

Michel Callon, Michel Foucault and the « dispositif » *When economics fails to be performative: A case study*

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In recent years, many important studies have focused on performativity or performance of economics (among others, see Callon, Milo & Muniesa, 2007; MacKenzie, Muniesa & Siu, 2007). Together with authors such as Yuval Millo, Fabian Muniesa, Donald MacKenzie, or Lucia Siu, Michel Callon has played an important role in this field. Most of these scholars have highlighted the way in which economics performs real world. We will, in contrast, focus on the opposite. Drawing on the case of air traffic management (ATM) in Europe, a case we have been working on for about ten years, we will attempt to show how economics failed to perform this industry. Our purpose is not to offer a kind of refutation or falsification of the performativity theory from a Popperian stance. Obviously, this theory acknowledges the fact that economics does not always perform the economy. Rather our aim is to refine the theory, to pinpoint some paradoxes related to performativity or performance, and to bring forward thinkable promising research perspectives.

We shall begin by examining what, in Michel Callon's perspective, constitutes and does not constitute the performativity of economics. Then, we will have a look at Michel Foucault's notion of « *dispositif* » (apparatus or device), to explore how Callon relies on Foucault, but also how Foucault can still be useful when approaching the notion of device. After that, we will present the selected case, air traffic management (ATM) in Europe. Finally, we will discuss this case in connection with the theoretical framework.

Michel Callon on performativity (or performance)

To understand what Michel Callon has in mind when using the notion of performativity or performance, it is useful first to understand what it is not or what it is opposed to.

First, performativity is opposed to embeddedness, to the idea that economy is embedded in a social world that determines it. What seems interesting to Michel Callon is not how the economy is embedded, but how it succeeds in gaining autonomy from the social world. Michel Callon, here, is quite in line with Fernand Braudel (1979/1992) when he showed how the economy tried to free itself, in a difficult and slow process, from the social world, especially religion. Emphasis is therefore placed on the mechanisms that allow the economy to become separate from the social environment and, reciprocally, on how the social can thereafter be economized: « *the question is not: what do we call economic behavior, or what is the*

economy, but how are behaviors, institutions, agencements, and rules of the game economized? » (Callon, 2008, p. 22).

Principally since Walras (Dumez, 1985), distinctions are made between pure and applied, and positive and normative economics. On the one hand, there would be the abstract world of models, explicitly or implicitly normative, and on the other hand, there would be the real world to which these models would be or should be applied. The notion of performativity questions these distinctions.

Something similar can be said in connection with the concept of convention, or the idea that agents must agree on rules and norms before acting, and in order to interact. These rules, explicit or tacit, would be the necessary condition of coordinated economic behaviors. According to Michel Callon, however, conventions could be and must be forgotten. Performativity is something very different from agreed upon rules.

Performativity can also be contrasted to self-fulfilling prophecies. If all agents believe something will happen and act accordingly, it turns out the thing happens. Michel Callon considers this mechanism to be simplistic, and not to correspond to the way economics performs reality.

Finally, performativity must be distinguished from (neo) institutionalism. In order to function, the economy is said to need institutions. Michel Callon thinks the notion of institution is too static: it can explain how an economic state can reproduce itself, but not how it can evolve. And institutions are stuck: they do not explain how they can evolve themselves. They are a framework and, as such, seem unable to change and let change happen. In Michel Callon's view, old as new institutionalisms lack explanatory power.

Thus, to understand what Michel Callon means by performativity or performance, we must first examine the large and impressive set of ideas from which this notion is intended to break. These ideas include all the well-known theories regarding the economic world, orthodox as much as heterodox, Nobel-prize winning or otherwise. The second step consists of focusing on what Michel Callon concentrates when speaking of performativity, namely the economic discourse and devices.

Regarding economic discourse, Michel Callon thinks it is important to go beyond the distinction between the disciplinary, scientific, academic economic theory, and the spontaneous economic theory by practitioners. To capture that, we introduced, when analyzing price control practice in France between 1936 and 1986, the expression « spontaneous (economic) theory » (Dumez & Jeunemaître, 1989). The academic official theory condemns price control as an infringement of the free market mechanism. The price controllers, some pure practitioners, other (like Taussig or J. K. Galbraith) trained in academic economics, invented a sort of spontaneous theory of the practice (« spontaneous philosophy » is an expression by Gramsci, taken over by Althusser, 1967). When dealing with the performativity of economics, Michel Callon (2006) speaks of « economics at large », which means academic economic theory as economic “theory” made by practitioners, or spontaneous economic theory. « Economics at large » is a domain that avoids the traditional distinctions between pure and applied, positive and normative economics, and subsumes the various types of economic discourse.

What Michel Callon has in mind when forging such a large and undetermined domain, is to show that performativity relies on the creativity (models, algorithms, spontaneous economic reasoning) of the agents – of all types of agents, practitioners as well as academics. In that perspective, experimental economics appears as one of

the most important development of recent years. During the initial period, experimental economics was not very creative: the aim was to « test » models, to see whether or not they matched agents' real behaviors. As economists are poor Popperians, and behave themselves rather as scientists in Thomas Kuhn's description, *i.e.* they are not very interested in falsifying their theories, experimental economics was for them mostly a matter of indifference. Things changed when experimental economics no longer limited itself to testing models, but sought to invent new forms of markets. Michel Callon believes that, through the experimental approach, economics is enlarging the gap between itself and other social sciences: « *L'expérimentation à la fois comme creuset où s'élabore la théorie et comme cadre qui permet à cette théorie d'avoir des effets, est devenue selon moi un enjeu majeur* » [« experimentation is at the same time the crucible in which theory is elaborated, and the framework allowing this theory to have effects; today, experimentation has become a major challenge »] (Callon, 2006, pp. 26-27). Fabian Muniesa and Michel Callon speak of « experimental performance ».

Performativity can be thus rooted in theory or practice. In this process, argues Michel Callon, devices are essential. In an interview, Michel Callon (2008) explains that, since *The laws of the markets* (1998), he may have changed his mind on performativity, which became performance or copformance, but not regarding devices. These are the central, invariant, elements of the approach (Callon, Milo & Muniesa, 2007; MacKenzie, Muniesa & Siu, 2007). There is a paradox here. Strictly speaking, performativity designates a discourse that is at the same time an act that changes the world. The change in the world coincides with the uttering. The first historical statement of performativity, the one by Varro in his *De lingua latina*, is clear-cut: « *Spondere est dicere spondeo* » (« To promise is to say: I promise »). In Michel Callon's perspective, the performativity or performance of economics definitely does not work in that way. Economics performs the real world if and only if socio-technical devices exist that make the performance possible. If devices are few and limited, the performance of economics is rare and limited (Callon, 2006, p. 26). Theory becomes true if devices let it become true. In the perspective of the Actor Network Theory (ANT), devices as non-human actors act, and in a sense even act more truly, than human actors. Michel Callon underlines two additional points. Upstream, devices are rooted in algorithms. These algorithms may be anchored in academic theory, and be presented and discussed in economic journals, or in practice and spontaneous theory. Upstream again, in order for economic devices to work, goods must have been created as abstract or concrete objects that are both valuable and exchangeable. Downstream, Michel Callon insists on the calculative skills with which the agents must be equipped. But the analytical core of the approach is the device itself. A simple algorithm, the creation of valuable goods, the agents' calculative equipment not by themselves sufficient to make economics performative. For instance, the agents' calculative equipment is created by the devices, and not the other way around, even if there is always at the same time framing and overflowing (which makes the difference with institutionalism). Since Michel Callon refers to Michel Foucault when speaking of devices and performativity, it might be useful to turn to the latter to understand what devices are in the former's perspective.

Michel Foucault and the « dispositif » (device, or apparatus)

Michel Foucault uses the French word « dispositif », which is translated as « apparatus » (Agamben) or device (Callon), and sometimes let in French as English translations are not completely satisfying. Actually, the word « dispositif » comes

from very far away in the past. Agamben (2009) has tried to draw its genealogical tree. In French, « *dispositif* » originally means the final part of a sentence, where reasons of the decision reached by the judge are explained in an ordered way. Then it means the way a general intentionally disposes his forces to get the maximum defensive or offensive impact. But Foucault takes the word from his master in philosophy, Jean Hyppolite. Hyppolite wrote on the young Hegel's *Die Positivität der Christlichen Religion*, where Hegel drew a distinction between natural religion, a direct contact with divinity, and the positive religions made of prescriptions, discourses and rituals that constrain religious behaviors. In this context, « *dispositif* » comes from the Latin *dispositio*, which translates the Greek *oekonomia* in a religious sense. The word has been used, especially by Ireneas of Lyon, to mean the way God intentionally organizes the salvation of humanity – what is called the economy of salvation (Fantino, 1994).

As for Foucault, the crucial reference in this connection is an interview he gave to the psychoanalytic French journal *Ornicar* in 1977:

[By « *dispositif* », I mean:] firstly, a thoroughly heterogeneous ensemble consisting of discourses, institutions, architectural forms, regulatory decisions, laws, administrative measures, scientific statements, philosophical and moral propositions – in short, the said as much as the unsaid. Such are the elements of that apparatus. The apparatus itself is the system of relations that can be established between these elements. Secondly, what I am trying to identify in this apparatus is precisely the nature of the connection that can exist between these heterogeneous elements. Thus, a particular discourse can figure at one time as the program of an institution, and at another it can function as a means of justifying or masking a practice which itself remains silent, or as a secondary re-interpretation of this practice, opening out for it a new field of rationality. In short, between these elements, discursive or non-discursive, there is a sort of interplay of shifts of position and modifications of function, which can also vary very widely. Thirdly, I understand by the term 'apparatus' a sort of – shall we say – formation which has as its major function at a given historical moment that of responding to an urgent need. The apparatus thus has a dominant strategic function [...] there is a first moment, which is the prevalent influence of a strategic objective. Next, the apparatus as such is constructed and enabled to continue in existence insofar as it is the site of a double process. On the one hand, there is a process of functional over-determination [...] on the other hand, there is a perpetual process of strategic elaboration. (Foucault, 1980, pp. 194-195)

Why is this text interesting in our perspective? First, because it shows the direct connection between Michel Callon's and Michel Foucault's analysis of devices. A device (or apparatus, i.e. a « *dispositif* ») has a hybrid nature. It is made of discourses and non-discourses (« *du dit et du non dit* »). It is the relationships between these heterogeneous elements that really count, and they can be complex. A discourse can be the programme of an institution, or, on the contrary, be disconnected from practices and conceal them (the practices being themselves silent, « *muettes* »). But it can also be an *a posteriori* interpretation of practices that developed ahead of it. One can see in Michel Callon's work the same complex relationships affecting discourses and non-discourses, the idea that devices structure behaviors and therefore act, the notion that devices are made of knowledge and, at the same time, produce knowledge.

The second reason for paying attention to Michel Foucault here is that one element present in his text seems to have (at least partially) disappeared in Michel Callon's

work, *i.e.* the particular dynamics of devices as structured in two phases. The creation of devices is marked by an « urgent need » (as Michel Foucault puts it). Then, during the second phase, new, unanticipated functions, strategies, and processes emerge and contribute to stabilize and entrench the device (if it does not rapidly disappear). So Michel Foucault's vision is an invitation to focus on two distinct moments: the appearance of the device, and its stabilization, a strategy that uncovers continuities and discontinuities.

Let us now analyze a case study to discuss Michel Foucault's and Michel Callon's ideas on performance and devices.

The case of the European Air Traffic Management

The selected case is an industry that, at its very beginning, was not conceived as a market and was kept off from the usual economic models and tools (profit, competition), and is now exposed in Europe to performance or performativity of economics: the Air Traffic Management (ATM), which consists mainly in Air Traffic Control, but also in flow management¹.

The control of the movements in the sky goes back to the Franco-Prussian war of 1870-1871, when balloons were used by both armies: Did states have the right to control the sky above their territory? The question became more topical at the time of the first airplane race in 1909. Blériot, the winner, flew across the English Channel, taking off

in France to land in the United Kingdom. An international conference was set up in Paris the following year, but no agreement was reached. Two principles of law oppose each other in this context. The first one is the sovereignty of nation states. Could a foreign plane be allowed to fly over Paris and land somewhere in France without the French State having been informed and having authorized it? The second one was formulated by Grotius in 1609 in his *Mare liberum*, and establishes that the seas – here, the skies – cannot be the property of a state and must remain free of access. The debate raged for thirty years until 1944, when the Chicago Convention was signed by more than fifty states. The Convention stipulates that a plane can freely fly over a country, provided it does not land, or lands to refuel without embarking or disembarking any passenger or good. But each country is entitled to define routes and to control the planes flying over its territory. Countries, however, are not allowed to set up a toll. With the development of jets, security became a major problem.

A propeller generally has enough time left to avoid collision with another propeller when both can see each other. But when a jet notices another jet, it is usually too late, and the collision is inevitable. It therefore becomes necessary to define routes and corridors, to create radar coverage in order to determine where each aircraft is located, to organize phone calls so that controllers can give instructions to the pilots. This costs a lot. At the beginning of the 1970s, it was admitted that the aircraft crossing the sky of a country must pay for the development of these technically sophisticated and heavy systems. It remained clear that this involved only cost recovery, and not a toll to give access to the sky, which remained free for all. In the which US, the air traffic management was provided by a public administration (the Federal Aviation Authority), and a tax collected on each ticket (and indicated as



*le Blériot XI
qui a traversé la Manche
le 25 juillet 1909*

1. For a more detailed presentation, see Beyer, 2008; Brooker, 2003; Button & McDougall, 2006; Dumez & Jeunemaître, 2001; 2010.

such on the ticket itself). In Europe, each aircraft pays route charges to every country it has crossed the sky. In the 1970s, the air carrier market was regulated, competition was limited, and profits were substantial. To pass the cost of air traffic management on to the passengers was not a big issue.

We have presented (very briefly) the case. It is striking that the ATM industry was maintained off the usual economic rules of competition and profit. Two questions then arise: can the ATM be analyzed as a device, and, if yes, in what sense? If it can be analyzed as a device, what is its performance of?

ATM both presents a unity and is heterogeneous. The unity comes from an intention or intentionality: making flight as free and secure as possible. The heterogeneity comes from an intertwining of rules (both legal and technical) and technical systems (radars, telecoms, screens of control, huge software that compute flight plans data and helps controllers in their task), *i.e.* from an intertwining of discourses and non-discourses. This complex heterogeneous system governs the behavior of pilots, air carriers, controllers, and states. It relies on legal and technical knowledge and know-how, and it produces knowledge, as any control system does. Insofar as it encompasses algorithms, there are good reasons for considering it as a device in Foucault's and Callon's sense. This applies, for instance, to the determination of the en-route charges aimed at recovering costs. The algorithm takes into account the distance flown in the sky of the country crossed over, the square root of take-off weight of the aircraft, and a service unit defined by each country on the basis of the costs of the national ATM system and of the number of controlled flights per year. Another algorithm manages the disequilibria between the flight plans asked for by the air carriers and the capacity of control in real time.

If the answer to the first question is that there are indeed good reasons to see the ATM as a device in Foucault's and Callon's sense, then we can turn to the second one: what is this device the performance of? Analysis tends to indicate it is the performance of law with the help of engineering. Law, a subtle and complex combination aimed at managing liberty of flight and national sovereignty simultaneously, thus relied on engineering to establish the device.

Now comes a third question: what place was given to economics in that device? Economics was intentionally contained and its place reduced to a minimum. Profit was eliminated; the only implemented economic principle was that the en-route charges must be cost-related. But the cost-relation is weak: each country announces its costs and recovers them. There is no in-depth control of these costs. However, an attentive look demonstrates that economics is not completely absent. To a controller, any aircraft, whatever its type, is a point on a screen and must be handled so as to avoid potential collisions. The aircraft is controlled as long as it stays within a country's sky. Costs are related to control duration, and, as an approximation that is easier to calculate, to the distance flown in the national sky. In Europe, however, another factor is taken into account: the takeoff weight of the aircraft. While the task of control is exactly the same for both large and small airplanes, the former pay more, though only in relation to the square root of their weight. Big machines thus cross-subsidize small ones, but not too much. The algorithm organizes cross-subsidization. More generally, the device as a whole, supposed to perform law and engineering but not economics, entails nonetheless cross-subsidization. We will return to that crucial point. The answer to the third question is mixed. Economics was not present in the device when it was created, and then it penetrated it in a very limited way.

Things changed in the 1980s when air transportation was deregulated. Competition became fierce with the apparition of low cost companies. This had two main consequences: operational margins, which were comfortable until then, decreased dramatically and traffic exploded. As regards ATM, it appeared at the same time very costly (eroding the operational margins of the air carriers) and inefficient (delays grew, peaking in 1988-89). This raised the issue of performance. Economics was called for at two different levels: the transformation of the whole industry into a market, and the introduction of limited economic mechanisms. In the 1990s it was discussed to merge all the different national upper airspaces into one European unified upper airspace, and to organize auction procedures for the entire block or a few great partial blocks. This assumed that part of the airspace was transformed from an object of national sovereignty into a valuable, exchangeable, good. Competition was set up – not *in* the market, but *for* the market – through an auction mechanism between the different national service providers, individually or allied. Technically, specialists agreed that it would be possible to control the entire European upper airspace with four or five centers (in the current situation, each country has at least one center, large countries such as France, Germany or the United Kingdom have several). The creation of a market lay within the framework of a general development where the deregulation of air transportation and the privatization of airports and control towers had created real markets. How could the European ATM have lasted as a legal-technical device, like an isolated islet on an ocean of markets?

However, the insertion of the ATM in an economy of competition and profit stumbled against the sovereignty of nation states. In particular, states put military issues in the forefront to keep in place their national service providers of air traffic control. It was an excuse more than anything else, since the European military are aware that an efficient air defense is impossible in the framework of one single country: Paris is only two hundred kilometers off the boundary with Belgium. At a time of jet fighters and crusader missiles, the air defense of Paris takes place far away from French boundaries. That is why European Air Forces strongly cooperate within NATO. But of course, it is also true that they must be able to take over the national sky in case of a major crisis. This can be guaranteed, even if the upper airspace is normally managed on a European basis.

The crucial issue was not really there. Any transformation of the European ATM industry into a market would have deeply changed the multiple cross-subsidization mechanisms established by the legal-technical device. As said before large aircraft pay for smaller ones, and big international air carriers for regional companies. Regional companies could therefore disappear with the introduction of market mechanisms. Besides, the separation between upper and lower airspace emphasizes the fact that upper airspace is far less costly to control than the lower. In the upper airspace, aircraft remain at the same altitude. In contrast, when approaching the ground, they change altitude and direction. The control task is far more complex and costly. When upper and lower airspace are not separated, high-altitude flights pay for flights that leave or approach airports. US companies that fly over Europe pay for European carriers that use airports in the continent. If, however, upper and lower airspaces were separated, US companies would end up paying less, and European ones more. The development of a market would make visible the existing hidden cross-subsidization; thus, European air carriers, which would be inclined to favor the development of a more efficient market, actually block it.

At the same time, the legal-technical device has shown a true capacity of innovation. When delays reached a maximum, an organization, the Central Flow Management Unit, was set up to manage in real time the disequilibria between the demand from the air carriers and the capacities offered by the European service providers of air traffic control. The disequilibria could have been interpreted as a classic economic issue, as an imbalance between supply and demand to be dealt with by such economic tools as congestion pricing. The economic approach was discussed, but not adopted. Rather, a management algorithm was chosen, which follows the principle of *first-come, first-served*. It processes flight plans one after the other and, if demand exceeds supply (the capacity of control), it stops aircraft on the ground. Before the implementation of that algorithm, aircraft took off and were delayed in flight. This costed a lot in fuel. The new device has therefore positive economic consequences. Nevertheless, it is not a performation of theoretical economic ideas or of a spontaneous economic reasoning, but rather an engineering device with a law principle: treat every aircraft, which means every company, big or small, on an equal footing. In the same perspective, the European Commission, with its plan for the industry (The Single European Sky), created another legal-technical device, the Functional Airspace Blocks. It is inspired by the idea that considerable technical efficiency gains could come from organizing control according to airspace blocks larger than the national airspaces. The FABs were created by a European rule (law) with a technical basis (they must be « functional »); they therefore constitute a legal-technical device. The economic dimension was left backstage.

At the very beginning, FABs were seen as concerning only upper airspace. But the upper/lower separation was later abandoned to avoid cross-subsidization. Another example is given by en-route charges. They remain collected by the states for the flown distance in their own sky. Let us suppose France and Switzerland decide to establish a FAB, putting together part of their airspace. If the aim is a better functional performance, routes will probably be modified, and become more rational than the previous ones, which took into account the boundary between France and Switzerland (the new route will be shorter in the French sky, for example, and longer in the Swiss sky). But every change of a route will create a loss for one of the countries, and a mechanical gain for the other (here a loss for France and a gain for Switzerland). Technical restructuring is therefore impeded by its economic consequences.

In conclusion, performation by economics failed to replace performation by law, with the helping hand of engineering to shape the device. This failure operates at the general level of attempting to transform the industry into a market. Economic elements were nonetheless introduced into the legal-technical device. Some public service providers have been transformed into economic agents through privatization. In the United Kingdom, for example, a licence has been given for thirty years to an alliance of airline companies led by British Airways through an auction mechanism. The framework nonetheless remains the entire national sky, not separated into an upper and a lower airspace. Economic agents have been set up, but without the creation of a European market device. Economics stepped in with the proposal for substitutes for market mechanisms, something on which academic economists have been working since the 1980s. Such mechanisms mainly consist in regulatory policies. The European Commission imposed on each country a separation between regulation and service provision, and established a regulator. As a result, for many countries, the process included the creation of a privatized economic agent at the level of service provision, and of an independent economic regulator at the public administration level, without, however, leading to the creation of a market. At the

same time, a « sunshine » regulatory authority, the Performance Review Commission, was set up at the European level, disposing of no real power except the one to publish reports on performance issues (McCraw, 1984). Thus, some economic elements were incorporated into a legal-technical device.

Discussion

Obviously, it would be risky to generalize from this case, and simplistic to think the case could falsify or refute the performativity approach to economics. Interpretation is far more complex. We will therefore insist on further potential research paths.

1. In Michel Callon's approach to performance or performativity, two apparently contradictory tendencies seem to coexist. On the one hand, Michel Callon states that, like other social sciences, economics is performative (see the debate in Callon, 2006). On the other hand, when analyzing performativity, Michel Callon focuses on economics in a particular manner, and, as we discussed above, emphasizes some particular features, such as the current trend in experimentation. Our case suggests that the two positions are not really contradictory. One could think that two social sciences such as law and economics have a particular status in terms of performativity (the idea that law is different from other social sciences has been developed by Günther Teubner from the perspective of autopoiesis; see for example Teubner, 1987). Our case suggests that the particular status of law and economics derives from the fact that both can at the same time define great principles (liberty, equality and due process for law, performance for economics), and mobilize techniques to set up devices which will operate the performative process. Law and economics sometimes compete with each other, and that brings about situations in which one dominates over the other, and in which the dominated formulates strong critiques vis-à-vis the dominant. In our case, law dominates, and economics tries to step in from the performance perspective. If our analysis is right, the opposite situation might also be found. The question remains open of whether other social sciences could compete with law and economics in defining great principles to evaluate empirical situations and mobilizing techniques to set up devices.
2. When analyzing the competitive process of performativity, it seems interesting to pursue Foucault's dynamic approach, which separates moments of urgency, especially during the creation of devices, from periods of routine. When the ATM device was established, the object of urgency was not performance, but the litigation between national sovereignty and liberty of flight. A legal-technical device was adopted instead of an economic one. Only long after that, the performance issue surfaced, in a situation characterized by a legal-technical performance. The change towards an economization of the industry ran against three main elements. First, inertia or path-dependence. Williamson (1999) has highlighted that establishing a market in a different institutional frame must be analyzed with the "remediableness" criterion in mind. Indeed, it is always difficult to compare an existing institutional framework, with its positive and negative, but long-operating elements, with an ideal alternative. *Status quo* is not an option like others, since there is a premium on existing devices (Beach, 1990). The second element that opposes the movement against economization is the legal-technical device's capacity to innovate. As seen above, the device was able to invent non economic algorithms to manage the discrepancy between supply and demand of air traffic control or to establish a

legal-technical as complex object as the FABs. Third, the existence of cross-subsidization. Agents that seemed to favor the industry's economization, e.g. air carriers, turned out in the end to be very conservative, and sought to maintain the legal-technical device to preserve the hidden financial flows of cross-subsidization. There thus seems to be « moments of performance », and these moments could be of different kinds.

3. The case highlights the difficulty of identifying mechanisms through which a law-technical device could give way to an economic device. In examining the performance of economics, Michel Callon has identified three elements: algorithms, devices that provide agents with calculative equipment, and valuable, exchangeable goods. For these elements to function in our case, public administrations would have to become calculative agencies, the national airspace, which is an object of sovereignty, would have to be considered a valuable good, and market devices and algorithms would have to be established. But is it possible to set up all of this at the same time, and thus at once replace a legal-technical device that evolved progressively over a century? Which mechanisms could enable such a transformation, i.e. an economic performance of the industry? The most favored one has been privatization. A market was supposed to emerge if agents were to transform themselves into calculative agencies. In 1998, privatized service providers established a trade association, CANSO to promote economic behavior. As we explained, however, two obstacles hindered the development of a market: the existence of a competitor device, and the fact that the airspace did not become a valuable good. In Michel Callon's view, the device is the crucial factor. Devices act, more than individual agents do. But who are the agents that push and orient the creation of a device, and with what purpose? We here turn again to Foucault: devices are established at particular moments marked by a sense of urgency, and with an intent linked to this urgency. The initial aim can disappear and be replaced by another, as well as by multiple functions that make the device last. But are there other types of mechanisms to create devices? This question seems to remain open.

References

- Agamben Giorgio (2009) *'What is an apparatus?' and other essays*, Stanford, Stanford University Press.
- Althusser Louis (1967) *Philosophie et philosophie spontanée des savants*, Paris, Maspéro. [(1990) *Philosophy & the Spontaneous Philosophy of the Scientists, and other essays*, Gregory Elliot (ed), London, Verso.]
- Beach Lee Roy (1990) *Image theory : decision making in personal and organizational contexts*, Chichester/New York, John Wiley.
- Beyer Antoine (2008) "Les frontières du 'Ciel unique européen'. Enjeux techniques et territoriaux du contrôle aérien en Europe", *Flux*, n° 71, janvier-mars, pp. 8-23.
- Braudel Fernand (1979) *Civilisation matérielle, économie et capitalisme. XV^e-XVIII^e siècles*. 3 vol, Paris, Armand Colin. [1992, *Civilization and Capitalism. 15th-18th*, Berkeley (LA) London, University of California Press.]
- Brooker Peter (2003) "Single Sky and Free Market", *Institute of Economic Affairs Review*, June, pp. 45-51.
- Button Kenneth & McDougall Glen (2006) "Institutional and structure changes in air navigation service-providing organizations", *Journal of Air Transport Management*, vol. 12, pp. 236-252.

- Callon Michel [ed.] (1998) *The Laws of Markets*. Oxford, The Sociological Review/Basil Blackwell.
- Callon Michel (2006) “La performativité de l’économie”, *Le Libellio d’Aegis*, n° 3, pp. 21-28.
- Callon, Michel, Millo Yuval & Muniesa Fabian [Eds.] (2007) *Market devices*, Oxford, Blackwell.
- Callon Michel (2008) “Elaborating the notion of performativity”, *Le Libellio d’Aegis*, vol. 5, n° 1, pp. 18-29.
- Dumez Hervé (1985) *L’économiste, la Science et le Pouvoir. Le cas Walras*, Paris, PUF.
- Dumez Hervé (2009) “Qu’est-ce qu’un dispositif ? Agamben, Foucault et Irénée de Lyon dans leurs rapports avec la gestion”, *Le Libellio d’Aegis*, vol. 5, n° 3, automne, pp. 34-39.
- Dumez Hervé & Jeunemaître Alain (1989) *Diriger l’économie : l’État et les prix en France 1936-1986*, Préface de Jean Denizet, Paris, l’Harmattan collection “Logiques économiques”.
- Dumez Hervé & Jeunemaître Alain (2001) “Improving Air Traffic Services in Europe. The Economic Regulation Perspective” in Henry Claude, Jeunemaître Alain, & Matheu Michel, *Regulation of Network Utilities: The European Experience*, Oxford, Oxford University Press, pp. 290-311.
- Dumez Hervé & Jeunemaître Alain (2010) “The management of organizational boundaries. A case study”, *M@n@gement*, vol. 13, n° 3, pp. 151-171.
- Fantino Jacques (1994) *La théologie d’Irénée. Lecture des Écritures en réponse à l’exégèse gnostique*, Paris, Éditions du Cerf.
- Foucault Michel (1980) [edited by Gordon Colin] *Power/Knowledge: Selected Interviews and Other Writings, 1972-1977*, New York, Harvester Press.
- McCraw Thomas K. (1984) *Prophets of Regulation*, Cambridge (Mass), Harvard University Press.
- MacKenzie Donald, Muniesa Fabian & Siu Lucia (2007) *Do Economists Make Markets? On the Performativity of Economics*, Princeton, Princeton University Press.
- Muniesa Fabian & Callon Michel (2009) “La performativité des sciences économiques” in Steiner Philippe & Vatin François [ed.] (2009) *Traité de sociologie économique*, Paris, PUF Quadrige, pp. 303-338.
- Teubner Gunther [Ed.] (1987) *Autopoietic law. A new approach to law and society*, Berlin, de Gruyter.
- Williamson Oliver E. (1999) “Public and private bureaucracies: a transaction cost economics perspectives”, *The Journal of Law, Economics, and Organization*, vol. 15, n° 1, pp. 306-342 ■