central Bank as the lender of last resort. In May of 1985, with the recent experience of bank and thrift institution failures that have led to various central bank

refinancing, it is not necessary to go into any abstract discussion of a lender-of-last resort intervention; we need just point to or describe what happened in Mexico, Argentina, Continental Illinois, Maryland, Ohio, etc....

What we have are financial systems whose internal dynamics and interactions, with business that needs to finance control over capital assets and households that profess to hold indirect or protected assets, leads to situations in which a collapse of asset values, financing of activity and therefore of income and employment seems imminent. Over the years the Central Banks have developed interventions which do not permit realized values to represent the unconstrained dynamics of the system. All we have to do is recall Irving Fisher's description of a debt deflation process to recognize the way in which central banking intervenes in the process to abort extreme consequences.

If there is any part of the economic process and any period in economic experience where overt intervention, in order to prevent or dominate what market processes would generate, is accepted, it is when lender of last resort interventions occur. Even though Central Banks and lender of last resort interventions are common to our two economies, the institutions and the form the intervention takes is quite different. In particular the existence of government "holding companies" mean that intervention in Italy is often at the firm level whereas in the United States the intervention is almost always (Chrysler and the Railroads of the Northeast are the major exception) at the financial institution level. Whereas the intervention in Italy at the firm level may not have any monetary policy implications, the interventions at the financial institution or financial market level in the United States affect the reserve base of banks and the interest rate structure. At times the

Federal Reserve's reactions to what it interpreted is an incipient financial crisis led to both a refinancing of threatened organizations and a significant easing or accommodative stance in its monetary policy actions.

Conclusion

From my argument it follows that the "priors" that should guide our research are:

1) The interactions within a complex economic system lead to the endogenous generation of intermittent incoherence and

2) Incoherence is rarely observed in the economy because the thrust to incoherence is aborted or contained by institutional constraints or policy interventions, either automatic or discretionary.

These priors mean that a progressive research strategy will have both an abstract and an institutional program. The abstract program will be to show how strong or special are the assumptions that lead to the equilibrium result and how any natural relaxation of these strong assumptions leads to incoherence. Furthermore the Blatt findings may mean that econometric research in macroeconometrics will tend to validate the researchers priors, not tell us much about the economy.

The institutional research program needs to study the institutions of the financial, labor and technology markets to see how they effectively act to constrain the incoherence breeding processes that are natural to complex systems. Innovation in technology, in finance and in labor markets are often incoherence inducing - perhaps more so in technology and finance than in labor. In order to study the impact of institutions it is necessary to have observed institutional differences. Thus comparative institutional studies

within a framework in which institutions differ is an essential part of a serious research agenda.

The Schumpeter vision in which finance and innovation are closely linked is especially relevant to the study of instability. Schumpeter's vision - as modified by later Keynesian and Kaleckian ideas - has a mass of profits determined by aggregate variables such as investment, government deficits and the foreign trade surplus (neo-mercantalism) and various capitals (ability to finance) that compete for shares of this mass. Innovations in technology, in finance, in the organization and compensation of labor are devices used by capitals as they compete for profits.

But my task is to raise the curtain - not to draw final conclusions. There is a serious research program which I hope we are starting: "How do the actual institutions of capitalism affect the stability and growth of the economy, given that we know that complex systems should by their own internal dynamics denegerate into incoherent behavior?" To do economics without equilibrium, even as the end results of processes and constraints is a pseudo-equilibrium, is the challenge we face.