# The Effects of Informatization on the Economic and Financial Crisis

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## The contemporaneous technical system

To understand the effects of informatization, it is useful to refer to the *theory of technical systems*[1]. A "technical system" is taking place when a small number of techniques come in synergy, their alloy releasing a previously unknown effectiveness. This was the case with industrialization, which was build from the eighteenth century on the synergy between mechanics and chemistry, to which were added electricity and oil at the end of the nineteenth century.

Computerization relies on the synergy between microelectronics and software, to whom network was added in 1975: this synergy allowed the emergence of a *contemporary technological system* (CTS). The computer, which was previously devoted mainly to calculation[2], became - with word processing, spreadsheet, grapher, messaging and file sharing, then the Internet and the Web - a universal instrument that brought the assistance of the automaton to personal work as well as communication between people.

The origin of industrialization was purely technical but it had anthropological and geopolitical consequences: it has expanded the system of wage labor and gave birth to the modern corporation, to working class and class war. It has led to rapid urbanization and rural exodus, to rapid technological change and the use of scientific research, it has prompted the deployment of the education system and health system, encouraged imperialism and colonialism, caused wars which used devastating weapons provided by the industry.

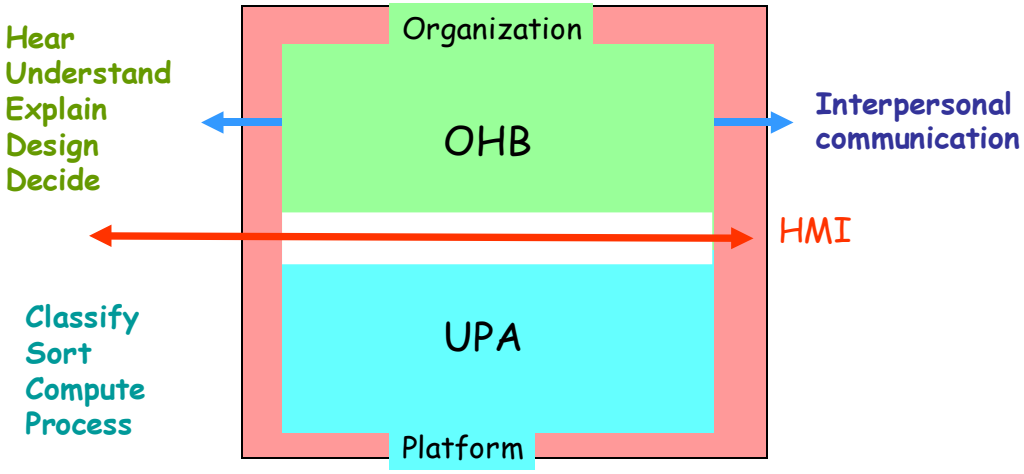
It is the quality, the power of their industry which ranked the nations : those who had not been industrialized were soon dominated or colonized by the industrialized nations.

## What are today the consequences of the CTS?

The set of interconnected computers is a ubiquitous programmable automaton (UPA), able to achieve everything that can be programmed and released through the network whitout the constraints imposed by geographical distance. While industrialization was based on the alloy *between hand and machine*, and subjected the "manpower" to strict discipline, computerization results in the alloy *between the brain and the automaton* and mobilizes the skills of the "brainpower".

The organized human being (OHB) forms indeed an original alloy with the UPA: it follows a specific organization of the company and its relationships with customers, suppliers and partners. This alloy has given rise to a new continent and we can call "informatization" all the phenomena which are generated by this emergence.

1 Bertrand Gille, *Histoire des techniques*, Gallimard, 1978.
2 Pierre Mounier-Kuhn, *Histoire de l'informatique en France*, PUPS, 2010.



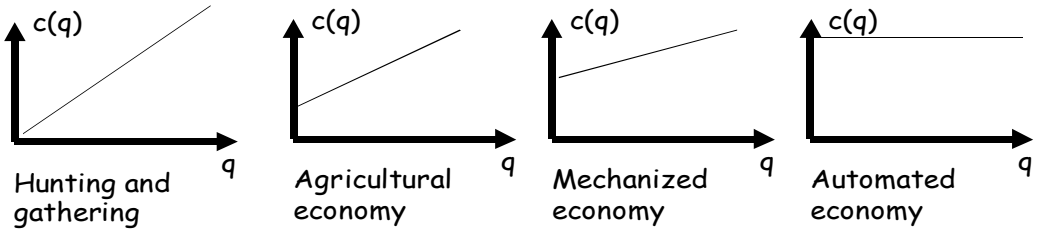

*The dialectic of OHB and UPA*

It presents to action new possibilities which are naturally accompanied by new risks. In the enterprise, the deployment of "information systems" has economic effects, but also sociological (structures of legitimacy and power), philosophical (methods and techniques of thought) and finally metaphysical ("values" that give a sense to the productive action) effects.

**Economical dimension of informatization**

The migration from a technical system to another has consequences one can perceive only in the frame of a general equilibrium model embracing at once the initial allocations, the production function and utility function, and allowing to simulate mentally the functioning of a specific economy: studies that are devoted to *only one* aspect of the economy may not in fact reflect interactions that are perceptible only with a general equilibrium approach.

The automation of production has nullified the marginal cost of production, or at least make it almost negligible. This is obvious for software and integrated circuits: the total production cost is spent during the initial phase of design and investment. It is the same for networks whose cost depends on their *dimensioning*: marginal cost is zero when their capacity is not saturated.




*Evolution of the cost function*

The cost structure of these fundamental techniques affects products that, increasingly, incorporate computers and software (automobiles, airplanes etc.). The cost of services is itself, for a large part, a fixed cost of initial dimensioning.

When the production function of an economic sector is such that the marginal cost is (practically) zero, the regime of this sector is established either under natural monopoly or under monopolistic competition. For products that lend themselves to quality

differentiation - that is to say for most of the products - monopolistic competition will prevail[3].

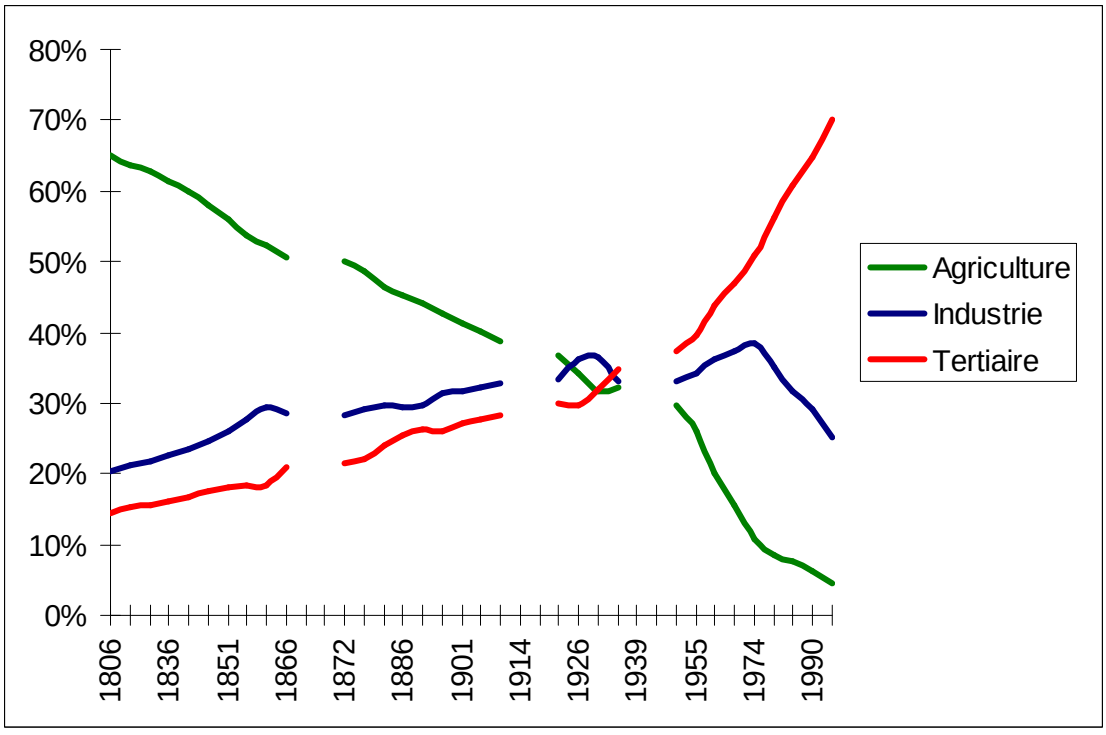
This confuses some of our models, some of our habits of thought, because economic theory has accustomed us to the canonical couple formed by perfect competition and monopoly.

An *economy of maximal risk*

As most of the cost lies in the design phase that precedes the production in volume, the contemporary economy is *ultracapitalistic*: plans, computer programs, organizations and equipment represent a stock of labor, "dead labor", and therefore a fixed capital (to be of course distinguished from financial capital).

It follows that this economy is *the economy of maximal risk*. The cost of production is fully spent before the firm has sold a unit of product, and thus received the first response of the market, and while little is known about the initiatives of competitors. In addition, the cost is generally high because monopolistic competition requires quality: designing a new operating system or a new microprocessor costs the order of ten billion dollars.

The structure is changed: while the mechanised economy had a strong need for mechanized labor, it is not the same for the computerized and automated economy. Most of the jobs migrate to design on the one hand, service and customer relationship on the other.




*Evolution of the structure of employment in France (Source : Marchand and Thélot)*

The risk is even higher because computerization provokes a globalization of the economy: the ubiquity that the network provides embraces naturally the world, and

3 Michel Volle, *e-conomie*, Economica, 2000.

computerization of logistics has, with the automation of handling containers, led down the cost of transportation of goods. In addition a ultracapitalistic firm seeks naturally the broadest possible market for balancing the fixed cost of production, and has to compete on the world market with other firms which have the same ambition.

This ultracapitalistic economy of maximum risk is inevitably a very violent economy: he who does not will or not know how to engage in corruption is losing market shares, and predators thrive.

Culture of the predator

"I want to become a godfather, I want malls, shops and factories, I want women. I want three cars, I want people to respect me when I go somewhere, I want stores around the world. And then I want to die. But as the real ones die, those who lead for good: I want to die murdered "

(Roberto Saviano, *Gomorra*, Gallimard 2007, p. 141)

Computerization of finance facilitates the laundering of the money that corruption and crime provide, is recycling this money in the "normal"economy and thus allowing the conquest of political and economic power by predators[4].

Control of legal economy by predators

"The criminal way takes over when the legal industry is in crisis. If there is a lack of liquidity, it emits false currency, and in order to get capital quickly it sells fake bonds. Competition is crushed through racketeering, imported goods escape taxes. [One can] provide customers with stable prices, without erratic fluctuations, and repay bank loans without difficulty. "

(Saviano, op. cit. p. 315)

Then there exists a direct conflict between entrepreneurs and predators: both may look the same (language, clothing, lifestyle, authority) but they are guided by respective conflicting values. While the predator is fundamentally a *consumer* and a *destructor* (he feeds on its preys), the entrepreneur is essentially a *producer* and a *creator*, aware of the role of his business in the biosphere at the interface between physical nature and society.

To reduce the firm to profit maximization is to take the risk of confusing the entrepreneur and the predator in the same reprobation and misunderstanding. If the company's goal was to maximize profit, the rational calculation would guide the entrepreneur to illegal activities which are very profitable even if one deducts the risk of legal punishment: it is precisely this calculation that predators do.

**Financial crisis**

The power of computers is also a trap. A computer models that can handle several thousand simultaneous equations plays well, but its results are opaque to reasoning - econometricians know that results can be erratic when the approximations are poorly controlled.

4 Michel Volle, *Prédation et prédateurs*, Economica, 2008.

But it happened that the unification of global financial market through the network, the speed that provide automatons, the availability of algorithms that detect arbitrage opportunities, offered to finance new sources of profit while apparently reducing risks: the entire global financial system was solidary and it seemed impossible that it collapses as a whole. The apparent disappearance of risk unbalanced finance, whose core activity is the risk / return tradeoff, and promoted the mere pursuit of return. "Mr. Hudd (CEO of Fannie Mae) told its employees to take risks aggressively, or to leave the firm[5]".

Automatization of Finance

« The Wall Street titans loved swaps and derivatives because they were totally unregulated by humans. That left nobody but the machines in charge. » (Richard Dooling, "The Rise of the Machine", *The New York Times*, October 12, 2008)

« Since the Big Bang of the 1980s, large amounts of stocks and shares - and derivatives of them - have been traded automatically by computers rather than by humans. These so-called "algotrades" accounted for as much as 40% of all trades on the London Stock Exchange in 2006; on some American equity markets the figure can be as high as 80%. » (Sean Dodson, "Was software responsible for the financial crisis?" *The Guardian*, October 16, 2008)

« Use of digital technology caused the present financial turmoil. »
(Neville Holmes, "The Credit Crunch and the Digital Bite", *Computer*, January 2009)

Hence informatization is, if one accepts the definition of Aristotle, the *material cause* of the financial crisis because it has made possible and ultimately inevitable behaviors which, embodying a transformation of finalities, organizations and competition, have been its immediate cause.

**Immaturity of the production system**

The constraints of security have also often been neglected. The alloy of the OHB and the UPA requires double supervision: supervision of human behavior, presenting a risk of error or malice, and supervision of the automaton, which is prone to breakdowns and whose program, necessarily finite, can not answer the limitless diversity of situations and incidents involved in any prolonged confrontation with nature. However, this oversight has often been neglected because one has underestimated the risks and given undue reliance to the computer.

Let us leave finance to consider the production system. In order to guard against the maximal risk, companies are grouping together: most products are presently developed by partnerships (or by a network of sub-contractors). Moreover, the quest for quality has prompted them to design their products as collections of goods and services: cars for example, emblematic products of industry, become a package formed by car itself and various services (advice before sales, financing, periodic maintenance, alerts, recovery in end of life), and with renting this package evolves finally towards a pure service.

An *information system*[6] ensures the interoperability of partnership and the cohesion of the package of goods and services. Its quality depends on the semantic relevance of the concepts he observes, on exactitude of coding, on accuracy of the modeling of

5 Charles Duhigg, « Pressured to Take More Risks, Fannie Reached Tipping Point », *The New York Times*, 4 octobre 2008.
6 Michel Volle, *De l'informatique, savoir vivre avec l'automate*, Economica, 2006.

processes, on reliability of supervision, on lightness that it provides to the strategy, finally on the appropriateness of the technical solutions and resources (dimensioning, skills) to all these requirements.

But the facts show that the production system has not matured its informatization. This is evidenced by the rate of f ailure of IT projects that surveys of the Standish Group reveal, which would not be tolerated in any other field of engineering: only a quarter of the projects succeed properly, a quarter of them fail, half lead but with a multiplication of time and budget by a factor of three.

| | 1994 | 1996 | 1998 | 2000 | 2004 | 2006 |
|---|---|---|---|---|---|---|
| Success | 16% | 27% | 26% | 28% | 29% | 35% |
| Excess | 53% | 33% | 46% | 49% | 53% | 46% |
| Failure | 31% | 40% | 26% | 28% | 18% | 19% |

*A very high failure rate (Source: Standish Group)*

**A disequilibrium**

Hence computerization is not yet mature in companies, whether in finance or in the production system. It is the same if we consider politics: at the precise moment when the economy was entering the regime of maximum risk, regulations have been removed, the safeguards dismantled, safety rules abolished, the natural law being that the one reacts first by panic when faced with a radically new situation.

Panic prevails also on the consumer side, consumers being both superficial and immature. Their demand is a clumsy and unfaithful translation of their needs and instead to choose to maximize their quality /price ratio, they oscillate between the search for the lowest price and adherence to a versatile fashion that attracts them to the latest gadget: to be convinced of this fact, it is enough to visit one of the stores Apple has opened in Paris...

* *

So our economy is as unbalanced as the economy of the 30s. Keynes diagnosed the causes of this disequilibrium: economic agents, who kept the habits of caution suitable for an agricultural economy, failed to anticipate the fertility of the industrial economy; hence weak demand, stifling the production system, caused a paradoxical "poverty in abundance".

The contemporary disequlibrium is of another nature. It results from an imbalance of demand and institutions in a modern, computerized production system. The effectiveness of informatization is then in large part sterilized and captured by predators, and we also know "poverty in abundance".

**A challenge for economics**

Since its creation by Adam Smith, economic theory was bound with industrialization: it is fundamentally a theory of efficiency in the mechanized economy.

Informatization has however changed all the fundamentals of the economy:

- the alloy of the "brainpower" and the automaton replaces, in the heart of the production system, the alloy formed for two centuries by "manpower" and machinery;
- initial allocations focus on skills and know-how, and are disturbed by predation;
- utility and use value depend more on the qualitative diversity of available products than on consumable quantity;
- cost function has condensed in *design* and experiences increasing returns;
- the economy is generally under the regime of monopolistic competition.

The present economy requires therefore from the economists an innovation more important than these accomplished by Keynes when he modeled the uncertainty of the future and the destabilizing effect of expectations.

We need to have the creative energy of Adam Smith himself if we want to formulate, as he did in his time, an economic theory that addresses the needs of the contemporary technical system and its practical consequences. We need also a corporate accounting, a national accounting and econometrics based on the redefinition of the value, usefulness and effectiveness which is implied by the emergence of the CTS.

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**Bibliography**

Dodson Sean, « Was software responsible for the financial crisis? » *The Guardian*, 16 octobre 2008

Dooling Richard, « The Rise of the Machine », *The New York Times*, 12 octobre 2008

Gille Bertrand, *Histoire des techniques*, Gallimard, La Pléiade, 1978

Duhigg Charles, « Pressured to Take More Risks, Fannie Reached Tipping Point », *The New York Times*, 4 octobre 2008.

Holmes Neville, « The Credit Crunch and the Digital Bite », *Computer*, janvier 2009

Marchand Olivier and Thélot Claude, *Deux siècles de travail en France*, INSEE, 1991

Mounier-Kuhn Pierre, *Histoire de l'informatique en France*, PUPS, 2010

Saviano Roberto, *Gomorra*, Gallimard 2007

Volle Michel, *e-conomie*, Economica, 2000

Volle Michel, *De l'informatique, savoir vivre avec l'automate*, Economica, 2006

Volle Michel, *Prédation et prédateurs*, Economica, 2008