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ARTICLE

# Coherence, Diversity, and the Evolution of Capitalisms—The Institutional Complementarity Hypothesis

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**Abstract**

What are the forces that make relatively and transitorily coherent the institutional configurations of capitalism? In response to the literature on the variety of capitalisms, this article investigates the relative explanatory power of various hypotheses: institutional complementarity, institutional hierarchy, coevolution, simple compatibility or isomorphism. Compatibility is too often confused with complementarity and it is frequently an *ex-post* recognition, rarely an ex ante design. Both hybridization and endometabolism are the driving forces in the transformation of institutional configurations. Uncertainty and the existence of some slack in the coupling of various institutions are key features that call for the mixing of various methodologies in order to detect complementarities. This framework is then used in order to show that three distinct institutional complementarities are at the origin of the more successful national economies since the 90s. Thus, institutional diversity is being recreated and the existence of complementarities plays a role in this process.

**Keywords:** institutions of capitalism, institutional complementarity/hierarchy, coevolution, supermodularity, *Régulation* theory.

## 1. Introduction: The Variety of Capitalisms, a Major Challenge to Economic theories

The concern for institutional analysis was renewed during the 90s in response to both theoretical anomalies and puzzles on one side, and new empirical issues on the other. Actually, modern neoclassical microeconomic theory has recognized that market mechanisms cannot cope with public goods, externalities, innovations and social justice concerns (Ingrao and Israel, 1990) and these market failures call for alternative

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coordinating mechanisms (Stiglitz, 1987). Simultaneously, economists have rediscovered with Ronald Coase (1937) that firms do play a major role in the allocation of resources and might be more efficient than markets when transaction costs are introduced on top of production costs. Social scientists have shown that markets, firms and the State are not the only institutional arrangements enabling economic coordination (Hollingsworth and Boyer, 1997) and that markets are not the best allocating mechanism in all circumstances (Boyer, 1997). Furthermore, the collapse of the Soviet Union has triggered a string of research about previously neglected issues: How to build a market economy? Is there a single brand of capitalism or can a significant variety of capitalisms coexist, even in the long run?

These two agenda tend to converge towards two quite central but difficult questions. First, what are the forces and mechanisms that coalesce a series of economic institutions into a viable system? Second, how do capitalisms change and evolve in the long run? The answers drastically differ from one research program to another (Table 1).

*Standard neoclassical theory* considers that economic calculus in terms of costs and benefits can be applied to the choice among alternative institutional forms. Basically, they emerge out of the interaction of individual agents and this process is assumed to deliver a *smooth evolution* and a continuous adjustment to external shocks that are translated into relative price movements. If some inertia or irrationality prevails, public authorities should use *benchmarking* in order to convince individuals to adopt superior economic institutions.

*Transaction costs theory* assumes that organizational forms should be selected in order

**Table 1. A bird's-eye view of the literature**

| Theory | Factors of coherence | Degree of diversity | Evolution |
|---|---|---|---|
| Neo-classical | Global optimization | One best way | Continuous |
| Transaction cost | Partial optimization | Rather limited | Sluggish |
| Evolutionary | Fitness/Learning | Significant | Coevolution Technology/ Institutions |
| NIE | Social/Political embeddedness | Large | Path dependency |

to minimize these costs. This framework has mainly been applied to industrial organization in order to distinguish between subcontracting, vertical integration, franchising, and so on…. Some authors, such as Williamson (1985), have proposed to extend transaction costs to the analysis of capitalism systems. Given the sunk costs associated with any investment into a given organization and institution, these systems should display inertia, *path dependency* and in some cases *sub-optimality*, but in the long run institutions should evolve according to the factors that govern transaction costs. This research program is now addressing the issue of economic and institutional change and this implies a significant redesign of the basic concepts and tools of NIE (North, 2005).

*Evolutionary theory* is built upon the hypothesis that heterogeneous organizations and institutions are selected by the equivalent of a fitness criterion and/or they can also evolve via a process of trial and error and learning. A general feature of these models is to exhibit non-ergodicity, path dependency, possible irreversibility and ex post sub-optimality. Therefore, the results that have been obtained for technologies exhibiting increasing returns to scale (Arthur, 1989), can be extended to institutions, scientific paradigms, and conventions. Consequently, the very process of evolution is able to deliver contrasted industrial, technological and economic structures, even when national economies are open to trade (Dosi, Fabiani, Freeman and Aversi, 1993). Capitalist economies are seen as systems of *coevolving* technologies, organizations, institutions and conventions.

A branch of the *New Institutional Economics* (NIE) stresses that the constitutional and legal processes are crucial in the definition of economic rights, among them property rights, and consequently various national economies differ due to their constitutional order (North, 1990). Paradoxically, this vision is not far away from the older conception that considers that economic transactions are embedded into a dense web of social relations (Polanyi, 1944; Granovetter, 1985, 1992). Therefore, the institutions of capitalism are not necessarily selected according to their economic efficiency since their role is to define the rules of the game, to deal collectively with uncertainty and to help solving the conflicts, disequilibria and crises that are typical of any market economy.

## 2. The Institutional Complementarity Hypothesis

Each of these hypotheses captures a part of the stylized facts concerning the evolution of contemporary capitalisms. The present article proposes another and more recent approach in terms of *institutional complementarity*. This hypothesis originates from scholars that try to comprehend the persisting institutional diversity between the US and

Japan and still more between economies in transition (Aoki, 1994, 2000, 2001), or between the US and Germany and other continental European countries (Amable, 2000, 2003; Hall and Soskice, 2001; Boyer, 2001). A variant of this hypothesis considers that some complementarities derive from the impact of one institution over another and that this feature, i.e., *institutional hierarchy*, may have been a major ingredient in the coherence of economic systems (Boyer, 2000; Ebizuka, Uemura and Isogai, 1997).

Broadly speaking, the Institutional Complementarity Hypothesis (ICH) is able to explain many stylized facts about the evolution and diversity of institutional architectures. First, comparative analyses do show a *limited number of varieties of capitalism* (Amable, Barré and Boyer, 1997), far inferior to what would result from a pure combinatory process (Amable, 2003). Second, ICH explains why most *benchmarking experiments* do not deliver the expected results when applied to capitalism, and this is not necessarily surprising since the same factors do not shape capitalist institutions and business internal organizations. There is a good example of the methodological weakness of benchmarking: the rather mixed (Zeitlin and Trubeck, 2003) or poor results (Kok, 2004) of the open method of cooperation put forward by the European Commission under the name of the Lisbon strategy that was supposed to bring continental Europe to the technological frontier, simply by mimicking the best practices observed in the world. Third, this is also an explanation of the difficulties experienced by the former socialist East European countries when they tried to adopt and adapt to market mechanisms: the web of past interdependency between labor institutions, credit management and State interventions hindered the adoption of the new market- oriented institutions (Delorme, 1996; Chavance *et al.*, 1999). More generally, the existing institutional complementarities, inherited from the Golden Age, explain the *painful process of institutional reform* in many continental European countries (Boyer, 2004c).

Nevertheless, ICH is not such a simple notion. Thus this article intends to discuss various *methodological issues* and then apply the major findings to one major issue: have not the 90s been a watershed in terms of the variety of capitalism? A tentative answer to this question will build upon research about the institutional prerequisites for the successful implementation of a knowledge-based growth regime (Boyer, 2004). A twin paper (Crouch *et al.*, 2005) has investigated a related issue: are non-liberal capitalisms, such as Germany or Japan *de facto* converging towards a market-oriented configuration similar to the Anglo-American one (Yamamura and Streeck, 2003)?

First of all, one should distinguish carefully between proximate but actually *different concepts* that try to capture the interaction between two or more institutions or

organizational devices. Second, it is important to recognize the *large variety of mechanisms* that may generate the equivalent of institutional complementarity: clearly, a purely technological complementarity is only a highly specific conception of the mechanisms that explain the clustering of institutions or alternatively of organizations. A third methodological issue relates to the level at which the complementarity hypothesis is relevant: the arguments used to explain the diversity of *internal organizations of firms* are not the same as those that are invoked for the *diversity of capitalisms* in spite of the efforts of the variety of capitalisms (VOC) literature to relate one with another. Institutions are generally conceived as constraints that are detrimental to economic performance. By contrast a branch of the literature proposes that institutional constraints might be beneficial and complementarity plays an important role in promoting better outcomes. Another important question deals with the issue of complementarity by *ex ante design* or by *ex post discovery*. Put differently it is important to make a clear distinction between the retrospective analysis of the social scientists and the vision and interpretation by the actors themselves acting on the spot.

*The detection* of institutional complementarities is not an easy task and this may explain why such different methods have been used by researchers, even when they share the same objective and field of investigation. It is therefore necessary to assess the relative merits and limits of each of the strategies that have been implemented in order to relate institutional complementarity and the demonstration of a variety of forms of capitalism. The use of the concept of complementarity is rather static since it is argued that it introduces a large institutional inertia…but this vision can be challenged and quite to the contrary the shift from one type of complementarity (or hierarchy) to another may explain *the transformation of an institutional architecture* and the related "*régulation* modes" according to *Régulation* theory (RT).

Two last sections apply the previous notions and methods to the issue mentioned in the introduction. Do we still observe a *significant diversity* of institutional configurations in the era of financial innovation, globalization, and productive paradigm shift? A short conclusion wraps up the main findings of the article.

## 3. Some Definitions and Clarifications: A Series of Related Concepts

Actually, there is a risk of confusion of complementarity with seemingly similar but distinct concepts. The emergence of this term has been associated with some implicit hypotheses that have to be spelled out.

### 3.1 Supermodularity

Two elements E and E′ are said to be supermodular if the performance R of the conjunction of E and E′ is superior to any other mix of elements i.e.

$$R(E, E') > R(E, A)\ \forall A \neq E' \quad \text{and} \quad R(E, E') > R(B, E')\ \forall B \neq E$$

This precise definition puts strong limits on the use of the notion of supermodularity. First the analyst has to explicit a criterion of performance that is not so evident (profit maximization for the firm, but what should be the relevant criterion for a capitalist economy: average profit rate , rate of growth, total factor productivity, level of employment and activity, equalitarian distribution of income, wealth,…). Second, the concept is clearly associated with the idea of optimum and maximization, a core trend of economic analysis. but it is not necessarily so for sociology, law, history, and so on. Basically, only sophisticated models (see for instance Amable *et al.*, 2001) are able to prove such a supermodularity. But how to diagnose supermodularity by direct observation without the construction of a formal model engendering a series of fictitious worlds?

A good *example* of possible supermodularity relates to productive models. It has been argued that just in time, total quality control and highly skilled workers define a genuine productive model at odds with the previous Fordist model whereby mass-production of standardized good required less competence from the workers and less demanding consumers in terms of quality. The very concept of supermodularity has precisely been used in order to show that a continuous and marginal adjustments of managerial tools was not able to promote the transition from the old to the new productive model (Milgrom and Roberts, 1990).

### 3.2 Complementarity

Two elements E and E′ are said to be complementary if the performance R of the conjunction of E and E′ is superior to the performance of each element considered separately, i.e.

$$R(E, E') > R(E) \quad \text{and} \quad R(E, E') > R(E')$$

The concept of complementarity is less demanding that supermodularity, since it only requires that the conjunction of two elements is Pareto-improving with respect to the existence of only one of the two entities. Nevertheless, both complementarity and supermodularity require the choice of a performance criterion R and the ability to compare various systems in order to check the basic property. Either by using formal

modeling or by observing a hierarchy in the ranking of systems composed respectively of only E, only E′ or both E and E′.

Some examples of possible complementarity might be useful to help grasp the nature of this concept. According to many authors, a financial regime governed by direct finance is complementary with weak unions and the domination of short-term strategies and conversely, a patient financial regime built upon bank credit is complementary to a strong union, both involved in long-term strategies. Another example associates as complementary an accommodating monetary policy and flexible labor markets, a typical American configuration, whereas the monetary regime associated with a conservative central banker is seen as complementary to rigid labor markets that are supposed to explain European unemployment.

### 3.3 Compatibility

This third notion is frequently confused with the second one…but it should not be! Actually E and E′ are compatible if they can be jointly observed in existing economies and societies, i.e.

$$\text{There exists an economy such that:} \quad E \cap E' \neq \varnothing$$

An interesting *example* is provided by Martin Höpner (2003) when he investigates the links between the dual management board system and employees' codetermination. The tenants of a strong variant of VOC would regard these institutions as *complementary* — having observed the good "performance" of the German economy until the early 90s — whereas the observation only says that they are *compatible*. The proof of complementarity would call for a theoretical model adding up and/or subtracting a complete series of institutions and assessing the related impact upon an agreed measure of performance.

### 3.4 Hierarchy

This third notion implies a form of causality between two entities E and E′. Basically, the idea is that in order to be sustainable or viable the entity E absolutely needs the presence of another entity E′ out of a complete series E″, E‴, E⁗. Formally, this means:

$$\text{If } \exists\, E, \text{ then among a complete set } (E', E'', \ldots, E''''), \text{ there is only one } E' \text{ such that}$$
$$E \cap E' \neq \varnothing \text{ and } E \cap E'' = \varnothing, \ldots, E \cap E'''' = \varnothing.$$

In a sense, this criterion is more demanding than both pure compatibility and complementarity. The very existence of one entity cannot be observed without the presence of a single other one. Just to give an example for some monetarists and free

marketers, an efficient monetary policy absolutely requires totally flexible employment and wage adjustments. This is a strengthening of the concept of complementarity and it is introducing an *asymmetry* between institutions: E requires E′, but E′ could be compatible with many other entities.

### 3.5 Coherence

This is still another notion. Two institutions are declared coherent if they can *easily coexist* i.e. if $E \cap E' \neq \varnothing$ is likely for structural, theoretical reasons for example. This is more than compatibility since it means that the fitness of each institution is improved by the existence of the other but it is less than complementarity since this does not imply that the mix between E and E′ gives the best result among any possible association of alternative institutions. Here the following ranking of the various concepts according to an increasing fitness of the two institutions:

$$\text{Compatibility} < \text{coherence} < \text{complementarity} < \text{supermodularity} < \text{hierarchy}$$

The empirical observation of the coexistence of two entities may hint that they are coherent, whereas in order to declare that they are supermodular, one must select a performance criterion and show by theoretical and abstract reasoning — a model — that the precise mix of two entities gives the best results among a whole spectrum of entities. It is easier to show that two entities are complementary, whereas coherence defines an intermediate concept between compatibility and complementarity.

### 3.6 Isomorphism

In a sense, this is *a specification* of the case of coherence. Given the fact that organizations and institutions have interfaces, the constraint upon communication and mutual understanding implies some common principles that may come from one of the composing organizations and institutions (DiMaggio and Powell, 1991). Formally, two entities are said to be isomorphic if they are equivalent according to a general common principle ***P*** that defines a relation of equivalence ***R.*** i.e.

$$E \; \boldsymbol{R./P} \; E'$$

This ex post symmetry might well be the unintended outcome of the imposition by element E of its logic to element E′. Thus, it is a form of coherence and it may appear as the consequence of hierarchy. Sociological research on institutions gives many examples of institutional architectures generated by isomorphism. For instance, the rise of a Weberian public bureaucracy may impact upon the internal organization of large corporations. Conversely, the triumph of a free market ideology may induce a redesign

of the same large corporations in order to mimic quasi-market competition among profit centers. The concept of an industrial and military complex is a third example of the consequence of isomorphism, even if the explanation of its emergence is up to a political economy analysis. Therefore, in a sense, isomorphism is a specification of a mechanism able to produce some form of coherence.

Just to summarize: Isomorphism $\in$ Coherence

Hierarchy $\Rightarrow$ Isomorphism

[Note that this implication is not general, since hierarchy may be associated with contrasted logic, i.e. flexibility for E′ but rigidity for E].

### 3.7 Clustering

This concept simply describes the fact that two or several institutions are frequently observed simultaneously when some systematic comparisons are carried over. The concept is therefore purely descriptive and does not imply at all any idea that such a grouping of institutions necessarily implies better performance. Formally, this can be described by the existence of a significant correlation across various case studies ($i=1, 2, \ldots, N$)

For a sufficiently large N , correlation $(E_i, E'_i) > A$ A set according to a given significance threshold

Clustering and coherence are twin concepts, but they should not be confused. The first one relies on empirical and statistical observations, the second one calls for theoretical reasons that might explain the grouping of two entities. Ideally, these two approaches, respectively inductive and deductive, could converge and come close to the concept of complementarity.

Nevertheless, a distinction has to be made between clustering/coherence and complementarity. Implicitly at least, competition is not perceived to be a strong selective mechanism that would destroy any inefficient clustering. Furthermore, there is no natural efficiency criteria for a given institution that may fulfill simultaneously various objectives in different fields. Last but not least, evolutionary theories suggest that the fitness is relative to a given context, be it ecological, economical, social or political. The relations of clustering with related concepts are the following:

Clustering = high frequency of compatibility

Clustering + Coherence = Presumption of complementarity

Isomorphism = a possible source of coherence and clustering

Again, *an example* might be useful. When German multinationals go abroad, they rarely or do not export the codetermination nor do they export the dual training system. This would mean that these two institutions are clustering within the context of the German economy, but that they are not necessarily complementary at the level of the firm. The coherence of two institutions could well be *context related*. This means that institutions may exhibit triadic and not only dyadic relations, a quite important feature indeed.

### 3.8 Coevolution

Most if not all the previous concepts were mostly static. By contrast, the notion of co-evolution implies that the observation of the joint occurrence of two institutions or organizations might be the unintended outcome of a selection process or a learning mechanisms, operating via the succession of stochastic shocks and possibly major events such as crises. This concept is central to evolutionary contemporary research that was first designed in order to understand technological innovation but it can be extended to social norms, managerial tools or even economic institutions. A formal definition could be the following:

$$\text{When } t \to T \quad \text{correlation } (Et, E't) \to 1 \quad \text{with t time variable, T sufficiently large}$$

Again, the German trajectory is an interesting *example*. In a sense, the contemporary vision of a built-in complementarity between industrial relations and corporate governance might well be the unintended outcome of a highly unpredictable historical process made of class struggle, institutional innovations, and trial and error processes at various levels. The observation of the resilience of a mix of institutions implies only that they fit one with another without any idea of superiority in terms of efficiency. The example of technologies with increasing return to scale clearly shows that the result of the evolutionary process does not necessarily deliver the most efficient technological system (Arthur, 1989). Hence the following relations with the previous concepts:

Complementarity = ex post and sometimes false presumption of efficiency for the outcome of an evolutionary process that is the origin of the coevolution of institutions

Clustering = evidence that the outcome of a series of coevolution processes might be less idiosyncratic than expected, i.e. more than compatibility.

## 4. Diverse Origins of Complementarity Matter

Contemporary research displays a clear temptation to derive some major institutional complementarity for purely technical constraints. Just two examples: Milgrom and Roberts (1995) use the concept of supermodularity in order to explicit a strong complementarity between just in time, total quality control and team work. This hypothesis reminds the hypothesis of a strict complementarity between capital and labor in growth theory, "à la Harrod-Domar". Actually, it is far from evident to see managerial tools as basic inputs than can be dealt with the equivalent of a production function with a clear complementarity between factors. In the literature on the variety of capitalisms, the resilience of coordinated market economies is attributed to the organizational complementarity that exists at the firm level between skilled and highly paid workers and sophisticated equipments (Hall and Soskice, 2002). This complementarity is extended to economic institutions by the equivalent of an isomorphism between private organizations and national institutions. One may challenge this supremacy of technical complementarity and propose a complete spectrum for the origins of institutional complementarity.

### 4.1 Natural complementarity

This form derives from scientific laws about nature. For instance, the chemical industry is a good example of production functions with strong complementarity due to the property of atoms and molecules. This constraint deriving from science may of course exert some influence on the organization of the industry. But please note that technical complementarity is strict indeed (only the right mix of inputs gives the desired molecules) and nevertheless one could observe a significant variability in the organizations and institutions governing the same industry across countries.

### 4.2 Technical complementarity

It is a proximate concept of natural complementarity but the difference is about the origin of the efficiency associated with the conjunction of two inputs. Most of these complementarities are man-made and not deriving from natural laws. For instance, in the computer industry the hardware and the software are complementary and not only coherent, since they derive from a coordinated design. Similarly, the combustion engine creates a complementarity between car production and use on one side, and oil consumption and production on the other. De facto, social systems of innovation exhibit a series of complementarities or at least compatibilities between various techniques and products (Amable, Barré and Boyer, 1997).

### 4.3 Complementarity by design

This could be a better description of the complementarity just mentioned. A good example is the invention of an assembly line that creates intentionally a complementarity between the mechanical speed of the assembly line and the intensity of work, as well as between the equipment and the volume and skill composition of manpower. A complementarity that seems to be embedded into materials and techniques is actually the result of a choice and a strategy of social control and economic efficiency. According to contemporary conceptions of economic policy, the independent central bank needs as a corollary sufficiently flexible labor markets and a strong control over deficit spending. Such a complementarity is rarely observed de facto since it is indeed a strategy in order to transform the industrial relations inherited from the Golden Age. This form of complementarity is not at all a constraint but a *transformational project*.

### 4.4 Ex post discovered complementarity

It is not an intrinsic property of organizations or institutions but it results from the observation of the properties of an emerging regime that can be better understood after a long period of trial and error and learning. Paradoxically, such a discovery of complementarity comes at the very moment when an aging system is entering into a decline or a demise (see also Figure 4, infra). A well known example is the recognition of Fordism, as the synergy between mass production and mass consumption, at the very moment when this macro regime entered into a structural crisis. Let us add two contemporary examples. Information and communication technologies do not deliver automatically more productivity, unless they are associated with a significant reorganization of the firms (Askénazy, 2002). Such a statement was not at all evident in the early 90s. Similarly, ICT and profit optimization are seen as complementary but in the case of the air travel industry it took more than one decade to perceive that the sophisticated information flow that was created by the computerization of air travel reservation could be used in order to develop a real time yield management via continuous price adjustments (Bresnahan, 2002). For this author the emerging complementarity between a new technology and a managerial model is the outcome of a *coevolution* process made of trial and error that are erroneously interpreted *in retrospect* as a typical and well known static model built upon clear complementarities.

### 4.5 Functional complementarity

This is still another origin for the clustering of institutions. This is especially important for social scientists. The sociologist considers that social roles complement each other when the duty of an individual is the right of another one. For economists, the credit

given to a firm is the strict counterpart of the obligation to reimburse to the bank, as well as supply and demand having to fit one with another. Since functionalism has been severely criticized, functional complementarity has been somehow neglected in understanding the viability of socioeconomic systems. For instance, are not property rights, the existence of a strong and independent justice, and the enforcement of law the joint requisites for any capitalist system? When the Soviet-type economies collapsed, this basic finding was neglected by many mainstream economists who thought that markets would endogenously emerge out of the self interest of individuals.

It would thus be interesting to survey the available research on institutional complementarity and specially the case studies, in order to clarify the nature of the mechanisms they usually invoke. In the absence of such a survey, one may fear that the concept of complementarity may degenerate into a buzz word and a misleading fad.

## 5. The Links between Micro and Macro Complementarities

The recent trend of research has been to work out the micro foundations for macro regularities and therefore to try to derive institutional complementarities from complementarities observed at the level of the firm. The variety of capitalism approach (VOC) is a good example of such a strategy (Hall and Soskice, 2001).

Hence it is theoretically possible to generate a variety of capitalisms based on a combination of two hypotheses: first a technological or organizational type of complementarity between work, equipment and product; second an isomorphism between companies' organization and society-wide economic institutions. The reasoning can be captured by the following equation:

(Hall−Soskice [2001])=(Milgrom−Roberts [1990])+(Di Maggio−Powell [1991])

or in more theoretical terms:

VOC=theory of supermodularity+isomorphism between organization/institution

A careful examination of the reasoning and design of Figures 3 and 4 (Hall and Soskic, 2001 p. 28, 32]) demonstrates that the complementarities also relate to society-wide institutions which in turn shape, constrain or provoke appropriate management mechanisms and routines within firms. The causality is therefore twofold: on one side, it goes from the macro to the micro level, and on the other side, the macroeconomic dynamic is of course never more than the result of a conjunction of the different firms' strategies. Yet, these macroeconomic properties have absolutely no reason to be the

**Fig. 1. Links between organizational complementarity, organizational/ institutional isomorphism and institutional complementarity.**

direct expression of the constraints that the representative firms face.

Thus, the distance between the VOC's reality and results and an alternative macro orientation — such as *régulation* theory (RT) — is made explicit. The aim of RT is to develop macro institutional foundations for a series of micro behaviors. Figuratively, we could postulate a second equation that is representative of the latest RT developments, but, in a sense, of the VOC as well:

RT Microeconomics = institutional complementarity + institution/ organizationisomorphism

This paves the way for a vast but difficult field of research, where we would examine

the extent to which these two conceptions constitute alternatives (Figure 1) or inversely can be combined in practice, if only because technology, companies' organization, and economic institutions seemingly co-evolve over the long run.

## 6. Institutional Complementarity as Synergy Between Two Beneficial Constraints

A second issue is about the conception of institutions as pure constraints that are detrimental to economic efficiency because they block the free adjustments of preferences and production constraints via price formation. For Douglass North (1990) they are also enablers for the strategy of individuals, in dealing with uncertainty, coordination and interpretation of information. Thus, contrary to the Chicago School's conceptions, some mix of institutions may deliver better economic and/or social outcomes than a pure market economy. This conception considers that some constraints restricting economic opportunism, short-termism or allowing the supply of some public goods, are quite essential to the competitiveness of firms and thus they may have a beneficial impact on economic and social outcomes (Streeck, 1997).

### 6.1 The origin of a paradox

In the Walrasian tradition, the equilibrium prices make compatible preferences and technological constraints. This feature can be captured by the following equation, which expresses the idea that excess demand for each product and factor market is equal to zero.

$$Z = f(p, P, T) = 0 \Longrightarrow [p^w \quad C^w, \quad N^w]$$

Net excess demand | Price | Preferences | Technology | Equilibrium price | Consumption | Employment

Walrasian equilibrium

Unfortunately, the Walrasian auctioneer i.e. the global market maker, does not exist and has to be replaced by a series of institutions: a monetary regime ($I_1$), a competition law, labor market institutions ($I_2$). Therefore, individuals now not only react to the price signals but also according to the existing institutions that shape the formation of prices. *Apriori* this institution-rich economy displays a different equilibrium

$$Z = g(p, I_1, I_2) = 0 \Longrightarrow [p^i \quad C^i, \quad N^i]$$

Net excess demand | Price | Institutions | Equili brium price | Consumption | Employment

Institutional equilibrium

For most economists, the name of the game is to compare the outcome of a totally

abstract economy, the Walrasian one, for which any market equilibrium is Pareto-optimum, with a more realistic economy with various institutions but still an auctioneer. It is easy to understand then that any institution can only deteriorate the fit between preferences and technological possibilities. But if really existing decentralized imperfect markets are introduced, the various institutions might help in reaching a satisfactory equilibrium. Ideally, the various institutional settings should be compared according to their economic and social outcomes. But this requires the equivalent of a social welfare function in order to derive a single index out of the distribution of economic outcomes among individuals. Concerning the issue of complementarity, this very simple formalization might help in understanding the difference between compatibility and complementarity.

*Compatibility* among institutions is observed when there exists a set of equilibrium prices, consumption and employment. Such a property is not necessarily fulfilled and thus this is a discriminating criterion in the assessment of the viability of alternative institutional architectures.

$$I_1 \text{ and } I_2 \text{ are compatible if there exists an equilibrium } E(I_1, I_2) \neq \varnothing$$

*Complementarity* is a much more demanding criterion. First, the analyst has to compute an equilibrium with only the first institution $I_1$ i.e. $E(I_1)$ and repeat the same operation for institution $I_2$. Second, one adds the second institution and has to compute the new equilibrium $E(I_1, I_2)$. Third, and this is still more difficult, the economist has to adopt a welfare function in order to compare the two equilibria. Finally, the institutions $I_1$ and $I_2$ will be said complementary if their joint presence delivers a better outcome than each of the separate institutions. It can be captured by the two following conditions:

$$I_1 \text{ and } I_2 \text{ are complementary if } E(I_1, I_2) \succ E(I_1) \text{ and } E(I_1, I_2) \succ E(I_2)$$

### 6.2 A rather frequent configuration: four examples

If one sticks to *general equilibrium theory*, one could introduce two discrepancies with respect to the conditions that deliver an equilibrium. First, increasing returns to scale ($H_1$), second, imperfect competition or, more precisely, oligopolistic pricing ($H_2$). Whereas a pure competition ($H_0$) equilibrium does not exist with ($H_1$), the existence of imperfect competition entitles the existence of an equilibrium i.e.

$$E(H_1, H_2) \succ E(H_1, H_0)$$

Recent research about *institutional complementarity* (Amable, Ernst and Palombarini,

2002) shows by formal modeling that strong unions (SU) and patient capital (PC) provided by bank credit may deliver better macroeconomic outcomes than competitive labor (CL) markets and short-termism (ST) capital markets, i.e.

$$E(SU, PC) \succ E(CL, PC) \text{ and } E(SU, PC) \succ E(SU, ST)$$

Similarly, theoretical and empirical investigations exhibit a rather surprising complementarity (Amable, 2003, 2004). Traditionally, economists consider that product market deregulation (PMD) and labor market flexibility (LMF) strategies are to be undertaken simultaneously, because they complement one with another. But empirical analysis shows that a second configuration is built upon the complementarity between product market regulation (PMR) and a significant institutionalization of labor mobility (ILM). By contrast, the intermediate configurations (deregulation of one market, but strong regulation of the other one) display less satisfactory outcomes in terms of growth and employment.

$$E(PMD, LMF) \approx E(PMR, ILM) \text{ and } E(PMD, ILM) \succ E(PMD, LMF) ;$$
$$E(PMR, LMF) \prec E(PMR, ILM)$$

The viability of *a banking system* is threatened by periodic bank runs especially when free banking (FB) and fierce competition (FC) prevail. This has triggered the efforts of economists in order to find out regulations that could prevent such dramatic episodes. After nearly two centuries of recurring banking crises, practitioners and analysts finally find out the complementarity of two corrective devices. On one side a deposit insurance (DI) reduces the probability of bank runs but it simultaneously might induce banks to take more risk for their credit activities. Thus, on the other side, prudential ratios (PR) have been imposed in proportion to the risk taken for each category of credit (Borio, 2003). We find again that this institutional equilibrium is better that the constraint free equilibrium:

$$E(DI, PR) \succ E(DI, FB) \text{ and } E(DI, PR) \succ E(FC, PR)$$

This leads to two general proposals expressing the same idea. First, *two imperfections might be better than a single one*, since they correct each other's potential imbalances. Second, *two constraints might be beneficial* to the quality of economic equilibrium and social outcomes, provided they adequately interact each with another.

## 7. Complementarity: Ex ante versus Ex post

Actually some theoreticians think themselves to be forward-looking and clever enough to detect ex ante complementarity (Milgrom and Roberts, 1990). Actually, they probably are simply struggling in order to capture in their models the logic of the clustering of institutions that has been developed by a highly complex and unintended process. Even ex-post "the fact that one institution complements another is fundamentally uncertain" (Streeck, 2003). Furthermore, the institutions that are supposed to be complementary by institutional design, rarely end up so. Let us give an example of such a retrospective illusion.

### 7.1 The evolution of the regulations and institutions that prevent bank runs

Actually, many such episodes took place in history before theoreticians in sociology (Robert Merton) or economists (Diamond and Dybvig, 1983) proposed their explanations. For Robert Merton, the key interpretation was in terms of self-fulfilling prophecies, whereas Diamond and Dybvig were interested in the issue of the preservation of liquidity in response to a lower than expected rate of return on the credit offered by a bank. Furthermore the contemporary mix of insurance deposit and prudential ratios was not initially perceived as THE solution to bank runs. Various experts proposed the creation of a money clearing market among private banks, while others thought that the central bank should be the lender of last resort and thus stop bank runs. This is not to speak about the proponents of a pure currency principle according to

**Fig. 2. How deposit insurance and prudential ratios became to be perceived as complementary.**

which banks should only manage the payment system, without managing any credit. This means that the complementarity between (DI) and (PR) was not at all evident even two decades ago, not to speak of one century ago! (Figure 2)

Actually, this was the result of a largely *unintended process* that is *ex-post* summarized by the hypothesis of complementarity. *A priori*, many solutions were available from the more backward looking (interdiction of monetary creation by private banks) to the most innovative and unconventional ones such as the supply of an unlimited amount of liquidity to banks suffering from liquidity and even solvency problems. Private insurance companies were supposed to provide the liquidity help required during banking crises and various forms of bank deposits (with or without insurance) could have been proposed to customers and have diffused the cost of banking crises. But the trial and error process has converged towards the idea that a compulsory public insurance should cover individuals' bank accounts, up to some thresholds. But then, bankers may become more risk prone since they are sure to are bailed out in case of liquidity shortage. Therefore the type of banking crisis has changed and calls for new countervailing mechanisms. It took several decades to invent the prudential ratios elaborated by the Bank of International Settlements (BIS) and this device propagated all over the world. Observing that at least for financially developed economies, banking crises had become less frequent, many economists were induced to conclude that there exists an intrinsic complementarity between (DI) and (PR).

But this was not at all the end of the history of banking management and this nice complementarity has in turn encountered some limits. For instance when prudential ratio were introduced into the ailing Japanese banking system after the bursting of the bubble in the early 90s, the direct impact has been to exacerbate a credit crunch and a contraction of investment. Thus, depressing the level of economic activity, the introduction of prudential ration has created a new wave of non-performing loans. Given a rather complete deposit insurance, no bank run took place in Japan. Nevertheless the conjunction of deposit insurance and prudential ratio has not be sufficient to restore the confidence of the customers about the soundness of the banking system and the recovery of the Japanese economy. In a sense, the complementarity between two institutions has a variable impact according to the general context in which such a complementarity is embedded.

But there is another reason to put in historical perspective such a complementarity by looking at the American trajectory. Since the early 80s, financial innovations have been promoting direct finance to the detriment of banking intermediation. Consequently, the

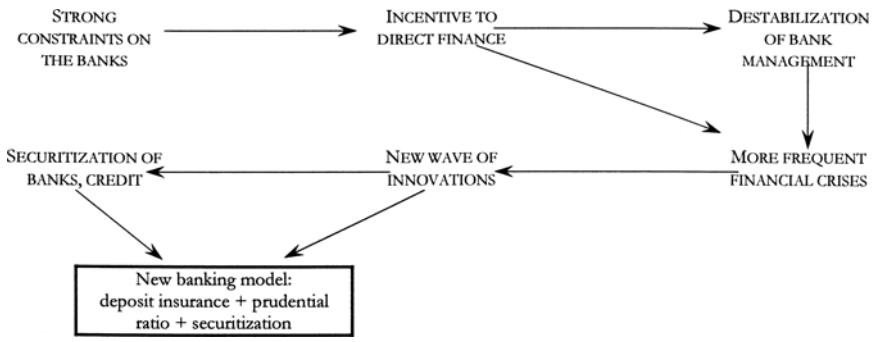


**Fig. 3. The rise of direct finance puts pressure upon previous complementarities.**

competitive situation of banks has been deteriorating and has pushed them to take more risks. But to compensate for the different risks linked to default of payment and interest rate variations, the banks have benefited from the new trend toward securitization: by grouping some of their credits and converting them into securities, the banks could spread out the risk that traditionally was concentrating into the credit system. Thus appears a new complementarity of ID and PR with the strategy of securitization (Figure 3). Now ID, PR and S exhibit a triadic complementarity.

### 7.2 From Serendipity to ex post rational choice explanation

Actually, the theoreticians and model builders drastically simplify the issue of institutional complementarity in removing most of the uncertainty that is at the origin of the emergence of most, if not all, the observed clustering of institutions. Serendipity is more frequent than rational economic calculation as far as the emergence of institutional complementarity is concerned. The very recognition by the actors of a complementarity may trigger destabilizing strategies and innovations that erode the beneficial role of this complementarity that then may enter into a crisis. The degree of coupling of institutions might first be rather weak but increases through time by the recognition process according to which actors try to exploit this perceived complementarity. The success of the complementarity between two institutions is context dependent, i.e. it has to be compatible with the social and economic global ordering.

Thus, the perception by most of the actors of a complementarity could well be the early warning that the system may enter a crisis, due to the exploitation by a larger and larger fraction of the population of the benefits of this complementarity (Figure 4). More generally, these remarks put some emphasis upon the time dimension of

**Fig. 4. The process of emergence of institutional complementarity: a synoptic view.**

complementarity, i.e. a quite essential feature in order to understand institutional change. Some contemporary political scientists do converge towards the same challenge: how to introduce time in theories dealing with a stationary world (Pierson, 2004) ?

## 8. Detecting Complementarities

A priori various methods are available in order to test ICH. Of course, the first step is to define a *performance criterion* and this is not evident at all since each brand of capitalism has its own criteria: rate of growth, total factor productivity and profit rate for market led capitalism but improvement and homogeneity of standards of living for social democratic capitalism…and so on. Once this choice has been made, the economists may first build a theoretical model and formalize how economic agents react to various institutional environments and what are finally the global performance indexes. *Contemporary micro theory and game theory* have thus been used in order to assess the possible complementarity of various institutions that result from the interaction of agents within the given institutional context. For instance, some models show that employment stability and the main bank were complementary for the Japanese economy in the 1980s (Aoki, 1988). Or alternatively highly mobile and competent work force were complementary with venture capitalists in the Silicon Valley of the 1990s (Aoki, 2001). Similarly, strong unions and financing by bank intermediation have been proved to be complementary under some conditions (Amable, Ernst and Palombarini, 2002) and this

helps to understand the European configurations.

These models are highly abstract and theoretical. They basically discuss the conditions under which the mix of two institutions delivers a superior performance and the related thresholds are confronted with some stylized facts drawn from historical analyses or international comparisons. Therefore, a direct test of the relevance of a given complementarity has to be carried through different approaches, i.e. rather sophisticated econometric studies, generally combining cross section along with time series. Two institutions are analyzed as complementary with respect to growth, if the term built by multiplying a representative index of each institution has a positive and significant impact on growth (Ernst, 2001). Such a strategy has been popularized by the empirical research on corporate governance. For the time being, few results seem to be robust enough and to fit with the teaching of the theoretical models.

Other methods can capture the rather different concept of *clustering*. Among them, the *qualitative comparative analysis* (QCA) (Ragin, 1987, 1994) is interesting since it removes the issue of optimization of performance just to try to reveal the various mixes of institutions that deliver a given qualitative outcome. Such a method has been used in order to detect what institutional architectures can cope with the use of ICT and one of its merits is to leave open the nature and the number of institutions that turn to be associated with good performance (Boyer, 2004a). Similarly, it can be enlightening in the interpretation of the success of business models to directly test the de facto complementarity between managerial devices, often obscured by the rhetoric and the marketing of these models (Kogut *et al.*, 2002).

But such methods miss a crucial point: the *evolutionary aspect of complementarity*, clustering and still more co-evolution. In order to address this issue, a first method, available and frequently used by institutional research, consists in digging up national or regional economic history in order to check if the circumstances of the creation of an institution are really the same as the reasons that may explain its persistence and viability. In this respect, most of the institutions that are today perceived as complementary, were in fact created for distinct purposes and only the succession of crises, experiments and sequential innovations finally delivered the complementarity that is recognized at the end of a rather long historical process. But of course it is difficult to drive general results out of a series of singular case studies. QCA was invented precisely in order to extract some general hypotheses from the juxtaposition of case studies. But economists generally do not use this method since they dream of generating a counterfactual history and thus they prefer to build models in order to simulate various

**Table 2. What tools for what type of relationships between institutions?**

| Notions \ Tools | Economic Reasoning | Economic Modelling/ Game Theory | Qualitative Comparative Analysis | Automatic Data Analysis | Econometric Analysis With Non Linear Term | Historical Analysis | Evolutionary Models |
|---|---|---|---|---|---|---|---|
| Supermodularity | * | ** | | | | | |
| Complementarity | * | ** | * | | ** | | |
| Compatibility | | | * | | | * | * |
| Hierarchy | | ** | | | | ** | * |
| Coherence | * | | | * | | * | * |
| Isomorphism | | | | * | * | * | |
| Clustering | | | ** | ** | * | | ** |
| Coevolution | | * | | | | ** | ** |

dynamic processes under different institutional and stochastic hypotheses. This is precisely the aim of evolutionary models, the last generation of which has stressed the importance of coevolution: what static neoclassical theory explains as complementarity might be the outcome of distinct selection and learning processes, that are nevertheless related in terms of outcomes (Dosi *et al.*, 1993)

Thus one observes a rough correspondence between the nature of the links among institutions and the tools that are required in order to check the existence of these links (Table 2). Alas none of these strategies is self-sufficient, therefore ideally, facing a given research issue, the research should try and use each method that can possibly deliver a piece of the puzzle.

## 9. *Régulation* Theory

The concept of complementarity was not present in the earlier RT research, since this research program relied upon the notions of accumulation regime, *régulation* mode, architecture of institutional forms, and exogenously driven and endogenously generated crises (Boyer and Saillard, 2002). Nevertheless, the inner development of this research agenda has shown the usefulness of two concepts in order to understand the coherence of a set of institutions: those of institutional *complementarity* and *hierarchy*. But the major emphasis of RT is about structural transformation and endogenous coevolution of institutional forms. Thus, this approach has proposed two other mechanisms: *hybridization* and *endometabolism* of institutional configurations.

### 9.1 The coherence of a *régulation* mode: From complementarity to hierarchy

Basically, a coherent *régulation* mode is only the *post factum* outcome of a series of innovations and adjustments. Quite all institutional forms result from social compromises that are then embedded into law, jurisprudence, social norms, and conventions. Each of these institutional forms induces some specific behavior, for firms, wage earners, banks, and so on. At the economy wide level, there is no automatic mechanism that would warrant the compatibility of the behaviors associated with the different institutional forms that have contrasted origins, purposes, and outcomes. Thus, institutional forms are continuously adjusting one to another and coevolving. The *coevolution* is the process of trial and error through which a series of institutional forms that are initially disconnected and formally independent (since they result from institutionalized compromises among diverse agents in different fields) adjust to one another until a viable institutional configuration emerges. The economic adjustments

then become part of a mode of *régulation* and retrospectively this mode appears as coherent. Thus, RT extends to institutional analysis a concept developed by neo-Schumpeterian theories in relation to the joint evolution of technologies and organizations. However, the mechanisms at work may differ: for technologies, market selection is crucial, while for institutional forms political processes play a determining role.

In retrospect, in order to capture the core of a *régulation* mode, it may be useful to invoke the concept of *institutional complementarity*. More precisely, the complementarity of institutional forms describes a configuration in which the viability of an institutional form is strongly or entirely conditioned by the existence of several other institutional forms, in such a manner that their conjunction offers greater resilience and possibly better performance compared to alternative configurations. It has already been mentioned how the Fordist wage-labor nexus and a credit based monetary regime appeared to be complementary, as were the competitive wage-labor nexus and the gold standard regime. The same idea is emphasized by the "Comparative Institutional Analysis" with respect to the complementarity of keiretsu, employment stability and the main bank in Japan (Aoki, 2001). The notion of institutional complementarity seemingly transposes at the macroeconomic level the theory of supermodularity (Milgrom and Roberts, 1990), but the underlying mechanisms are rather different: the institutional complementarity is only observed *ex post* and does not derive from any organizational or technological complementarity observed at the firm level.

## 9.2 Institutional change: From one hierarchy to another

The observation of the transformations of industrialized countries during the last two decades has shown the interest of a third notion, that of *hierarchy* of institutional forms. This describes a configuration in which, for any given era and society, particular institutional forms impose their logic on the institutional architecture as a whole, lending its dominant style to the mode of régulation. Whereas the notion of institutional complementarity implies at least implicitly symmetry between two or more institutions, the hypothesis of institutional hierarchy stresses the asymmetry among these institutions. Thus, TR adopts two definitions, one static, the other dynamic.

*Institutional hierarchy by design* means that during the conception of some institutional form, the constraints of another central, and hence superior, institutional form, are explicitly or implicitly taken into account. For instance, if nominal wage becomes the equivalent of a labor standard, the objective and the tools of monetary policy have to be redesigned (Hicks, 1955) and this means that collective bargaining on

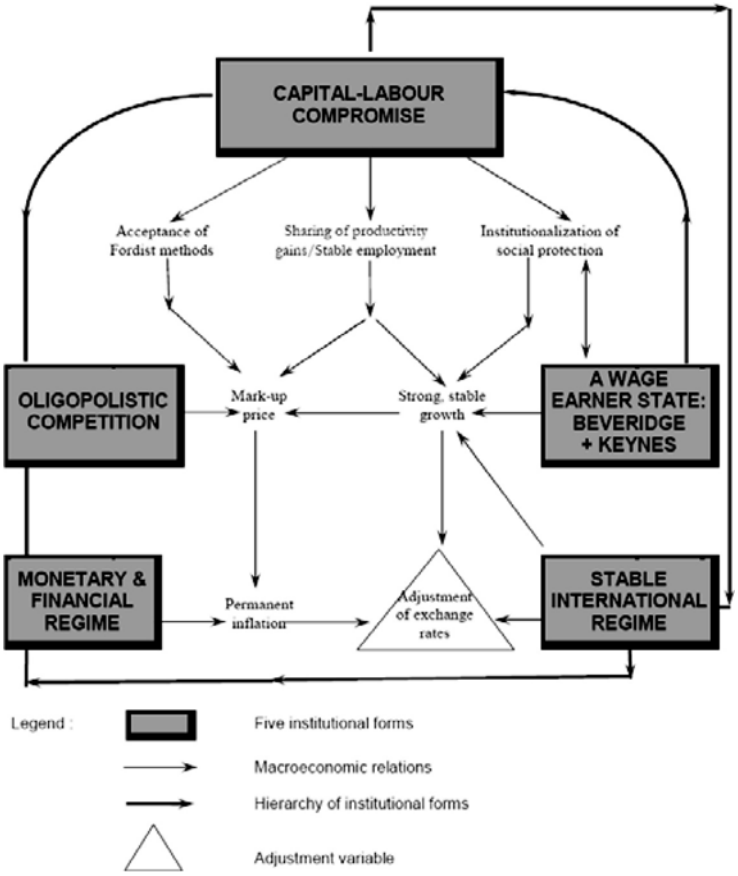


**Fig. 5. Hierarchical position of the wage labor nexus during the fordist golden age.**

wages has a primacy over the (Keynesian) monetary regime, and thus that there is a hierarchy from labor market institutions to the monetary regime. Similarly, the monetary regime put forward by a conservative Central banker implies flexible labor market adjustments and the absence of any structural public deficit by governments. This is an *inversion* with respect to the previous institutional hierarchy.

According to a second interpretation, *the transformation of an institutional form guides the development of one* or several other institutional forms. Under Fordism, the wage-labor nexus played this role, because of the founding compromise from which it originates and its transformations finally permeated nearly all other institutional forms

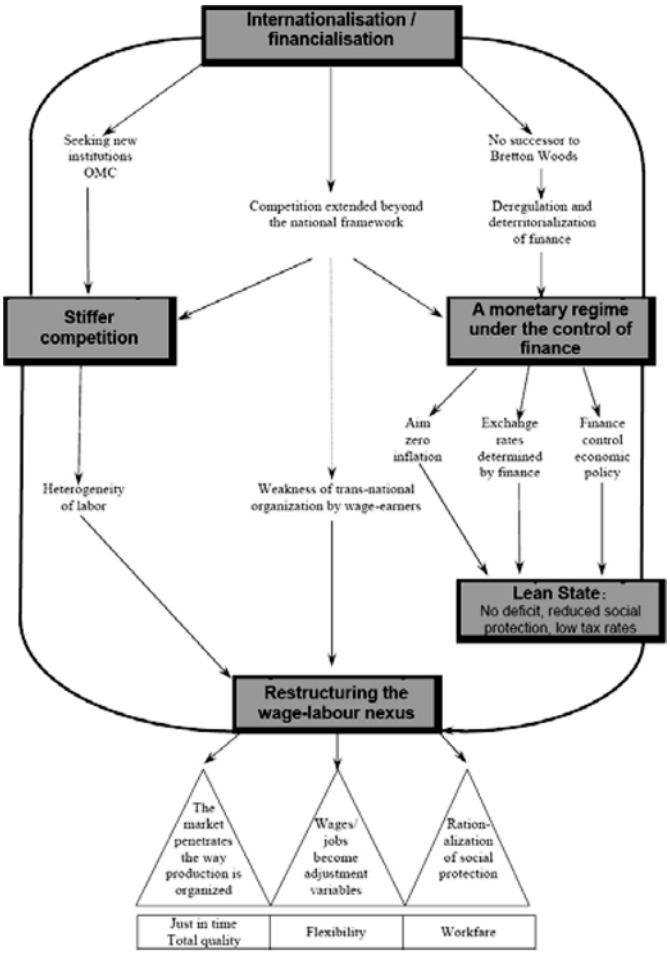


**Fig. 6. Internationalization and financialization: the new hierarchy since the 1990s.**

(Figure 5). With the opening of domestic economies and the financialization of corporate governance, the form of competition and the financial regime have progressively shaped quite important transformations into the inner organization of the wage labor nexus (Figure 6).

Ex post, the two definitions converge but when analyzing the process of institutional change, the second definition is more operative that the first one. This remark brings an important issue about *the time horizon* of institutional hierarchy. Both concepts may give the impression of a completely static and deterministic system, without any uncertainty,

slack, or time dimension.

### 9.3 Time and space: Endometabolism and hybridization

Actually, these two issues are central for RT, since the cross-national comparison of *régulation* modes has shown that the fit of various institutions was far from perfect and that it varies in the long run in response to two major mechanisms.

*Hybridization* describes the process through which tentatively imported institutions are transformed via their interaction with domestic institutional forms. This means that there are some degrees of freedom within each general institutional form. This mechanism of hybridization is a major factor in order to explain the evolution of institutions and the diversity in institutional architectures. For instance, the respective institutional architectures of the American and Japanese capitalisms can be fruitfully interpreted as the results of their interactions over nearly a century (Figure 7).

*Endometabolism*, i.e. the inner development of tensions within a given architecture, is a second source of evolution of these institutional architectures. In a sense, the mechanism described by Figure 4 above is one example of such a dynamic analysis of the emergence, maturation, and crisis of a regime. The recognition that the fit among institutions is always partial and transitory brings to the forefront the mechanisms diagnosed by comparative historical analysis (CHA): *layering* and *conversion* are powerful mechanisms of evolution (Thelen, 2003) as well as *recombination* of institutions (Stark, 1997). Again this implies a "softening" or at least a careful use of the concepts of complementarity and hierarchy.

It is not an easy task to calibrate the relevance of these various mechanisms. Clearly, the analysis of institutional change is still an infant industry: many new theoretical developments and empirical studies are required in order to dare to provide any clear prognosis. By chance, it is a very active field of research (Djelic and Quack, 2003; Thelen, 2004). Nevertheless, it is interesting to test these notions, tools, and hypotheses against some contemporary evolution. Ideally the background could be the large literature about the diversity of capitalisms and evolutions (Fligstein, 2001; Jessop 2001; Coates 2002; Whitley, 2002; Amable, 2003). More modestly, the next section investigates the institutional configurations that have been successful during the 90s and argues that they display three different complementarities.

## 10. Contemporary Diversity of Capitalisms: How Useful Is the Institutional Complementarity Hypothesis?

The 90s have propagated the practices of *benchmarking* and the ideas that both

**Fig. 7. Hybridization and endometabolism, two factors of institutional change: the joint evolution of american and Japanese trajectories.**

corporate governance and capitalist institutions should *converge* towards the most efficient configuration. This vision can be tested (Boyer, 2004). First a performance criterion has to be selected: let us define a successful economy as experiencing simultaneously an increase in total factor productivity, fast growth, and job creation. Second, quantitative as well as qualitative indexes of institutional forms have to be built, in order to characterize each institutional configuration. Third, in order to leave open the number of successful configurations it is convenient to use the qualitative comparative analysis (QCA) method.

The results are interesting since they confirm the plurality of successful institutional architectures, but they do not cope with conventional opposition between two brands of capitalism (Figure 8).

*The knowledge economy* relies on the complementarity between the high general educational levels that permit intensive job training and institutionalized cooperation between, on the one hand, the academic system and the research centers, and on the other, business. On average, a large proportion of total output is devoted to education, to software and to other vehicles for the transmission of knowledge. Information and communication technologies are intensively used, but they are simply a channel that favors *widespread socialization* of knowledge by means of collective investments. This model is basically different from the so-called "New Economy", and its leading firms such as Intel and Microsoft, since Linux may well become the emblem of this type of knowledge economy. Here the market is not the dominant form of coordination — instead *cooperation* is, in this instance, institutionalized and organized on a national basis. Thus this configuration does not bring major inequalities since the rather even distribution of education endows individuals with good skills. Sweden, Finland, and Denmark (Lundvall, 2004) belong to this configuration. This feature is good both on the production side with the dynamism of innovation, and on the demand side, for diffusion of new products with a large informational content.

*The deregulated economy* on the other hand allows for a *private appropriation* of advances in knowledge inasmuch as patents and the defense of intellectual property rights become the tools that enable those who have the highest diplomas and/or the major talent to keep most of the innovation rents for themselves. A very active external labor market is given the task of evaluating at all times how much everyone is to be remunerated, depending on his/her competency and on the demands of the market. This capture of the rents associated with innovation is mitigated by the fact that competition on the product markets tends to cause a considerable drop in the price of information

**Fig. 8. The successful contemporary capitalisms: three distinctive complementarities.**

goods, allowing consumers to benefit ultimately from innovation-driven advances. In this configuration, the unequal distribution of competences is a key ingredient of the very dynamism of growth. Not only the US but also most English-speaking countries explore this trajectory.

*The accelerated catch-up model* is made possible by a shift in the technological paradigm. This is another configuration that is capable of triggering a virtuous circle, despite, or maybe because of, the initial lag that the countries in question (Ireland, Portugal) were experiencing during the old Fordist mass production period. A *heavily protected labor force* does not impede membership in this regime — unlike the second configuration, which is typical of countries featuring a significant confidence in market mechanisms. The complementarity between institutional arrangements is not so clear but the structural changes in the international economy and innovation systems play a role since they remove the barriers to development that previously existed.

This method finally exhibits the complementarities or at least compatibilities between various institutional arrangements (Amable, Ernst and Palombarini, 2002). Nevertheless, they do not derive from a canonical supermodularity originating in technology (Milgrom and Roberts, 1990): just-in-time and total quality control are not considered here. Furthermore, these configurations differ from the ones previously investigated. Comparative institutional analysis (Aoki, 2001) contrasts the hierarchical and vertically integrated mass-production firm with the flexibility associated with modular production and the mobility of competences typical of Silicon Valley. The 'Varieties of capitalism' theory stresses a dichotomy between non-coordinated and coordinated market economies, with the US on one side, and Germany on that of a social market economy (Hall and Soskice, 2001). In fact, different configurations emerge when the analysis focuses upon complementarity/compatibility issues.

## 11. Conclusion

The institutional complementarity hypothesis (ICH) opens a rather *promising research program* that could help understanding the nature and evolution of capitalisms. First, complementarity is one of the forces that stick institutional forms one with another. Second, there is not a single form of complementarity but a significant variety. Third, this explains why benchmarking is not necessarily successful and why institutional reforms are so difficult: as soon as two different institutions are complementary they should to be changed simultaneously, whereas reformers tend to divide and segment the issues at stake.

From a methodological standpoint, ICH has to make clear some major issues. First, complementarity should not be confused with more or less close notions such as *compatibility*, *coevolution* or *clustering*. Second, various methods have to be combined in order to test ICH. Among them, QCA and non-linear econometric methods seem rather promising for a general social science approach, whereas formal modeling is an avenue more easy to explore for economists than for other disciplines. Third, if complementarity is not only dyadic but triadic, empirical research becomes more difficult but probably more relevant.

From a theoretical point of view, three major findings emerge concerning respectively the origin of complementarity, the time horizon that governs complementarity and finally the level at which it operates. First, economists often refer to technical complementarities in order to derive the related complementarities between institutions. Of course, they might exist but they describe only a part of the large set of complementarities. Some of them derive from *pure institutional factors*: for instance the liquidity of the commercial bank calls for deposit insurance, then prudential ratio and finally a lender of last resources. Second, historical studies exhibit a *form of paradox*: when a majority of actors discover and opportunistically use the benefits of a given institutional complementarity they have finally discovered, this complementarity tends to decay, to vanish, and the institutional system enters into a crisis. Third, the ICH is not sufficient to bridge *the gap between micro and macro* analyses of institutional complementarities. Nevertheless, the notions of *isomorphism*, and to a certain extent of *hierarchy*, do provide some cohesive factors between firms, organizational configuration and the overall institutional architecture.

When applied to the issue of *capitalism diversity and evolution*, ICH suggests quite interesting hints. First, complementarity is one of the factors that provide the glue that holds together a global institutional architecture. Second, even in the era of globalization, financialization, and knowledge-based competitiveness, national economies still exhibit contrasted institutional configurations…but the number of these configurations is quite limited compared with what should result from a purely combinatory approach. Third, capitalism diversity is not a pure matter of historical legacy, inertia, or irrationality since at least two mechanisms — *endometabolism* and *hybridization* — permanently drive institutional change both in terms of destruction of obsolete configurations and creation of new institutions.

The present article points out *a challenging research agenda*. What are the patterns of institutional evolution and what are the forces and factors that shape these patterns? The

ICH explains some typical patterns: emergence, diffusion, maturation, sophistication, lack of reactivity and finally erosion and crisis. Nevertheless, case studies and comparative analyses suggest that other and quite complex patterns are observed. *A priori*, a creative use of the various notions of compatibility, coevolution, clustering, and of course complementarity and hierarchy may probably explain the diversity of these patterns in institutional change. This could help in the design of institutional reforms that have proved to be so difficult during the 90s.

In order to make some progress in this direction, *a comparative institutional analysis of change* seems a good starting point. It seems premature to try to capture within a formal economic model the various mechanisms defined by the present article, because the system could become so complex that it would be difficult to derive any clear analytical conclusion. By contrast, it would be quite interesting to survey the various studies of institutional change — focusing on the dynamic of capitalisms — and elaborate a list of the explaining factors put forward by the authors. Then each empirical study could be incorporated into a large sample of national and historical cases and the use of QCA could be quite useful in diagnosing the mix of factors that govern institutional change. In a second phase, economists could try to build various models in order to check if logical reasons are at the core of the observed configurations.

This article suffers from a clear weakness. Whereas it deals with social compromises, the shift of bargaining power between actors, and the related shift in institutional hierarchy, no explicit mention of a *political economic approach* has been made. Clearly, the contrast between the Fordist golden age and the contemporary period cannot be explained without a serious analysis of the transformation of the social structures within national economies in relation to the process of internationalization on one side, and the formation of political coalitions on the other. It may be that this is the force that creates institutions and the glue that makes them legitimate and compatible. This could well be the origin of viable growth regimes.

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