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ECONOMIC DISEQUILIBRIUM—THE GENERATOR OF ECONOMIC GROWTH

"Growth is the result of instability, development is the result of instability:" with this simple statement the great economist François Perroux announced one of the greatest revolutions to have taken place in the science of economics since Quesnay and Adam Smith founded the discipline that dominates our present civilization.

To many people, this axiom might seem a paradox or even an untruth. Middle-brow intelligence, with its resistance to change, is still under the influence of a philosophical outlook we call "Greek" (in spite of Heraclitus)—in which the logical norm of equilibrium and the ethics of moderation are still basic to the order of things—and of concepts we call "cartesian," in which "mechanistic" stability and "mathematical" immobility are thought to express the whole of scientific reality.

"Reality is incredible," as one of the greatest scientists of our time (Einstein) has written.

Translated by S. J. Greenleaves.

In political economy, as in modern physics, a priori thinking based on reassuring but outdated schemata of thought—have had to give way to experimental rationality which permits a grasp over a paradoxical reality, to which it adapts itself.

PROGRESS AND FAULTS OF THE THEORY OF STABLE GROWTH

What is wrongly called *classic economy* (since it refers to the highest moment of a science as yet in its infancy) was dominated by the belief in natural harmony, in automatic mechanisms and spontaneous equilibrium. The mechanism of prices demanded that supply adapt itself automatically to demand; and *homo œconomicus*, reduced to the role of a perfect little automaton, with prices as its motor and profit as its liquid fuel, was no more than a cog in the great machine that produced a state of general equilibrium and growth.

This splendid intellectual schema was not without being contradicted by economic reality. By the end of the 18th century cycles of fluctuations and instability could be observed in industrial countries. Classic economists insisted in interpreting these as mere momentary imperfections within their economic system (due to imperfect competitiveness, lack of fluidity and mobility in production factors) or as impure elements due to extra-economic factors (war, political disturbances etc...).

But these contradicting facts stirred up two categories of adversaries.

A *socialist* school of thought; which denounced economic instability as the result of contradictions inherent in the capitalist system. Proudhon writes his *Contradictions économiques*.[1] Marxist dialectics strive to prove how an antinomic chain of disequilibriums must engender a cumulative process leading to decline and to the destruction of the structures of the capitalist system.

On the contrary a *liberal* school of thought, hoping to learn from a study of past and present economic disturbances and the newborn socialist critique, attempted to build a scientific theory of general equilibrium.

[1] However Proudhon distinguishes, whith exceptional lucidity, "institutional contradictions which lead to distruction," and "antinomy" a functional "contradiction" that "results in movement" and "aims at production." Cf. new edition *Œuvres choisies* (Gallimard, Collection "Idées").

The Lausanne school, with Léon Walras and W. Pareto, tried, with the help of principles borrowed from physics,[2] to correct the mechanistic empiricism of their predecessors by elaborating a mathematical model of general economic equilibrium. By yoking the notion of the interdependence of economic phenomena, at the heart of a given whole, with that of the global equilibrium of the same whole, this school of thought tends implicitly to identify general equilibrium with economic growth.

The great economic crises of the 30's establish the philosophy underlying Walraso-Paretian equilibrium as an axiom. When the *interventionist* school of thought comes into being, based on Keynes' analysis of the crises, the plan of action that is proposed to put an end to the prevailing unemployment accepts as an economic law the postulate implicitly contained in the theory of the Lausanne school: balanced economic growth. Faced with evenly spread unemployment, the Keynesian state tries to bring about a simultaneous increase in all forms of production.

This economic theory and its practice excited the antagonism of unorthodox thinkers who discredited the "rudimentary stagnationism" (F. Perroux) implied by this attitude of mind.

Even in the period preceding the Second World War the static quality of the theory of general Equilibrium is treated disparagingly. The concept of economic movement without disequilibrium is abandoned. Drawing their conclusions from an observation of economic fluctuations,[3] many think that "*alternation*" is an inevitable condition of a dynamic economic equilibrium. Numerous researchers try to evolve statistically a "*law of cycles*" applicable to economic forecasts. But the "return" to equilibrium is always seen as the outcome of each cycle, while disequilibriums are merely a kind of tribute to be paid to progress. Having discovered the dynamism of economic phenomena, economic thinking is still hampered by narrowly mechanistic and grossly deterministic schemata.

However, on the eve of the Second World War, a whole series of theoretical studies, particularly those of *the Italian school*, demonstrated the weakness of the Walraso-Paretian model and

[2] Pareto, like Walras, an engineer, is also the author of a thesis on "The equilibrium of physical bodies."

[3] Cf. H. Guitton, *Fluctuations et croissance économiques* (Dalloz).

its variants (model of partial equilibrii proposed by Marschall, dynamization of the model of general equilibrium by the introduction of a "time" variable).

In line with the studies begun by U. Rucci (as early as 1924) and Amoroso (1930), J. Di Nardi exposes the incompatibility that exists between the mechanistic equilibrium upheld by these theories and the active interdependence of economic phenomena. Mechanistic equilibrium supposes a continuity in the functions of supply and demand, the infinitesimal divisibility of wealth, the perfect mobility of economic factors. Whereas a study of the real economic universe shows that this fluidity does not exist; hence the delays and divergences among economic phenomena, and the need for "*time*" in order to achieve equilibrium. On the other hand, the Italian school proved that the nature of the interdependence of economic phenomena differed notably from the functional relations between abstract quantities as expressed by mathematics.

Interdependence of a mathematical type supposes the instant reversibility of functional relations between quantities. The heterogeneous character of economic matter entails only partial reversibility, and its lack of fluidity a postponed reversibility. Furthermore in economics the time factor is not passive; it introduces new facts. Therefore a functional relation does not only entail a "*dynamic reversibility*" ("in which the effects react on the cause with characteristics different from those of their original state") but it also degenerates into a "*dynamic irresolution*"[4] in which it is not possible to predict, a priori, the direction to be taken by the forces that launched the dynamic movement. Thus new impulses come suddenly into being and lead to new disequilibriums. And the process, set in motion by the interdependence of economic phenomena, is always in opposition to the state of equilibrium it is supposed theoretically to produce.

By the end of the Second World War it was already possible to say that economic thought had accomplished a sort of negative revolution. The idea of automatic equilibrium had been definitely succeeded by that of spontaneous disequilibrium. Once the period

[4] Di Nardi, "Dynamic Interdependence and Irresoluteness in the Theory of Economics", published in Padua in 1941 and again in "Economie et Société," (*Cahiers de l'I.S.E.A.*, No. 2, 1967).

of mechanistic schemata had been superseded, the era about to begin was that of political economy and of mastery over economic growth.

FOUR THEORIES: DISEQUILIBRIUM—AS GENERATOR OF GROWTH

However, under the voluntaristic guise of a policy of balanced growth, the classic theory of equilibrium was to continue with a new lease of life, notably in the United States (with Ragnar Nurse in particular). But it was opposed by a revolutionary theory. Certain economists, brought into contact with countries under reconstruction and then with developing countries, observe the real process of economic growth and discover the very nature and origin of this growth in those much despized economic disequilibriums.

The theory of economic disequilibriums as generators of growth, already formulated in September 1948 by the French economist François Perroux,[5] who can justly be regarded as one of its inventors, appears as a major characteristic in the work of the Russian Kozlovskii[6] and of the Pole Oskar Lange.[7] Finally it is the basic theory for the studies on development of the American O. Hirschman.[8]

Together with the theories of a dominant economy and of the poles of development, F. Perroux formulates the following revolutionary theory of growth with great forcefulness:

"Growth is the result of disequilibrium, development is the result of disequilibrium... We no longer believe in balanced growth except as an imaginary path... These tensions that are, finally, the generators of growth cannot and must not be eliminated... Development is the setting in motion and the maintenance of the cumulative processes... Harmonized development is a succession of disequilibriums controlled and made socially tolerable."[9]

[5] "Une théorie de l'économie dominante," *Cahiers de l'I.S.E.A.*, April-September, 1948; "Note sur les pôles de croissance," *Economie appliquée*, June 1951.

[6] *Antagonisticheskie i neantagonisticheskie protivorechiaa* (Moscow 1954).

[7] *Traité d'économie politique* (1959).

[8] *The Strategy of Economic Development*, (1958).

[9] These sentences are taken from texts written between 1948 and 1951 and reproduced in the great economist's fundamental work: *L'économie du XX^e siècle* (Presses Universitaires de France), cf. pp. 169, 553, 257, 250 and 263.

As for Kozlovskii,—besides antagonistic contradictions that are peculiar to capitalist economies,—he goes so far as to distinguish between non-antagonistic economic contradictions. Among these he classes the intersectorial disequilibriums that have punctuated the development of Soviet economy. According to this economist the role of these disequilibriums is not only to warn but also to direct. "The characteristic trait of our difficulties and our contradictions consists exactly in this: they show us on what basis and with what means they can be resolved." They guide the actions of those who are responsible for the economy, and particularly of members of the Party and the State. The creative role of economic disequilibriums in the process of growth is therefore given most explicit recognition.

On the other hand Oskar Lange in his *Traité d'économie politique* stresses the "dialectic processes of development," in other words the generating action of disequilibriums. He considers development as the result of a series of "tensions" created by a chain of contradictions existing between forces of production, production relations and the superstructures.

He believes that development is the result of three closely linked dialectic processes.

All processes of growth are born of the active contradictions that exist between man and his environment, between forces of production and production relations, between production relations and the superstructures.

These unbalancing contradictions are the dialectic expression of the "law of a progressive development of productive forces." The first impulse is given by the contradiction that exists between man and his environment. This brings about a development of the forces of production and the old production relations. This throws production methods out of balance. This in turn leads to a second stage in which it is found necessary to adjust production relations to the new requirements of the forces of production. This change in production relations throws the economic and social superstructures out of balance. This entails an adjustment of the latter. Thus the "process of creation" is theoretically ascertained.

But this is no more than the schematic decomposition of a continuous movement, for Oskar Lange stresses that the law

of development "demands constant changes." Thus Oskar Lange, while respecting Marxist dialectics and their deterministic character, is the apostle of contradictions in growth seen as a series of generating disequilibriums.

Albert O. Hirschman,[10] on the other hand, draws on his experience in Latin American countries; he sees development as "sequences of disequilibriums."

"To study economic growth means to examine in detail the dynamics of the process of development... Unequal growth itself inevitably conditions further growth... Growth is necessarily unbalanced." Indeed it is through "a series of disequilibriums that growth is transmitted from the peak sectors of economy to other sectors." In order that an economy continues to progress, "the development policy must aim at maintaining tensions, distortions and disequilibriums." It should try to "orchestrate" judiciously "the sequences (of disequilibriums) rather than to eliminate them."

One is immediately struck by the resemblance between these theses and the writings of F. Perroux. In fact Hirschman often refers to the text of the French economist whom he quotes with obvious sympathy.

Thus four important economists, who belong to countries of very different systems and ideologies, all deny, in the name of economic studies, the thesis of balanced growth—believed so long to be irrefutable.

The theory of balanced growth is both logical nonsense and practical nonsense. Growth implies disequilibrium. Thanks to the generating action of dominant sectors, growth is accomplished by the breaking up of structures and by a series of disequilibriums that progressively "induce" growth throughout the whole economy. The possibility of the simultaneous growth of a whole economy is but the erroneous view of a few people who have been misled by mechanistic models and static mental schemata.

The belief in a balanced growth does not only neglect observable reality, but it is also quite mistaken about the very nature of economic phenomena and the process that produces develop-

[10] Paul Streeten in his "Unbalanced Growth" (*Oxford Economic Papers*, June 1959) puts forward similar ideas simultaneously with Hirschman. His name should therefore be added to the list of the economists I am examining.

ment in an economy. The inequality and heterogeneity of different elements (such as their relative rigidity) of an economic whole, creates those "asymmetrical effects" that are actuated by generating units (F. Perroux).

Growth is contagious owing to a series of disequilibriums that entail numerous adjustments and a "jerky" development (Hirschman); the theory of balanced growth merely uses two snap-shots of Economy taken at two different moments in time and neglects the motion picture of Growth. This movie shows a series of advances in one sector, followed by the recovery peaks of other sectors. But recovery in these sectors often goes beyond the original target, and in the meantime the peak sectors have also changed, thus the equilibrium is upset once more and a succession of distortions lead to a continuous transformation of structures. The theory of balanced growth, as Hirschman maliciously observes, is no more than "a comparison of statistics seen in retrospect." It completely forgets to examine and explain how, in the interval separating two statistical "exposures," the dynamics of disequilibrium (Perroux) can provoke economic movement, and how the dialectics of economic development (O. Lange) can bring about the recorded growth thanks to their generating contradictions (Kozlovskii).

The ideas of the four authors I have quoted show a definite tendency to converge. Economic disequilibriums are not only the generators of growth but also its liquid fuel. This revolutionary thesis, put forward by F. Perroux at a very early stage, is not only common to the three other economists, it is virtually the basis for all concrete policies of development that are practised at present.

Beyond this convergence of ideas, however, one notices obvious differences between their several points of view. They seem more obvious still if one bothers to analyze the notion of *generating disequilibriums* itself—the *adjustments* it presupposes—, the *limits* accepted by these "mechanisms"—and the inferred development *policy*.

On attempting a more thorough study, in the case of each of these authors, of the notion of the disequilibrium of growth itself one notices at once that the definitions of each writer are moulded differently according to their initial viewpoint and the final target they each accept.

KOZLOVSKII AND DIRECTING CONTRADICTIONS

Kozlovskii uses a study of the development of Soviet economy as his starting point. He realizes that recorded intersectorial disequilibriums not only cannot be eliminated but are part and parcel of the process of growth. Starting from a deterministic and materialistic viewpoint he discovers the existence of economic "contradictions" that set off the dialectic mechanisms of development. These so-called non-antagonistic contradictions have a functional role to play that must be accepted as part of the successful functioning of a socialist economy. "By their very existence (these contradictions) show by what means they can be resolved." The action of men responsible for the economy must therefore conform to the indications and the measures dictated to them by these dialectic mechanisms. The initiative of these men is reduced to conforming to "the direction" of the dialectic movement of growth. On the contrary the mechanisms of adjustment, and the extent of these adjustments, are given by the generating mechanisms that make them necessary. The policy and action of these men may be defined as the ability to read and apply the "instructions" supplied by this dialectic of development.

First Kozlovskii emphasizes the function of non-antagonistic contradictions (or generating disequilibriums), whose functional role can be logically integrated in the process of a materialistic dialectic. Then he contrasts them with antagonistic contradictions: dissociated disequilibriums that are the institutional blemish of the capitalist system.

From a strictly economic point of view this analysis reveals two important facts. First Kozlovskii establishes a distinction between generating disequilibriums (that play a priviledged role in socialist society) and dissociating disequilibriums (typical of capitalist society). This distinction limits the notion of disequilibriums as factors of growth.

Kozlovskii describes these generating disequilibriums, and the adjustments that they entail, from a mechanistic and deterministic point of view. It is all a question of "*mechanisms* of growth" based on disequilibriums and entailing actions and reactions that are quasi-automatic. These mechanisms would appear to be the antinomic homologue of mechanisms of growth based on equilibrium, as described in classic and neo-classic economy.

O. LANGE AND THE DIALECTIC PROCESSES OF DEVELOPMENT

Oskar Lange develops and refines Kozlovskii's theory and gives a slight variant of the concept of generating disequilibriums. He sees the processes of growth as going through three stages. In an advancing socialist economy they result from three important series of contradictions, or rather three series of productive disequilibriums: Disequilibriums between man and his environment—between the forces of production and production relations—between production relations and the superstructures. Oskar Lange is not limited by the relatively restricted framework of intersectorial disequilibriums that technically engross Kozlovskii's attention. His limits are the framework of structural disequilibriums and structural transformations. This rather more macroscopic viewpoint allows Oskar Lange to show how growth, moving from disequilibriums to new disequilibriums and from distortion to distortion, spreads dialectically in an economic society and transforms it. But although he emphasizes that growth spreads thanks to a dynamic of disequilibrium, he accentuates the creative action of man and of the dynamic of innovation. By borrowing two notions F. Perroux (with whom he had many long exchanges) had already developed at length, O. Lange extends the range of Kozlovskii's determinism, without abandoning it altogether. At the beginning of what he calls the "process of creation" in economic development, O. Lange places "the contradiction between man and his environment, that is to say the action of man on the world around him, and vice versa." Man's activity, while modifying his material environment, gives rise to contradictions between his ordinary behaviour and the new stimulants created by a changed environment. This tension forces him to change his economic behaviour, thus modifying the forces of production and giving rise to a new tension between these last and former production relations, which changes them and leads finally to a modification of the superstructures.

Three important observations should be made on O. Lange's analysis of development. First and most important, Oskar Lange, unlike Kozlovskii, does not distinguish between generating disequilibriums and dissociating disequilibriums. He does not consider the possibility of limiting disequilibriums.

Furthermore, though he continues to respect deterministic

ideology in his dialectic formulation of theses, he "de-mechanizes" the process of development. Human action is seen as playing a very important part in detonating the process of growth. The discovery of man and of his economic role brings Oskar Lange's ideas very close to those of the *économie généralisée*, where F. Perroux's economic theories as a whole, are synthesized. The kinship of their ideas has not gone unnoticed.[11]

Because of his materialistic ideology however, O. Lange integrates the creative action of man in a deterministic context that reduces it in scope. Thus in the end he brings us back to the physical viewpoint of "mechanisms of development." The economic action of man on his environment "happens independently of the knowledge an individual may or may not have of it, and independently of his will." Individuals are prompted to unbalancing actions and reactions by a "basic lever," an "economic stimulant" created by the material world around them. Though they are certainly conscious of the particular activity to which they are prompted by this stimulant, without having to grasp the "central lever" of dialectic movement that is driven by the "mechanisms of growth" they can act and react correctly. Consequently the great mass of workers adhere unconsciously to a general policy implied by dialectic movement. It is very tempting to contrast *homo œconomicus* of the classic bourgeois economy, who reacted to the mechanisms of equilibrium, and *homo dialecticus* of a socialist economy, who reacts to the mechanisms of disequilibrium. However O. Lange's analyses are more subtle than this, though they do not altogether escape from a certain ideological dogmatism.

D. HIRSCHMAN AND THE EFFECTIVE SEQUENCES OF DISEQUILIBRIUMS

At first sight the viewpoint from which Hirschman approaches the problem of growth seems opposite to that of the preceding theory. It is quite definitely spontaneistic. Following a solid Anglo-Saxon tradition it is imbued with a radical empiricism corrected by a certain decisional way of thinking. It is dominated

[11] "L'économie généralisée et la pensée actuelle d'Oskar Lange" by A. Nowicki (*Cahiers de l'I.S.E.A.*, June 1961, Series G.).

by a spirit of economic experimentalism based on a confidence in "natural" mechanisms and the spontaneity of corrective reactions.

Hirschman starts from an essentially practical problem. He does not need to try, like Kozlovskii, to discover and use the intersectorial disequilibriums of a highly industrialized socialist economy; nor, like O. Lange to integrate human action in the dialectic processes of development; he hopes to discover a practical recipe to enable underdeveloped economies to "take off" (to use an expression dear to Rostow). Rostow,[12] a great believer in balanced growth (which he tries to dynamize), certainly outlined the four stages of development. But he never showed how this "take off" happens: how the "take off" passes from a preparatory phase to the actual "take off" itself. All experiments in development that tried to start all sectors of an underdeveloped economy at once have failed. Why? Because, misled by monetary interpretations of the tendency to growth, (tendency to save and tendency to invest covering the tendencies to create and work)—the advisers on development in industrial countries have underestimated the importance of institutional structures and of the mental habits of economic agents, and above all they were wrong on the very nature of growth.

Growth is the result of disequilibrium. Productive disequilibriums are created by areas of development (here Hirschman explicitly adopts F. Perroux's theory). Growth is transmitted from sector to sector by a series of jerks, a succession of disequilibriums and reactions of adaptation. These reactions in turn create new disequilibriums, and development continues. An underdeveloped economy takes off thanks to a cumulative series of disequilibriums. In this manner it acquires "patterns of growth."

From these remarks—they follow closely those of F. Perroux, formulated earlier—Hirschman draws an important practical lesson.

In all forms of growth there is a part that is autonomous (the growth proper to a generating sector or to a pole of development) and an even more important part of *induced growth.*

This is the result of positive incitements and negative incite-

[12] In his book *Stages in Economic Growth.*

ments. An economic environment surrounding poles of development has to *adapt* its decision and investments to the new situation in order to respond to the demand created by the growth of these poles and to react against the structural disequilibriums provoked by growth. These induced decisions and these induced investments help to make up for what Hirschman regards as the greatest handicap of developing countries: the difficulty their economic agents have in taking independent decisions and making independent investments. From then on the process for making an underdeveloped economy "take off" is easy. It is merely a question of using the mechanism of induced growth, in other words of maintaining and encouraging productive disequilibriums to the maximum. On further analysis one can see that it is a question of obtaining an *optimum disequilibrium* and, in particular, of encouraging those "sequences of disequilibriums" that lead to the greatest number of productive investments and call for the greatest number of generating decisions. It is therefore possible, in a given situation and period of time, to build empirically a model of optimal disequilibriums (of "optimal disorder" as Hirschman calls it); this model would aim at bringing into action the greatest possible number of productive resources thanks to the "mechanisms of induction" and the "apparata of encouragement."

Thus the "open sesame" of all economic development lies in the choice of "*effective sequences.*" The effectiveness of unbalancing sequences can be appreciated with reference to three criteria:—their *power to unsettle*, in other words their ability to perpetuate disequilibriums, their *power to encourage*, in other words their ability to multiply the effects of induction—their *framing power*, in other words their ability to determine a whole "framework" for a given economic whole,[13] owing to key link ups with other economic elements.

Firstly, the most effective sequences are those which "move furthest away from equilibrium." Each advance in the sequence is induced by an internal disequilibrium and provokes in turn a disequilibrium that brings on a new advance. A policy of development should therefore try not to encourage a return

[13] The formulation of these criteria and the analysis that follows are my own, but they are a faithful interpretation of Hirschman's development.

to equilibrium, but rather it should try to prevent too rapid a convergence and encourage possibilities of divergence. The policy should act upon the "precious mechanisms of development sparked off by an unbalanced growth." The task of those who are responsible for development is to maintain and encourage these precious disequilibriums, and even create them, instead of trying to elimitate them. Thus the disequilibriums should reach their optimal power to unsettle.

Secondly it is important "by examining from all sides the intersectorial matrix of en economy," to pinpoint the areas of development, the key industries that provoke the most effective unbalancing sequences in satellite industries. Here again Hirschman's studies touch on the analysis of the theory of a dominant economy as set out by F. Perroux in 1948.

The third aspect that characterizes effective sequences is an appreciation of their ability to create a framework for an economy. Although it has many points in common with the notion of "key activity" (this, together with the concepts of "dimension" and "power of negotiation," is part of "the effects of domination" analysed by F. Perroux), Hirschman's viewpoint is still essentially original. Hirschman even compared the development of effective sequences with the assembling of the pieces of a jigsaw puzzle. It is a question of "minimizing the assembly time" and therefore "of setting the most difficult pieces in position;" the others can be placed inductively.

There is therefore an optimal order in which the sequences of disequilibrium must be chosen, or rather the order in which the poles of development are chosen is important (although it is not possible, in each individual case, to determine this order except experimentally).

Hirschman's thesis is finally characterized by a very thorough systematization of the theory of unbalanced growth. This systematization has two characteristics: it is *mechanistic* and it is *liberal*.

It is *liberal* in as much as it relies "in the main, on the forces of the market." Hirschman trusts in a certain "optimal disorder" and thinks it is useless to hope that with "integrated planning" one can shorten the process of development by telescoping the phases of the disequilibriums. Why does he see over-simplified

planning as ineffective? "Because of the quasi infinite number of possible correlations and the unpredictable character of many of these." Thus Hirschman is suggesting that it is right to tolerate a certain amount of "improvization" within the framework of a global development policy.

Although Hirschman places his trust in the forces of the market (unlike Kozlovskii and O. Lange), he also believes in a certain *automatism* in the processes of growth. This mechanistic viewpoint brings him close to the two writers from whom he was separated by his liberalism. For him the sequences of disequilibrium that create growth are but "precious mechanisms" that must be maintained or sparked off. The responses of adjustment take on the same automatic character. Doubtless disequilibriums, as generators of growth, involve destructive effects and inhibiting "polarizations," but according to Hirschman, "corrective sections put a stop to these almost automatically." Whether these actions are brought about by the forces of the market or by extra-market forces in no way changes the setting off of corrective mechanisms. "Extra-market forces, he remarks paradoxically, are not necessarily any less automatic than market forces." Should these not be enough, "great pressure is exerted on public authorities to force them to get something done." Since "the desire to remain in power" is as strong a force as "that of realizing a profit," corrective measures are set off almost automatically.

This condensation may make the argument seem specious. In fact, the confusion that these developments reveal throws into relief the fundamental postulate on which the whole theory of economic disequilibriums as generators of growth is built.

This theory implies, I think, that disequilibriums provoked by the poles of growth involve a *double response* from "activated" sectors.

Firstly this theory supposes that the positive effect of productive disequilibriums generates a *constructive action* (for example an additional supply of a certain product in order to satisfy an increase in the demand from the generating sectors). It also takes for granted a *corrective reaction* to the difficulties created by these disequilibriums (for example greater competitiveness among the generating sectors). In the absence of these reactions, the disequi-

libriums would have a destructive effect; the social and economic scope of this effect should be evaluated with precision on a level with the whole economy.

The "responsibility"[14] of an economy is, I think, a fundamental assumption of the theory as a whole, and contradicts the mechanistic character of Kozlovskii and O. Lange's theses as well as Hirschman's. Having accepted this, the importance of a practised economic policy and the importance of human and social factors seem overwhelming. A voluntaristic and probabilistic viewpoint is inescapable whenever one tries to apply the processes of unbalanced growth in a concrete situation. Hirschman himself seems to realize this in his conclusion to *The Strategy of Economic Development*. He admits feeling a certain uneasyness when he considers "the importance he has attributed to disequilibriums," and he underlines the unfavourable effect they could have on development "in the absence of corrective measures." In this indirect way he sets himself the problem of the responsibility of an economy. He certainly recognizes that economic disequilibrium not only creates opportunities for profit earning that must be siezed, but also produces obstacles that have to be overcome. However he promptly assumes that "any clearly apprehended obstacle is already half under control;" he further believes that "all conflict has a constructive role to play." He presupposes therefore that economic agents are both conscious of the obstacles they must overcome, and are able to act voluntarily. Having admitted this Hirschman switches at last from a mechanistic to a voluntaristic viewpoint.

On the other hand, the importance he gives to the development policy of a State finally turn his liberal premises towards interventionist conclusions.

Indeed, he believes that during the process of development the State should play two apparently antithetical roles:[15] on one hand it should promote development by interventions destined to foster or even to create disequilibriums; on the other hand it

[14] The theory of Responsibility of an Economy that I develop in this article (cf. pp. 99, 102, 103, 110 and 111) is my own, but I consider it to be the corollary of any theory of unbalanced growth.

[15] On the difficulty of fulfilling these two roles cf. my article on "Les limites d'une économie concertée" (*Perspectives*, 18 February, 1961).

should "be ready to react against these pressures and to break them down in all kinds of sectors." The State should therefore fulfill an *unbalancing function* (promoting growth by an effective sequence of disequilibriums) and a *balancing function* (breaking down pressures). Hirschman's empiricism leads to an apparently contradictory "state of flux." Just as Kozlovskii and O. Lange started from a mechanistic and deterministic viewpoint and found they could not eliminate voluntaristic consequences from their theories, so Hirschman reaches interventionist conclusions, though he claimed to base his theories on liberal automatisms.

Thus, though economic disequilibriums are seen as the motors of growth, man must keep cleaseless watch over the "regime" of these motors.

The conclusion one reaches after studying these various theses is the very one F. Perroux had emphasized for the first time in his *theory of harmonized growth.*

F. PERROUX AND THE ORGANIZATION OF GENERATING DISEQUILIBRIUMS

Though written before these theses to which it is akin[16] this theory seems almost a synthesis of the preceding ones in breadth, precision and subtlety.

From one point of view the extensive and innovating writings of François Perroux may be regarded as a reconsideration of a dynamic of unbalanced growth. As I have already tried to formulate elsewhere,[17] Perrouxian economy can be schematized in a dynamic with a triple component: (1) a dynamic of the inequality of economic units (which corresponds to his thesis on the *unequal functioning of growth*); (2) a dynamic of economic projets (which he interpreted in his thesis on the *propagation of economic progress*); (3) and a dynamic of organized growth (which corresponds to his thesis on *the mastery of growth*).

[16] I must stress that both Hirschman and O. Lange have kept up an open dialogue with the author of *L'économie du XX^e siècle* and that Hirschman also refers to Kozlovskii in *The Strategy of Development.*

[17] "Une philosophie de l'action: Les idées-maîtresses de F. Perroux" (*Entreprise*, 10 November 1966).

These three theses that deal respectively with the agents, the factors and the policy of growth, analyse very thoroughly the unbalancing process of development.

The first of these theses (which reorganizes his theory of "dominant units," "poles of growth" and "macro-decisions") help us to grasp the "wherefore," of growth and its generating disequilibriums, thanks to his study of the effects of domination by generating units and of momentous independent decisions. His thesis on the propagation of economic progress (which is expressed in a "theory of economic information" and "a theory of economic innovation") is a thorough study of the process by which generating disequilibriums spread and throws light on the workings of development and induced growth. As for his thesis of the mastery of growth (which includes his theory of how to "extend and exceed economic calculation" and of "harmonized growth"), this deals with the economic aims of this growth and with socially tolerable disequilibriums. The logic of probability, when extended to the areas of collective costs, calculated risks and the natural tendencies of human psychism, defines the means and the aims of a policy that orchestrates productive disequilibriums.

The birth, diffusion and control of disequilibriums as generators of growth: such could be the wording of a plaque describing the whole of François Perroux's work.

The *dynamic of disequilibrium*, which inspires all F. Perroux's concepts, is based on a realistic study of contemporary economy.

"The modern economic world is as different as possible from the over-simple mechanism of classic economic theories."

Economy is inequalitarian: economic units are unequal in size and power. Economy is heterogeneous, not only because the units are unequal, but also because their products are heterogeneous and receive innovation and information in different degrees. Economy is bellicose. Whatever form an economic regime may have, competition between units and between national economies is always aggressive. Lastly economy is dynamically conscious: those who act are not robot contractors, but "agents possessed with ability and will power," who therefore have a will and a conscience coupled to very different degrees of power (hence the strategies to influence or adapt their own and other units).

Judged as the fruit of accidental imperfections these characteristics had been rejected by classic and neo-classic economists. Accepted in the name of a realistic study of economy, they shatter the static theory of general equilibrium and its modern equivalent, the theory balanced growth.

On one side, "human progress has the upper hand over mechanical equilibrium, from which man was almost entirely banished." On the other hand, since economic units are unequal and heterogeneous, disequilibrium is normal to economic movement. "Asymmetrical effects over an irreversible period of time" exist and are brought to bear on dominated units by the dominant units.

Resulting from a combination of three factors (size, power of negotiation, the nature of the activity of the dominant unit), the effect of domination is mainly interpreted by an effect of encouragement that allows the generating unit to spread its own growth to its environment. But this domination is also expressed in a secondary way by a bottleneck[18] effect on the dominated units. Problems of how to moderate and correct an economy taken as a collectivity then arize.

What is undeniably true is that "a complete dynamic may be deduced from the effect of domination, a dynamic of inequality." This is complementary to the dynamic of innovation discovered by Schumpeter, and is indispensable to growth, for it *is* growth. It would be quite unrealistic and unscientific to condemn this inequality and to associate automatically "exploitation and domination." "Growth... progress, F. Perroux is not afraid to write, have, up to this day, been produced in a state of inequality by inequality. And there is reason to believe that in the future growth and progress will depend not on greater equality, but on the elimination or correction of non-productive inequalities." Furthermore, F. Perroux goes on elsewhere, "economic progress depends on optima relations between productive inequalities and on the changes in the terms that interpret them."

At this point one discovers that F. Perroux—while asserting the ineluctability of the equation: economic inequality = economic

[18] On this point see my article "Les investissements étrangers et le danger des usines flottantes" (*Perspectives*, 14 January 1961).

disequilibrium = economic growth,—distinguishes between productive inequalities and non-productive inequalities, and intends to submit these notions to the discipline of collective economic calculation and the framework of an economic policy.

At this stage in his analysis, the French economist has already superseded the narrow concept of growth and shows his preference for the concept of development.

Strictly speaking, economic growth interprets the expansion of an economy in terms of quantifiable economic products, while economic development understands it in terms of the qualitative satisfaction of economic agents as well.

Intrinsically, development is first and foremost "a phenomenon of human interrelations" and, over and above a tendency to invest and to save, it depends on a tendency to create and work.

From this functional point of view "development is a series of cumulative processes which form a chain of disequilibriums." But these disequilibriums are far from creating growth mechanically. "Under specifiable conditions these disequilibriums bring about a *creative response.*" And this response "shifts the system towards a perennially unstable position of minimum dissatisfaction."

Here F. Perroux emphasizes a fundamental question that other theoreticians had left in a state of implicit assumption: the idea of responsibility[19] in economy, to which I have already referred.

Economic agents, instigated by the disequilibriums that are propagated by generating units, must respond with *receptive action* and *defensive reaction*, to assure that these disequilibriums are transformed into development. In the first case (for example the outlets offered by the generating firm) the response may be favoured by the market. But in many cases (for example the regional disequilibriums created by modern sectors) this response is the result of extra-market operations, "let us say briefly, of political decisions often taken under the effect of pressures from economic agents."

By emphasizing what I call the responsibility of an economy, F. Perroux moves away from the excessively mechanistic and

[19] Cf. pp. 95, 102, 103, 110 and 111 in this article.

deterministic character of Kozlovskii's and O. Lange's theses, and from Hirschman's excessively spontaneistic and liberal viewpoint. He believes there are neither mechanisms of equilibrium nor mechanisms of disequilibrium. "Automatism in development" does not exist. "Sequences (of disequilibriums) are not mechanisms because they are connected with individuals and projects." The propagation of effects of encouragement is "neither spontaneous, nor uniform, nor mechanical." Final consequences are the result of "conflicting projets" between unequal agents. After the initial disequilibriums there is no such thing as determinism in unbalanced growth. Contrary to what the fetishists of cybernetics believe, "the effects of encouragement or of bottlenecks created by a generating center cannot be foreseen or predetermined exactly, any more than the countershocks they entail in the area of propagation."

However much a man reduces uncertainty and calculates probability factors, he cannot eliminate the element of surprise from the future. All growth contains a part of uncertainty. All growth is a risk based on calculation.

It is therefore from the dual voluntaristic and probabilistic viewpoint that F. Perroux intends to control that dynamic of disequilibrium which is "untamed growth."

In order to tame this growth and to transform it into harmonized development, one must promote a "dynamic of frameworks," or in other words one must arrange and orchestrate disequilibriums thanks to (1) a *choice of the poles of growth*; (2) an *organization of the area of propagation*; (3) a *conscious planning* involving collective targets, reciprocal information and the correction of disequilibriums considered to be socially intolerable. The object of this dynamic of frameworks is what F. Perroux calls "harmonized development,"[20] in other words a succession of ordered disequilibriums made socially tolerable.

[20] This expression is preferable to "harmonized growth," also used by F. Perroux, which allows certain uninformed people to believe that the author of *L'économie du XX^e siècle* was a partizan of balanced growth, a most unfortunate misinterpretation.

GENERATING DISEQUILIBRIUMS AND THE DYNAMIC OF FRAMEWORK

The very notion of dynamic of frameworks underlies all the theories of unbalanced growth. Kozlovskii and O. Lange see it as a process inherent to socialist planning, practised by the State and the Party. Hirschman sees it as a "strategy of development" elaborated by the generating action of contractors and the corrective policy of a neo-capitalist state, acting as a "promotor" of growth and as a "shock absorber" for pressures. It is much more for F. Perroux. He sees it as the foundation of any theory of unbalanced growth, the essential means by which generating disequilibriums can be "orchestrated" to produce a harmonized development. If Kozlovskii and O. Lange merely see it as a simple element in socialist planning, and Hirschman sees it as a policy that catalizes the forces of a capitalist market, a dynamic of frameworks is seen by François Perroux as the fundamental method of liberal planning. Consequently, he is the economist who has produced the most complete analysis of the processes used by this dynamic of frameworks.

The first process used by a dynamic of frameworks is an organization of the *poles of growth.* The notion of poles of growth is a concept F. Perroux perfected between the years 1948 and 1951. Adopted by all partizans of unbalanced growth, Hirschman in particular, this theory, together with the practical policy it implies, has slowly been accepted.

Poles of growth and the organization of disequilibriums

After noting that dominant units (firms, groups of firms, industrial and regional sectors, national economies, etc...) exercize generating effects and induce growth throughout their economic environment, economists conceived the notion of poles of growth.

As generating units in a given area, they induce development in their immediate surroundings owing to "temporal links" and technical interdependencies, or "spatial links" and local interdependencies.

A poles of growth policy would be the voluntary and disciplined development of economic processes already existing in a spontaneous state. The policy should recognize existing poles of growth

(and their different combinations in axes of development) and to measure their generating (or inhibiting) effects so as to organize, distribute or even create new ones. Tables of inter-industrial exchanges, tables of inter-regional exchanges, would be the scientific means for identifying key-sectors and pilot-regions, and for quantifying, as far as possible, the growth they induce.

The environment of growth and the diffusion of disequilibriums

The generating effects of poles of growth depend essentially on the capacity of the polarized area to respond (*responsibility*):[21] In other words its *receptivity* to opportunities for profit-earning brought about by productive disequilibriums, and its *ability to react* against the obstacles that are caused by the same disequilibriums. This is a problem of how to propagate technical progress over which F. Perroux and the other economists of unbalanced growth have puzzled at length. The propagation of economic growth poses first of all the question of economic information and of its organization. Economic growth cannot spread, with a minimum of non-productive tensions, except in an informed environment. Information helps to determine which disequilibriums should be considered socially intolerable, and to tend towards a collective optimum. When organized through the medium of collective institutions and public organizations (institutes of statistics, programming centers, forcasting centers where economic accounts and programmes are worked out) it becomes information of general interest, the generator of all organized development, the dossier of all arbitration. Thus understood, information is essential to a conscious acceptance of productive disequilibriums and to a voluntary reduction of non-productive tensions. This theory of how to inform and propagate an economy, is directly linked to a theory of economic progress and innovation.

Coupled with the dynamic of domination (produced by the generating inequality of economic units), the dynamic of innovation (brought into being by a creative inequality among economic agents) is the result of the conjunction of three component

[21] Cf. pp. 95, 99, 103, 110 and 111 in this article.

factors of progress: economic creativity, the propagation of innovations and the meaning given to this progress.

Creativity is pre-eminently a de-stabilizing, unbalancing action; it breaks through all "routines of growth."

Propagation is the second component of technical progress and the dynamic of innovation. From it depend both the speed with which disequilibriums, caused by innovation, are transmitted to an economic environment and enrich it—and the length of time during which those who possess economic information gain an extra profit owing to their economic superiority in withholding the information exclusively to themselves.

In reality the question of the optimal speed of propagation is linked to the third component of the dynamic of innovation: the meaning of economic progress.

This *meaning* is none other than the way in which economic progress is understood by the whole of the agents of a given economy. The disequilibriums inherent to economic progress must acquire a meaning that is beneficient to all the agents who participate in the activity of a given economy.

Without this beneficient meaning, the various reactions of passivity, suspicion and hostility create socio-economic disequilibriums that upset growth and all the so-called "mechanisms" of growth. This leads one back to one of the essential assumptions on which the whole functioning of the theory of disequilibriums as generators of growth is based.

To ensure that the disequilibriums that create growth, propagate it effectively, the economic environment (that is all the men who actuate it) must, as I have already stressed, *respond*[22] to the stimuli set in motion by these disequilibriums. It must consent to this progress, since these productive disequilibrii call for *action* (in the case of opportunities for profit-earning) or *reaction* (in the case of obstacles to be overcome)—and since the non-productive disequilibriums (handicaps that must be endured) call for *acceptance*. It is possible to deduce from this remark the importance, for a harmonized development, of evaluating "disequilibriums, that can be tolerated by society" and of establishing programs, and even plans, that reflect a collective consensus. This

[22] Cf. pp. 95, 99, 102, 110 and 111 in this article.

consensus wil rest on the acceptance or even the encouragement of productive disequilibriums, recognized as the generators of growth, and of the setting in motion of measures destined to reduce and even eliminate disequilibriums considered as socially intolerable.

Programming growth and controlling disequilibrium

Having arranged the poles of growth and organized the environment of growth, the *programming of this growth* seems to be the third process advocated to give a dynamic " framework " to productive disequilibriums.

To multiply the areas of progress it is not enough to make an economic society progressive. The logic of the dynamic of growth—in order to make the causal disequilibriums effective and tolerable—calls for programming, in other words a plan that will indicate and even incite[23] or dictate.

On one level the strategy of growth appears to be the setting in motion and the fostering of cumulative disequilibriums (because they allow the maximum number of productive resources to be put into use)—on another level it clearly creates and develops a "common perspective of growth."

When this strategy is expressed in a plan it permits the achievement of an economic optimum thanks to: a reduction of the incompatibilities among different economic projets, the correction of disequilibriums considered intolerable, and the adoption of a "structure of preference" that implies the acceptance and implementation of productive disequilibriums.

A scientific formulation of this programming of growth involves two essential notions: the evaluation of *socially tolerable disequilibriums*[24] (the extreme limits of productive disequilibriums) and that of an *operational schema* (the strategy of growth).

[23] Cf. on this point my articles "Vers une planification incitative" (*Perspectives*, 11 March 1961) and "Espoirs et difficultés de la planification" (*Jeune Patron*, No. 152, April 1962).

[24] By grappling with the notion of *tolerable disequilibriums*, as early as 1948, F. Perroux, together with James Knowles, has made an essential contribution to the elaboration of a scientific theory of unbalanced growth. By clarifying, with Hirschman, the notion of equilibrium, he also indicated the practical limits of the generating role of disequilibriums. While emphasizing the "imaginary" character

Economic equilibrium as conceived by the partisans of balanced growth is the fruit of two errors. The first is due to a statistical illusion: a calculation of averages, that veils existing disequilibriums in a mist of time and space. The second can be attributed to an abusive comparison of a strictly economic equilibrium (narrowly quantitative) to a socio-economic equilibrium. The equilibrium that interests a concrete economic policy should be socio-economic. Socio-economic equilibrium is no more than the (normal) behaviour of an economy, whether in a period of growth or decline, progress or regression, that feels the effect of tolerable disequilibriums either particular or universal. A socio-economic equilibrium results from the acceptance of a certain amount of disequilibrium over a given period by a given collectivity. Since this concept is socio-economic in character, the degree of tolerable disequilibrium should not be defined except with reference to the power relations between social groups.[25]

To do so would give rise to the error of a too narrowly statistical calculation that forgets to integrate sociological elements and does not allow econometry and the processes of economic experiment to assume the proportions of an economic science that is socio-economic.[26]

How can one detect in practice when the limits of a disequilibrium considered to be tolerable have been overstepped? By the fact that the people turn to the public authorities asking for the corrective use of extra-market procedures.[27]

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of classic economic equilibrium, he warned against the "doctrinaire" character of certain modern theories that tend to present economic disequilibriums as mechanisms for generating growth automatically.

[25] By taking into account these power relations and their variations in time and space, the economist is able to compare similar socio-economic disequilibriums usefully, and to measure tolerable economic disequilibriums scientifically. By not taking these into account, disequilibriums that bear no relation one to another are often compared. F. Perroux ("Les trois analyses de l'évolution... chez Schumpeter," *Economie appliquée*, No. 2, 1951) condemns the naïvety, whether conscious or unconscious, of comparing, with economic action in mind, the socio-economic equilibriums of countries and epocs with different social organizations. In *The Statics of Development*, Hirschman also warns against this error.

[26] Cf. on this subject my article on "La socio-économie de Proudhon" (*Cahiers de l'I.S.E.A.*, April 1966).

[27] Cf. *L'économie du XX^e siècle*, p. 226. All quotations in this article without references are taken from this fundamental work.

But the "econometric measuring of tension following the criteria of movements in prices and salaries" cannot be other than a "rough and ready procedure."

Indeed it is often merely the interpretation, by the procedures of the market, of a given disequilibrium, seen only in terms of the movement of a given economic size.

In order to apprehend which disequilibriums are socially tolerable, one must advance in two stages. The first is to discover the real economic disequilibrium, the second to measure the extreme degree at which it can be tolerated.[28]

Tolerable disequilibriums and their "degree" are finally measured in function with two groups of factors: socio-economic factors and techno-economic factors (tension between the elements of the economic apparatus). However, an understanding of the results produced by this measuring of disequilibriums must always be qualified.

No doubt in the case of a concrete economy, with a given organization and structures, it is possible to calculate the econometric and sociometric indexes (within well-defined limits of space and time), but these calculations are vain if one forgets

[28] In order to apprehend objectively a lasting economic disequilibrium, be it tolerable or intolerable, one must measure the three factors that interpret it. These factors are none other than (*a*) "the inequality of fluxes" or rather the relation between the movements of at least two different economic dimensions; (*b*) "persisting inequality" (the momentary inequality of fluxes is merely a normal characteristic of economic movement); (*c*) finally a social and political comprehension of this persisting inequality (or rather its apprehension on a level of pratical economic policy).

Once economic disequilibrium has been objectively evaluated in this way one must then measure the degree to which it can be tolerated. To do so one must first try to measure, sociometrically, the "power relations between social groups." So as to appreciate the power of different social groups one must take into account three essential factors: (*a*) "the capacity for self-assertion of the social groups" (which depends on their number, their concentration, their degree or organization, their strategy and their ability to exert pressure on public authorities and public opinion); (*b*) their "capacity for resistence" when their standards of living are lowered or when the slightest relative increase in population occurs (this capacity for resistence does not necessarily coincide with their capacity for self-assertion); (*c*) lastly to complete the measuring of the degree to which disequilibriums can be tolerated, one should compare these two determining factors: the social plasticity of economic agents and the technical plasticity of the economic apparatus (cfr. "Les trois analyses," quoted in note 25).

One should note that these social groups and their power relations continue to exist whatever the economic system adopted. Thus the Pole Oskar Lange distinguishes, within a socialist economy, "social strata" with opposing interests.

the contingency of these indexes, and if one does not possess a "profound understanding of social tensions and breaking points." This cannot be acquired except "after a searching sociological study of a given economy."[29]

If such precautions are not observed, one could easily fall into what Agnati[30] calls "the taxonomy of deterministic and mechanistic modelism," or into a strict probabilism that forgets the practical superiority of the system of successive approximations. Such errors would restrict political economy to the field of economic physics, and it would neglect the dynamic indetermination inherent to the economic future (multiple possibilities, the onslaught of innovations), the contingency of the present (limited economic experience, within a given period of time), and the

[29] This analysis of tolerable disequilibriums and their measurement should be compared with the theory of the "zone of acceptable variation" that James W. Knowles expounded some ten years later in *The Potential Economic Growth of the United States* (Washington, 1960). This economist studies the possibility of establishing a stable relation between production capacity (the "physical limits of growth") and production potential (the "economic limits of growth"), and defines the latter as the "optimal activation that an economy is believed to be able to bear in an average year, without suffering from serious instability in employment, production and prices."

Later the concept of potential production was perfected as a statistical instrument by the Committee of economic Counsellors to the President of the United States, to help the President to exercise his economic responsibilities. Starting from a report on the real P.N.B. correlative of employment and establishing an employment target of a 4 % rate of unemployment of the active population, they calculated a potential P.N.B. This last aims at interpreting the potential economic rate of growth (by supposing that the rate of use of the labour resources will vary parallel to the rate of the use of capital, and that an unemployment of 4 % of the active population is a tolerable social disequilibrium).

Very close to this, though not so global and more pluralistic, is the system perfected by the French V^{e} Plan. As B. Cazes points out (*La vie économique*, A. Colin, 1965), the rate of growth of the Plan corresponds to a production potential that has to be achieved, and the zone of acceptable variations is in fact restricted by the 5 indicators of the Plan.

Two remarks should be made about these two systems, American and French, whose relationshinp to F. Perroux's earlier model is undeniable. First the limits to disequilibrium are based on an experimental process whose statistical basis includes, by reference to the past, rather rough and ready social hypotheses (for instance an acceptable unemployment rate). Secondly the calculation of the potential American P.N.B. allows an unemployment of 4 % of the active population as acceptable, whereas in the same case the French V^{e} Plan limits this unemployment to 2,5 % of the active population. This sythesizes the whole social contingency of the measuring of acceptable disequilibriums.

[30] A. Agnati "... Modèles, analogies et théories." "Economie et societé" (*Cahiers de l'I.S.E.A.*, January 1967).

breaks with the past (obsolescence and incompatibility of economic structures and behaviourism).[31]

At this point, after the measuring of tolerable disequilibriums, one reaches a second notion essential to the planning of unbalanced growth. This notion, without which the two other processes would be useless, is brought into play by a "dynamic of framework" (arrangement of poles, organization of the field of growth), and establishes an " operational schema " that will promote both a model and a strategy of growth. The Keynesian models and the models of balanced growth are, according to all the adepts of balanced growth, "fairly vigorous but quite unusable."[32] If for no other reason than that the movements in population, innovations and institutional changes, by their upsetting effect, make their schema of regular and progressive growth a purely imaginary thing, and their marginal calculations fundamentally unrealizable.

Whereas Hirschman outlines a model of "optimal disorder," showing his global faith in the optimizing disequilibriums of growth, F. Perroux proposes "a quantifiable schema of harmonized growth, that describes the conditions in which the global product of an economy can be maximized and the fluctuations minimized."

In fact this schema is contained implicitly in the anticyclical policies now practised. It should be transformed into a strategy of growth.[33]

[31] "Economic progress is the opposite of a prefabricated building" (F. Perroux). Its duration, its concrete objectives, its terms, its cumulative effects, should all be discovered through social experimentation. Tolerable disequilibriums, Hirschman's optimal disorder, discovered after a *procedure of collective groping*, will be measured by exploratory models of a probabilistic nature. These voluntaristic models are made up of the calculation of multiple errors and variants of the policies of growth, together with their specific rates of development and the proportion of unproductive disequilibriums they contain. ("Sur la science économique," *Revue de l'enseignement supérieur*, No. 2, 1960).

[32] Hirschman expresses an identical opinion.

[33] A strategy of harmonized growth tries: to increase the trend (by increasing the volume of the resources that are used and by a better combination of these resources thanks to innovation and its distribution in the economic area), to attenuate fluctuations (thanks to the use of automatic stabilizers, monetary and fiscal policies, selective actions to reduce non-productive disequilibriums between sectors) and the reduction of intolerable tensions between agents (thanks to a redistribution of revenues, and an active system of information and participation in the objectives of growth).

These operational schema of organized growth are none other than the dynamic formulation of "typical sequences," studied by means of models, that employ the techniques of economic accountancy[34] (overall economic tableaux, tables of inter-industrial exchanges) and that allow simulations and calculations of error owing to their multiple variables.

Although the objectives of a harmonized growth can be approached quantitatively, thanks to econometric and sociometric measuring, these can only furnish "categories of size" and "lines of thought" destined to help economic action. In any case, as Philippe Herzog remarks in his most interesting book on models of projection "quantified work should not mystify its principal users." In the domain of economics it acts merely as a "prop for qualitative reflexions," and as a guide "to achieve a choice of policy."[35]

A scientific theory of unbalanced growth, once it has criticized the idealization of equilibrium, should avoid systematizing disequilibrium. After all the science of economics is a collection of both quantitative and relative knowledge.

To understand the relativity of disequilibriums makes it possible to control them. Whatever the progress made in the fields of forecasting and cybernetics, the "fight-cum-competition to obtain goods that can be registered by book-keeping that is basic to economic experience," will always take place in the natural determination of an economic period of time, which introduces innovations and unforeseeable deformations of economic space, constituted by the perpetual change in human interrelations.

CONSEQUENCES IN RATIONALITY, ECONOMIC ACTION AND ETHICS

Growth is the result of disequilibrium. A recognition of this axiom drawn from economic experience shatters the concept of classic and neo-classic theories. A veritable revolution has ensued in economic thinking and practice, whose effects have not yet been fully understood.

[34] Cf. my article "L'ère des comptabilités nationales" (*Le monde*, 15, 16 and 17 September 1965).

[35] *Les projections à court terme des comptes nationaux* (forthcoming in the Presses Universitaires de France. Collection: Bibliothèque de l'Economie Contemporaine, étude I.S.E.A.).

On three planes that constantly cut across one another the idea of growth and the creation and propagation of generating disequilibriums as factors of progress profundly modified the rationality, action and ethics of economics.

Experimental logic is introduced, using concrete sequences of economic phenomena and a dynamic of disequilibriums instead of an economic rationality based on an abstract logical order and the synchronous development of all the elements of a given whole.

This dynamic rationality, which integrates the processes considered aberrant until the present time, comes from the discovery of the socio-economic character of political economy. The man of development—social actor who uses economic techniques—is no longer classic economic man—an automaton integrated in the logical mechanisms of a static economy.

In the logic of economic disequilibriums, pure economic analysis discovers poles of growth, areas of propagation and strategies of framing. Socio-economic study reveals circuits of invention, stimulations and conflicts-cum-competition, in the links between social disequilibriums.

Economic experience and the theory of applied economics (which cuts across those two fields of study, necessitated by the dual nature of economic facts) lead to the construction of a new economic logical norm. This logical norm is essentially pragmatic and even strategic—it allows for generating disequilibriums, it notes the reciprocity of means and ends, and discovers (beyond their monetary manifestations) the fundamental tendencies of economic development: tendency to work and tendency to create. These are recognized—in a given economy with a specific economic apparatus—as essential conditions that ensure that the "calls" of growth expressed by generating disequilibriums stimulate real "responses" of growth. Without these responses any theory of unbalanced growth remains a dead letter.

In the light of this new logical norm the five socio-economic assumptions that I consider basic to the rationality of the theory of disequilibriums as generators of growth are obvious:

1) *Assumption of "interplay" in an economy*: Interplay will always exist in economics. Both material and human resources are never used to the maximum. Under pressure from the stimul-

ations and restrictions created by the disequilibriums, resources are misused to a greater extent.

2) *Assumption of a globally productive profit*: These disequilibriums lead to certain partial losses; but thanks to the reactions they excite, a greater mobility of resources more than compensates for these losses.

3) *Assumption of a limit to disequilibrii*: This assumption expresses F. Perroux's degree of tolerable disequilibriums, Hirschman's notion of optimal disequilibrium, and to a certain extent Kozlovskii's notion of non-antagonistic contradictions.

4) *Assumption of an informed economy*: The economy is supposed to be sufficiently "informed" so that contractors, unions and public authorities can distinguish productive disequilibriums quickly enough to give them an effective "response."

5) *Assumption of the responsibility*[36] *of an economy*: The will and the power of economic agents to act and react are assumed. Now willingness and power, in a given economic and political milieu, depend on its inclination to work and create. The "response" of an economy, a hypothesis that underlies the theory of generating disequilibriums, is therefore always a function of the economic intelligence of the agents. And that is certainly one of the practical limitations of this theory.

By overthrowing economic rationality, this theory of generating disequilibriums in working towards a revolution in the instruments that *economic action* uses, that has hardly started yet.

All the instruments of analysis currently used in economic forecasting are based on a comparison of a future equilibrium with a corresponding equilibrium in the past, and on an examination of the plausibility of the proposed equilibrium. This is not the forecasting of dynamic sequences with a succession of disequilibriums, deformations of structures and competing projects, but a mere comparison and extrapolation.

In most of the models of forecasting used today, the discovery of tensions and generating or inhibiting disequilibriums is not usually due to the models of projection themselves or to their exactness, but to the interpretation their users give these models. These users, by comparing size and using their past experiences

[36] Cf. pp. 95, 99, 102, 103 and 110 in this article.

and their personal intuitions, "imagine" empirically the possibility or impossibility of a procedure that will lead from present "equilibrium" to a proposed "equilibrium."

This explains the frequent subjectivity of the results of these so-called objective methods.

The use of models with multiple variants and their resolution on an ordinator, can allow for a "simulation" of economic deformations, in a primitive though promising way. Thus we can hope to begin a scientific study of the "fan" of alternatives and its reduction to the desired size, typical sequences, unsettling processes, the deformation of a growing economic entity. But we are still far from the "biological" models that inspire certain econometricians; these would permit the forecasting of deformations in structures. The dynamic indetermination inherent in an economic future, in which the speed of innovation will be ever more rapid, will make the use of successive approximations ever more indispensable.

The study of disequilibriums in growth brings about a transformation of economic rationality and the instruments of economic action. At the same time it is possible to discover in the heart of the most technical analyses the practical importance of *economic ethics.* Thus the whole theory of disequilibriums as generators of growth implies moral option, whether or not this is openly admitted. Ethical assumptions are an incorporate part of the notion of tolerable disequilibriums. They are present in the dynamic of framing which is to orchestrate these disequilibriums—they predominate in the idea of objectives of growth by which generating disequilibriums and the acceptance of progress take on their full meaning and value. All preferential structures, all choice made conspicuous by a probabilistic model imply—over and above an economic calculation of political risk—a moral option for the general interest, for the material and the spiritual well-being of mankind and of the groups that work within the heart of an economy. François Perroux, precursor of the theory of unbalanced growth, concludes in *L'économie du XX^e siècle* with "a concept of the economy of man understood as the economy of the whole of man and the economy of all mankind."

Is this not, almost word for word, what one of the greatest

moral authorities said in speaking of the problem of world development?[37]

Ever since the science of economics abandoned the myth of equilibrium it has been "bereft of security." It is swept along by the inherent generating disequilibriums in economic growth to considering the problem of its own finality, over and above things that can be registered by book-keeping which remains its objective.

[37] Pope Paul's Encyclical "on the development of nations:" "Development must promote all of man and the whole of mankind."