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# Counterfactuals, superfactuals and the problematic relationship between business management and the past

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## Abstract

This article analyses counterfactuals and superfactuals as means to develop scenarios, by focusing on the relationship between the design of heuristic tools for decision-making and the analysis of an organization's past. It therefore addresses the questions whether and to what extent the *ex-post* analysis of the past can help us to understand the present and take *ex-ante* strategic decisions. The Fiat case is analysed, by focusing on how the Italian carmaker responded to expected changes in the structure of the Italian and EC car markets from 1970 onwards. A counterfactual will be explored to hypothesize what might have happened, had the Fiat management developed a superfactual on the basis of the company's evolutionary patterns each time a change in the output mix was planned. Finally, the article puts forward a simple scenario for Fiat's future.

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**Key words** • car industry • evolutionalism • intangible specialization • path dependence • structural repertoires

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## Introduction

Building upon recent research (Maielli 2005a; Maielli 2005b; Maielli 2006), this article focuses on an important implication of the epistemological link between scenarios and counterfactuals, namely the relationship between the design of heuristic tools for decision-making, such as scenarios, and the analysis of an organization's past.<sup>1</sup> In so doing, the article addresses the question of whether and to what extent the *ex-post* analysis of the past can help us to understand the present and take *ex-ante* strategic decisions. When it comes to analysing business scenarios, to project organizations into their past might be as important as projecting them into their future. In this sense, historical knowledge might be seen as part of business knowledge. Past, present and future would be seen as cycles of structuration, possibilities and constraints (Booth et al. 2008), but the analysis starts always from the present where we have better chances to see the connection between cycles or the lack of it.

Scenarios are tools widely utilized in business by individual organizations as well as industries and public institutions. They are used for strategic decision-making, technology selection and policy design and implementation. Also, scenarios can provide modal narratives designed to underline and break established behavioural paths and dominant logics within organizations. Thus, they can be seen as heuristic tools for decision-making as well as devices for individual and collective learning.<sup>2</sup> Obviously, these two facets of scenarios are related to each other. Nonetheless, this article deals mainly with how organizations develop heuristic tools for strategic decision-making.

As strategic tools, scenarios consist of two elements: an organization in a specific context at a specific point in time ( $t^0$ ) and an expected context at a subsequent point in time ( $t^1$ ). Scenarios are likely to change dynamically according to changes in the variables shaping the organization and its context both in  $t^0$  and  $t^1$ . Thus, scenarios are designed around two elements: a case study, namely the organization and its context in  $t^0$ , and a counterfactual-type narrative addressing the question of what will happen if one or more variables change in  $t^0$  and/or  $t^1$ .

Indeed, the set of variables shaping an organization in any given point of time is itself the outcome of past processes. The article analyses the circumstances under which an organization's evolution from  $t^{-1}$  to  $t^0$  would contain the seeds of its evolution in  $t^1$  and whether the analysis of evolutionary patterns would help the organization to construct effective scenarios. The article supports the idea that history is a hidden agent in business decision-making, as the evolutionary process of routines accumulation affects the way organizations collectively develop knowledge, perceive present, past and future and design tools for decision-making (Maielli 2006). Within this framework it is important to understand under which circumstances and within which boundaries it would be possible to suggest that the *ex-post* analysis of the past might facilitate the taking of *ex-ante* decisions (i.e. designing strategies for the future). In this sense the general idea that history matters is rejected as simplistic.

Building upon concepts such as routines (Nelson and Winter 1982), intangible specialization (Maielli 2005b) and structural repertoires (Clark 2000), the article develops an analytical framework based upon three main conceptual distinctions. The first is the distinction between the historical consciousnesses of evolutionary outcomes and company memory, where the former refers to an organization's consciousness of how events affect the reproduction and accumulation of knowledge while the latter refers to the activity of monitoring and recording events for day-to-day operational purposes. The second is the distinction between 'time evolution' and 'time revolution', where the latter definition refers to a situation when evolutionary links in the process of knowledge reproduction and accumulation are broken or made obsolete by unpredicted events. The third distinction is between a positive and negative heuristic for decision-making, where the former refers to an organization's ability to either choose or reject strategies, while the latter refers to a firm's ability to exclude strategies, as knowledge available to managers would only enable them to define what would not be possible to do.

The article suggests that a firm's consciousness of evolutionary outcomes would enhance the strategic awareness of the organization. Two sets of possibilities are identified.

If the time flow were evolutionary a firm's consciousness of evolutionary outcomes would enable the organization to identify how to use its competence to develop new products and services and how to identify the direction in which routines and technical knowledge should evolve in order to ensure that the products/services mix will meet the requirements of the future environment. Also, the firm aware of its evolutionary paths would be able to identify the limits that the routines underpinning knowledge accumulation and patterns of intangible specialization (Maielli 2005b) would place on strategy. Thus, the organization will be able to devise both a positive and a negative heuristic for decision-making. The positive heuristic would help identify what to do on the basis of internal strengths and external opportunities. The negative heuristic would help to decide what not to do on the basis of internal weaknesses/constraints and external threats. Such a negative heuristic would be the basis for an analysis of the requirements to break organizational and strategic paths and implement systemic changes in the long run.

On the other hand, if the time flow were revolutionary (i.e. the environment is changing or expected to change in an unpredictable way), the consciousness of evolutionary paths would still affect an organization's strategic ability but in a different and more limited way. It would help the firm to define the constraints that its own patterns of intangible specialization place on strategic decision-making. Given the uncertainty of the environment, the organization would not know which strategy or output mix would be the most appropriate but it would know which product it will not be able to produce efficiently given its pattern of specialization and incumbent structural repertoire. In this sense a firm's consciousness of evolutionary outcomes would help it to identify what would not be possible to do in the changing scenario but would not help it to recognize the direction in which to change its pattern of intangible specialization. In time revolution, a firm's evolutionary consciousness of evolutionary patterns would help it to develop a negative heuristic towards defining what would not be possible to do in the short or medium run.

Thus, according to the nature of the time flow, a firm's historical consciousness of evolutionary outcomes would help managers to structure cycles of possibilities and/or constraints. The article qualifies counterfactuals as the heuristic tools designed to structure cycles of possibilities within a scenario characterized by an evolutionary time flow, and superfactuals as the heuristic tools to structure cycles of constraints in scenarios characterized by either an evolutionary or a revolutionary time flow.<sup>3</sup> While counterfactuals address the question of what would happen if some variables changed, superfactuals focus on the constraining factors preventing the counterfactual from unfolding (Clark 2006).

In this article, the above-mentioned theoretical framework has been applied to the case of Fiat.<sup>4</sup> In particular, the article analyses how Fiat predicted changes in the structure of the Italian and EC car markets from 1970 onwards and how it responded to the expected changes in demand patterns. A counterfactual will be developed to suggest what might have happened, had the Fiat management taken into consideration the company's evolutionary patterns each time a change in output mix was planned. In doing so, the article explores the *ex-ante* decisions the management might have

taken on the basis of the *ex-post* analysis of the company's past. Finally, the article puts forward a simple scenario for the early 2010s.

The article consists of six sections plus introduction and conclusion. The first one deals with the epistemological difference between business and historical knowledge and how such a difference reflects on the use of case studies in the two disciplines. The concept of *historical consciousness of evolutionary outcomes* is analysed and a distinction is made between business history and 'history undercover'. The second section deals with the distinction between a company's memory and a company's consciousness of evolutionary outcomes. The distinction is made between positive and negative heuristics for decision-making. The third section deals with counterfactuals, superfactuals and scenarios, focusing on the underpinning epistemology of those heuristics and their relationship with the historical consciousness of evolutionary outcomes. The fourth section provides an overview of the Fiat case while the fifth section analyses intangible specialization at Fiat. The sixth section constructs a series of counterfactuals and superfactuals that might represent the basis of a better understanding of the Fiat past, present and future.

### **Business history, business knowledge and historical consciousness of evolutionary outcomes**

One of the contributions of business history to business knowledge consists of the development of relevant case studies based on historical research. This might be seen as a part of the Harvard Business School (HBS) legacy, where business history features prominently in the HBS curriculum, and the case study methodology features prominently in the HBS teaching and learning strategy. Needless to say, Chandler's business history research agenda has indeed been influential in shaping the HBS curriculum.

Chandler (1977, 1990) extrapolates the fundamental element of effective industrial capitalism from the analysis of the USA's big corporations and identifies the separation between ownership and control as the historically qualifying characteristic of 'contemporary capitalism', which distinguishes the industrial economy in the late 19th and 20th century from that of the late 18th and early 19th centuries. In this sense, the emergence of managerial firms is the historical phenomenon of the emergence of a new form of organization, inherently superior to previous organizational modes. By considering the rise of managerial hierarchies as a historical watershed in the history of the industrial economy and, at the same time, as an explanatory variable for business effectiveness, Chandler implicitly tries to equate historical knowledge with actionable knowledge for strategic management. Consequently, Chandler extrapolates the epistemic framework for strategic management from the historical analysis of contemporary American big business.

While Chandler's paradigm received mixed responses from scholars in business history and business management, economists such as Williamson (1975) and, more recently, Baumol (2002) developed frameworks that provided Chandler's ideas with theoretical robustness while explaining the evolution of industry structures and mechanisms

of technology-driven growth. According to Chandler, the progressive separation between ownership and control was caused by the increasing complexity of vertically integrated structures resulting from the three-pronged investments in minimum efficient size plants, distribution networks and managerial hierarchies. Vertical integration would facilitate the coordination of information and material flows. More importantly, managerial structure would enable organizations to accumulate the organizational and technical knowledge on which firms would base their strategic awareness. Knowledge accumulation would ensure, according to Chandler, long-term company survival.

Essentially, Chandler assumes that vertical integration would reduce transaction costs. However, while asset specificity and information asymmetry might well explain why a specific organization in a specific context developed as a vertically integrated structure, there is little theoretical ground or empirical evidence to suggest that vertical integration is the only way an organization could deal effectively with transaction costs in the contemporary era. All the critics of Chandler, from Sabel and Piore (1984) to Hannah (1994), Lamoreaux, Raff and Temin (2003) and Zeitlin (2003) suggest that organizational forms are subject to the influence of economic as well as social and institutional factors that are, *per se*, the outcome of ongoing historical transformation. The role of historians, then, would be to identify the socio-economic conditions affecting organizational forms and boundaries as opposed to identifying the best organizational form that facilitates modern economic growth (Lamoreaux, Raff and Temin 2003).

Clark has shown that the various social, institutional, economic and cultural elements affecting organizational forms tend to be configured as recursive repertoires that organizations and societies operate in response to future expectations (Clark 2000, 67). Structural repertoires configure the temporal dimension of organizational space, hence affecting strategic time reckoning. Therefore, Chandler overlooks the impact of 'timed space', as defined by the historical development of socio-economic conditions and institutions, on organizational forms. Thus, Chandler omitted to recognize that any organization, including business organizations, is *per se* a form of 'timed space' in which actors respond to stimuli and constraints that are time-specific but also space-specific. This is particularly evident in the way Chandler assessed the British case (Chandler 1990), without recognizing the rationality of British firms as organizations responsive to a context different from the American one. Paradoxically, by not recognizing firms as forms of 'timed space' the father of business history actually ended up denying history.

The above criticism of Chandler poses two questions. Firstly, if timed space constrains agency to the extent that optimal organizational forms are context-specific, to what extent can the knowledge acquired by the investigation of a case study be transformed into actionable knowledge for decision-making? Secondly, to what extent would the analysis of an organization's past and present conditions help illuminate strategic decisions for the future? Both questions are relevant to scenario-making.

The first question is apparently easier to address. The knowledge acquired from a specific case study will be usefully applied to a different case as long as the two cases belong to the same context, or as long as we use cases as a sort of 'flight simulator', training students to operate a predetermined set of repertoires according to a predetermined set of

situations. Either way, history would not matter. If two cases share the same timed space, by definition, historical specificity would not be relevant. As well, if the flight-simulator approach were taken, neither historical accuracy nor data from real cases would be needed.

However, when the focus shifts from the academic to the real business context (or in other words from simulation to reality), it becomes conceivable that the ability of managers to understand their own company as a case study and to construct different scenarios by changing variables would, per se, be affected by the way the structure in which managers are embedded has been developing over time. This is particularly true when structures experience relatively long periods of managerial stability and evolutionary processes of change. Managers' consciousness of evolutionary processes would help them to understand their company as a case study and to analyse variables to construct scenarios. More importantly, historical consciousness of evolutionary paths would help managers to understand why they construct scenarios in the way they do. Arguably, in many instances business analysis is implicitly historical where history acts as an 'undercover agent', implicitly affecting strategic analysis and synthesis (Maielli 2006). This implies that an epistemological distinction is needed between History, as a discipline investigating historical processes of change from the past towards the present (or more recent past), and 'History Undercover', as a process of reproduction that might well affect choices regardless of whether decision-makers have historical consciousness of their own decisions being per se historical processes of reproduction. To investigate history undercover implies investigating the evolution of firms from the past to the present to address non-historical questions related to business strategy and operational decisions for the future. The investigation of history as an undercover actor of strategy revolves around the identification of evolutionary processes of accumulation of structural repertoires such as intangible specialization. This underlines the epistemological difference with the investigation of the past towards addressing historical questions. In the domain of the past and with hindsight, history is an explicit target of analysis regardless of whether evolutionary or revolutionary processes occurred. In both cases, historical analysis will provide positive knowledge, although this would be confined to the past and therefore would not be actionable. *Ex-ante*, history would be an organization's implicit feature, whose analysis would provide a positive heuristic for actionable knowledge as long as evolutionary processes and structural repertoires are in place. If revolutionary processes occur, on the other hand, historical analysis of evolutionary patterns could only provide actionable knowledge within the limits of a negative heuristic, which is the knowledge of how the incumbent repertoire limits innovative agency and a quick response to change. This will be further analysed in the next section.

### **Company memory and company history between a positive and a negative heuristic for decision-making**

The recognition of history undercover as a specific way to project the investigation of the past into the present and future raises two interesting points. Firstly, because

Chandler did not consider firms as timed space, he was not able to transform business history into history undercover, with the detrimental consequences that his paradigmatic view of US historical hegemony did not entirely convince historians, while his paradigmatic view of vertical integration and separation between ownership and control as superior forms of organization did not entirely convince economists and business analysts. Secondly, if history undercover matters, so that we could use historical analysis to address business issues, then the following question should be addressed: 'To what extent can the *ex-post* analysis of the past help formulate *ex-ante* strategies?'

Abrahamson (2000) underlines that a company's history matters to the company's agents, as it would help managers not to repeat mistakes. Nonetheless, Abrahamson does not distinguish between organizational memory and organizational history. In this article, memory is seen as recollection of a sequence of events without historical consciousness of evolutionary outcomes. For a company, the memory of a mistake would be useless without the in-depth knowledge of why that company made the mistake, which processes were affected and what happened or failed to happen in the aftermath of that mistake. In the same way, a company's memory of an effective move or change would be useless without the in-depth knowledge of the processes that led the organization to act in the way it did. A company's memory of any event would be useless without the history of the event. In this sense, it seems reasonable to say that the analysis of evolutionary technological and organizational outcomes is per se a process of transformation of a company's *memory* into a company's *history*. Such a transformation is per se a process of learning that, at the same time, is affected by the specific way individuals and organizations learn. Thus, at the core of any analysis of a company's historical consciousness of evolutionary change, there is the accumulation process of tangible assets as well as the accumulation process of intangible assets in the form of the specific knowledge necessary to maximize specific investments in capital and technologies. This would include, of course, the set of routines that each company develops over time. The formation of tangible capital is deeply correlated with that of intangible capital. The process of capital *production* affects that of knowledge *reproduction* and vice versa, as well as the pattern of decisions that will determine further capital accumulation in the future.

Thus, Abrahamson refers to company history while implicitly meaning company memory. Even so, he implicitly provides an interesting point of reflection for the investigation of the relationship between historical co-evolutionary analysis of organizational outcomes and strategic planning. Abrahamson's view implicitly suggests that what he calls History would provide firms with a useful negative heuristic for decision-making. This would underpin a manager's decision not to undertake a given strategic step, as it might resemble a mistake experienced previously by the organization in which the manager operates. But would history inspire positive decisions too? In order to address this question, a distinction should be made between evolutionary and revolutionary time flow.

Arguably, if the time flow is evolutionary (so that firms expect predictable changes in the environment) a firm's consciousness of evolutionary outcomes would



enable managers to analyse their company's strengths and weaknesses and to adapt the firm to the expected scenarios with relative threats and opportunities. Managers would then have a relatively clear idea about what the firms would be capable or incapable of doing. They will either be able to take positive decisions (to introduce new products, services and processes) or negative decisions (not to introduce new products, services or processes for which the firm does not have sufficient competence). Positive heuristics would focus on changes to implement while negative heuristics would then focus on structural constraints to agency. Both ways, the organization would operate effectively its repertoires for decision-making. Structural repertoires are pre-definite sets of recursive actions that organizations and individuals activate in response to expected changes or to maximize routine actions (Clark 2000, 67). Firms with historical consciousness of evolutionary outcomes would have an advantage over firms without such a consciousness in selecting the right action to take when it comes to operate or change existing repertoires.

If the time flow is revolutionary, so that firms cannot predict the environment's trajectory of change, then by definition firms will not know which repertoire to activate. Managers would know only which repertoires the firms could not possibly activate or which actions should not be taken. This heuristic would still give firms an advantage as compared with organizations without historical consciousness of evolutionary outcomes. The advantage would be limited to the ability to rule out actions that are not compatible with incumbent patterns of intangible specialization and other structural repertoires, while the firm would not be able to identify the course of action needed to meet the changing requirements of the uncertain environment. In other words, managers would know what are the internal strengths and weaknesses of the firm as outcomes of the firm's evolutionary process but would not know what are the external threats and opportunities emerging by the environment's revolution. Therefore, managers would know what not to do on the basis of the firm's weaknesses – which would discourage certain actions regardless of what the environment requires – but they would not know what to do on the basis of their strengths or whether their strengths would actually matter. More importantly, managers would not know in which direction to break established paths of routines and structural repertoires.

Having established the scope within which a firm's historical consciousness of evolutionary outcomes can be transformed into actionable knowledge, our attention has to turn to the heuristic tools enabling such a transformation. The next section of this article identifies counterfactuals as the modal narrative for positive decision-making scenarios, and superfactuals as the modal narrative for negative decision-making scenarios.

## **History undercover between counterfactuals and superfactuals**

The previous section revolved around the distinction between time evolution as opposed to time revolution, with reference to technological and organizational changes within organizations and to socio-economic changes outside organizations. In this respect, the evolutionary theory of economic change (Nelson and Winter 1982)

provides a framework to conceptualize the link between organization theory, history and sociological and economic theory. Such a link is at the core of the concept of national structural repertoires as theorized by Clark (2000). Evolutionalism helps to explain the recursiveness of structural repertoires and therefore provides the keys to unlock the essence of an organization as timed space.

The evolutionary approach emphasizes the tendency of firms to develop their technology and organizational routines through a series of incremental innovations, unless specific events, be they external or internal, force socio-economic actors to depart from their established technological and organizational path. A change in the established path, nonetheless, would force the organization to undertake a strategic voyage towards the unknown. Thus, most firms tend to specialize in a limited number of services or goods. Their innovative capability would be limited within specific markets.

Similarly, occupational blocks within organizations tend to preserve routines and technical knowledge as ways to protect their position or reinforce their weight within the organization. In this context, technological change would trigger discontinuity within the organization only if it caused a change in routines, hence in the process of reproduction of intangible capital. However, Penrosian learning, combined with the tendency of occupational blocks to preserve the routines underpinning their own process of knowledge reproduction, is likely to induce routine-driven path dependence.

Crucially, while the biological metaphor suggested by Nelson and Winter has been interpreted as representing the mechanism explaining change (the set of genes changes because of unpredictable modification within and without the organization) the concept of routine-driven path dependence implies an opposite interpretation of evolutionarism, where the accumulation of routines in the long run is more likely to induce inertia than change, so that routines reproduction induces routines recursiveness.

Structural repertoires can be considered as complex sets of routines whose recursiveness affects not only operations within firms, but institutional and social responses to changes outside productive units and business organizations (Clark 2000). Industry and market structures as well as consumers' behaviours are entangled with structural repertoires. Recursiveness of structural repertoires (as well as recursiveness of routines within structural repertoires) is the key determinant of whether the time flow is evolutionary or revolutionary. Therefore, it is the key determinant of a firm's timed space and strategic scope of manoeuvre.

If structural repertoires are stable and recursive reproduction of routines occurs (time evolution), a firm's consciousness of evolutionary patterns can enhance the ability of agents to understand possible evolutions of the process and product within a given set of repertoires. Here, a counterfactual narrative is seen as one of the possible devices to base the analysis of an organization's scope of manoeuvre in  $t^1$  upon the historical consciousness of an organization's evolution from  $t^{-1}$  to  $t^0$ . On the other hand, if the time flow is revolutionary so that some routines or occupational blocks collapse within the structural repertoire shaping the relationship between organizations and their context, an organization conscious of its own evolutionary outcomes will be able to see the constraints posed by the set of resisting routines, but will not be able to see

in which direction new routines should emerge. We contend that the superfactual narrative would be the tool best suited to capture such a negative heuristic.

Counterfactuals are forms of modal narrative used to define possibilities, opportunities and constraints by addressing the question of what would happen if one or more variable changed in a given and known scenario or, indeed, within a given and known organization (Booth et al. 2008; Clark 2006). Counterfactual logics can help the design of scenarios and define the hypothetical scope of manoeuvre that would result by changing variables and modifying internal strengths and weaknesses and external threats and opportunities. Product/service design and output-mix optimization would be facilitated by addressing the question of what would happen if one or more performance objectives changed within the organization and if one or more competitive factors were altered in the product. A firm's historical consciousness of evolutionary outcomes would help the firm to understand which variables could be changed within and outside the organization, given the routines of knowledge accumulation underpinning the structural repertoire in which the firm operates.

However, if time flow were revolutionary, with systemic changes in technology and in the pattern of consumption, organizations would find it more difficult to analyse opportunities and threats. The company would not know which of the routines should be changed in order to remain competitive within a rapidly changing and unpredictable environment. In such a case, a firm's historical consciousness of evolutionary outcomes would suggest to the company which routines would be difficult – or impossible – to change given the mode of knowledge accumulation and Penrosian learning embedded in the company repertoire of routines. The organization would not know in which direction to change routines but would know which routine could not effectively be changed, and therefore should not be changed. In this situation, rather than asking what would happen if one or more variable would change in the scenario, the organization would be interested in addressing the question of which variables within the organization could not be changed regardless of the changes ongoing in the environment. Thus, the scenario would then revolve around the question of what could not possibly happen even if the company tried to change a number of variables within the firm or even if a number of variables changed outside the organization.

This negative heuristic is captured by what Booth et al. (2008) defined as the superfactual. Instead of being concerned with questions of possibilities such as what would happen if one or more variable changed in a specific scenario, superfactuals are concerned with constraints, hence addressing the factors that would prevent the 'what if' from unfolding. An example of the use of superfactuals has been provided by Clark (2006). By analysing the European car industry during the 1960s, Clark analyses the factors that prevented Rover from making the transition from niche to mass production of luxury cars, something that Mercedes and BMW managed so successfully. On the basis of the analysis of Rover routines and British national structural repertoires, Clark falsifies the popular counterfactual proposition, according to which: 'had Rover not merged with British Leyland and focused on niche production instead, the company would have survived' (Clark 2006). He then developed the superfactual proposition according to which: 'even

if Rover had not merged with British Leyland and focused on niche production it would have suffered terminal failure'. Finally, based on the analysis of routines and internal repertoires at Rover, Clark reformulates a new counterfactual proposition according to which: 'if Rover sold its saloon manufacturing operations to British Leyland and focused on its 4WD products, particularly the innovative Range Rover, the company would have perhaps survived as an independent UK manufacturer'. This new counterfactual proposition is based on the fact that the internal routines for designing and manufacturing off-road vehicles were much more efficient than the routines for luxury saloon cars. With the Range Rover, the company was effectively a first mover in the market for sport utility vehicles that boomed in the US from the mid-1980s onwards. Of course, Clark's new counterfactual implies that the Rover management was actually able to forecast trends in the American market, which features completely different patterns of consumption and cultural repertoires as compared with the UK market. This seems to be quite a heroic assumption, which might explain why the new counterfactual did not unfold. However, Clark's superfactual analysis provides a good example of what we have defined as history undercover. The analysis of constraints as the outcome of an evolutionary process of structuration of repertoires of routines is implicitly historical. However, such an analysis is used to identify cycles of possibility and constraints in strategic decision-making.

### **Fiat: An overview**

This section of the article analyses output-mix optimization at Fiat between the 1960s and the 2000s. Fiat is the largest Italian industrial group, whose core business is car manufacturing. The company is well known for its success in designing, manufacturing and selling city cars although it produces a wide range of vehicles, as is typical of European generalist manufacturers. Nonetheless, Fiat's output mix is skewed towards the lower segments of the market. The subsequent sections of this paper show that the set of routines underpinning mass production at Fiat in the 1950s and 1960s affected the way the company reproduced technical skills, and the business ethos, towards the specialization of intangible assets in the design and manufacturing of small cars (Maielli 2005b). Fiat's intangible specialization in utilitarian cars was consistent with the pattern of consumption and the structure of the domestic market, where the intangible specialization of large corporations, along with market structure, defined the Italian structural repertoires for mass producers.

Fiat was established in 1898 but initiated large-scale production in the 1920s. Due to the limited size of the Italian market and stagnating per capita income, cost was by far the most critical performance issue. This affected the routines developed by the company and its overall technical and business culture. Both product and process design were geared to containing complexity and the cycle time. Material requirement planning was optimized by containing the weight of the cars (Maielli 2005b).

The techno-structure remained remarkably stable between the 1920s and the 1960s, when Fiat accumulated considerable skills in manufacturing small, light and

inexpensive cars. This enabled the company to exploit the domestic market after the Second World War. During the 1950s, the tiny Fiat 500 proved to be a competitive substitute for mopeds. Between 1955 and 1970, output increased threefold, while more than 70% of the output consisted of lower segment units (Fiat 1996, 121). This meant that the Italian market was substantially different from the domestic markets of the other EC countries. While the entry level product in the Volkswagen range was the Beetle, whose engine had a cubic capacity of 1200cc, the entry level product in the Fiat range was the Fiat 500, whose engine had a cubic capacity of 500cc.

Thus, increasing European integration after 1970 introduced an element of uncertainty in the market. The medium and upper segments of the market were expected to become the most important in size. The medium and upper segments were also expected to become the most lucrative as demand was becoming income-elastic rather than price-elastic. As the European market became increasingly important vis-a-vis domestic markets, it is important to investigate the reasons why Fiat is still today very much dependent on the lower end of the market. Actually, this question is even more relevant in the light of the division that has emerged during the last 30 years between German manufacturers, which dominate the medium and top end of the market, and Italian and French producers dominating the lower segments.

Crucially, in 1969 and 1989, Fiat undertook two attempts to adjust its output mix upmarket but both attempts failed (Maielli 2005b). After yet another restructuring process from 2004 onwards, Fiat was able to reverse the trend towards decreasing economic performance that had started in the mid-1990s and culminated in net losses between 2002 and 2004. The rescue was yet again due to the success of small cars such as the New Panda and the Grande Punto, competing respectively in the same segments as the Ford Ka and Ford Fiesta. However, while the company is trying for the third time to adjust its output mix upmarket, it is not yet clear whether this last attempt will succeed.

By applying the concept of intangible specialization (Maielli 2005b), the next section of the article explains why Fiat did not succeed in shifting upmarket in the 1970s and 1990s. Counterfactual and superfactual analysis will be used for the *ex-post* assessment of the Fiat strategy and to evaluate future scenarios.

## Intangible specialization at Fiat

Building upon evolutionary economics, intangible specialization tries to explain efficiency differentials in the design and manufacturing of different products made by the same organization (Maielli 2005b). This might affect the probability that a given differentiation strategy would succeed. The concept was applied to Fiat in order to explain why, between 1960 and 2000, Fiat's output mix remained skewed downmarket in spite of two attempts to adjust it upmarket. The analysis revolved around the specific process of accumulation of technical skills in product design during the 1950s and the 1960s, at the time when Fiat developed mass production processes. In that period, the interaction between the routines underpinning the selection of the organization's mission,

the routines underpinning process and product design, and the specific product and process requirements of each segment of the domestic market shaped the process of accumulation of design skills, and the reproduction of technical creativity and business ethos all oriented towards the reduction of complexity costs (Maielli 2005b, 261–6).

In particular, cost reduction inspired the pattern of routines used by Fiat to assess technical efficiency, which, in turn, inspired efficient design of small and relatively inexpensive cars. Since technical efficiency equalled cost reduction, the routines underpinning cost control triggered the reproduction of a set of conceptualizations that defined clever engineering, good management, and ultimately professional success within the Fiat structure. The process of reproduction of those concepts is central to intangible specialization because it inspired the development of technical solutions that made Fiat very competitive in the lower segments of the market, while engineers and managers tended to take strategic and operational decisions around the skills they had accumulated over time and which they were proud of. This made the Fiat techno-structure effective, or rather specialized, in the manufacturing of small cars. Since specialization was driven by the accumulation of intangibles (the blend of technical knowledge, routines and business ethos embedded in the techno-structure) rather than by the accumulation of tangible assets (specific tools or technologies) it has been defined as ‘intangible specialization’ (Maielli 2005b, 251–4).

Lifetime employment and managerial turnover based on internal careers made the techno-structure very stable, enabling the confirmation and the development of intangible specialization throughout the 1970s and 1980s. Because the routines underpinning intangible specialization were designed to minimize design complexity and production costs, they could hardly be suited to the design and manufacturing of medium-size and luxury cars. Although during the 1980s and 1990s, the company was committed to developing flexible production systems, its output mix remained skewed downmarket, because the intangible capital embedded in the techno-structure led product designers to excel in the design of small cars but not in that of medium and upper-range units. In other words, changes in the tangible capital at Fiat over the last 30 years failed to trigger a change in the process of intangible capital reproduction.

Crucially, Fiat’s process of intangible capital accumulation was driven by historically specific events, which affected the confirmation of the set of routines underpinning product design, particularly during the 1970s when the company had its first and, probably, best opportunity to shift upmarket. At that time, political and behavioural factors, including the distribution of power between production engineers and marketing managers, combined with market conditions and industrial relations, prevented the firm from acquiring new skills in the design and development of upmarket units. Most fundamentally, though, it was the business ethos constructed around cost-saving goals and the sense of pride deriving from the technical achievement of those goals that made sophisticated and expensive design unacceptable to the Fiat techno-structure (Maielli 2003, ch. 6–7; Maielli 2005b, 261–6).

Maielli (2005b) shows that between 1969 and 1989 Fiat had tried to break its own pattern of intangible specialization, although without much success. In 1967,

Gianni Agnelli Junior became Chairman of Fiat. He expected that the combined effect of intra-EC tariff removal and domestic market maturation would expose Fiat to the competition of German manufacturers in the medium and upper segments of the market, which were held to be the most lucrative segments in terms of per unit operating margin. Agnelli thought that a shift from a process-oriented to a market-oriented approach to manufacturing was needed in order to support the strategic adjustment of the output mix upmarket. Accordingly, he promoted Giammario Rossignolo from Head of Marketing to Head of Strategic Planning and Control. This was exceptional in Fiat history, as Rossignolo was an economist rather than an engineer and had developed his career at Fiat outside the design hierarchy.

In order to implement Agnelli's strategy, Rossignolo decided to take over Lancia, an Italian manufacturer with a solid reputation in the upper segments of the market, but which, by 1967, was almost bankrupt. Rossignolo's plan was to use the Lancia brand and technical specificity to establish the Fiat Group as a credible player in the upper segments of the market where the Fiat brand was also expected to increase its share thanks to aggressive product renewal. However, product and process engineers stressed that Fiat had to maximize synergy by fitting Lancia with Fiat engines if the company wanted to produce upmarket units in a cost-effective way. This implied reducing Lancia's brand identity to maximize technical synergy and economies of scale. The difference in strategic thinking between marketing and operations managers led to a compromise where the former were in charge of product renewal decisions and output-mix optimization strategies, while the latter were in charge of operational and product design decisions. Thus, engineers were eventually able to control product and process design towards cost containment. As a result, the Lancia brand content was diluted and Fiat proved unable to compete with BMW and Mercedes.

In the 1970s, Fiat lost substantial market share and, for a wide range of reasons, found itself on the verge of bankruptcy. Without analysing in full the crisis of the 1970s, it suffices to say that the restructuring of the company saw production managers regaining the control of both product renewal and output-mix optimization, as Rossignolo resigned in 1978. In 1979, the largest shares of resources were allocated to product renewal in the lower segments of the market. The success of small cars like the Fiat Uno contributed to the rescue of the company but also meant that in the 1980s the Fiat output mix shifted back downmarket, with 70% of the output consisting of small cars. Indeed, Fiat was profiting from the fact that the Italian market was growing much faster than any other market in Europe during the 1980s, as demographic and economic conditions pushed up new demand as opposed to replacement demand. Crucially, the restructuring of the late 1970s reinforced patterns of intangible specialization that were consistent with the neo-infant phase of the Italian market in the 1980s (Maielli 2005b, 258–9).

However, during the 1990s, further integration and maturation of the EU market meant that once again Fiat's output mix became a weakness in the company's outlook. Nevertheless the reinforced patterns of intangible specialization towards the manufacturing of small cars led to the failure of a second attempt to shift upmarket



in the 1990s. In fact, at that point, the design gap between small and large Fiat cars, and indeed the quality gap between Fiat and its competitors in the upper end of the market, had increased even further. As had been the case with the late 1960s, in 1988 Fiat took over Alfa Romeo, a company with the brand potential to compete with BMW. However, once again synergies prevailed over brand identity. Fiat engineers abandoned the Alfa Romeo technical configuration, featuring front engines and rear-wheel drive with the De Dion Bridge.<sup>5</sup> Crucially, just when Alfa Romeo shifted to front-wheel drive in the 1990s, BMW adopted the De Dion Bridge scheme, which was far more suitable for high performance cars. Therefore, it is reasonable to believe that many Alfa Romeo customers fled to BMW as a result of the change in technical layout in the two brands. During the 1990s, Fiat experienced a long period of stagnation, which culminated in the crisis of the early 2000s. For most observers, one of the reasons for the crisis was an output mix skewed far too downmarket.

The concept of intangible specialization provides a reasonable *ex-post* explanation of Fiat's failure to adjust its output mix upmarket during the 1970s and the 1990s. Interestingly, the Italian literature on Fiat overlooked the company's attempts to shift upmarket, particularly the one in 1969. Nevertheless, analysts always considered output-mix optimization and market positioning as areas of major concern for Fiat's prospects. Accordingly, many observers (Becchi Collidà and Negrelli 1986; Enrietti and Fornengo 1989; Mosconi and Valeo 1982; Volpato 1996) predicted that Fiat would – or suggested that Fiat should – adjust the output mix towards upmarket segments, by exploiting increased flexibility in design and manufacturing. These analysts implied the following counterfactual: 'had Fiat shifted upmarket the company outlook would have been better'. However, such a counterfactual did not survive rigorous historical analysis. Crucially, the two attempts to shift upmarket in 1969 and 1989 show that Fiat's intangible specialization did not prevent the management from recognizing changes in strategic time, nor did it impede managers from designing a new strategy that was expected to provide a better response to changes in the environment. However, Fiat's intangible specialization curtailed the company's ability to implement the strategy once it was designed. In this light, it is reasonable to suggest the following counterfactual: 'had Fiat possessed a historical consciousness of evolutionary outcomes, its managers would have recognized the implications of intangible specialization'. Both in 1969 and 1989, this would have left the company with a better idea of the actual strategic scope of manoeuvre as described by the following super-factual: 'even if the company shifts upmarket it will not succeed'.

Presumably, based on such a super-factual, Fiat strategy in the 1990s would have been completely different. Like PSA, Fiat would have tried to achieve the largest possible market shares in the lower segments of the market by profiting from intangible specialization rather than trying to change its structural repertoires in the short-medium run, leaving the shift upmarket as a long-term strategy. Crucially, on the basis of the historical analysis of evolutionary outcomes, no one within the Fiat structure could have predicted with absolute certainty whether Fiat was going to retain its leading position in the lower segment of the European market, as new competitors were emerging,



particularly those Japanese car manufacturers that had invested in new production capacity in Europe. Nonetheless, Fiat managers would have known with a much higher degree of certainty that the company was not going to catch up with the existing competitors in the medium and upper bands of the market, at least in the medium and short term. Thus, Fiat could not have known *ex-ante* whether sticking with small cars would have saved the company, but certainly, the historical consciousness of evolutionary outcome would have suggested that shifting upmarket was not a viable strategy at the time. This simplifies the kind of negative heuristic that would have been captured by the superfactual reasoning as described earlier.

However, neither the concept of intangible specialization nor counterfactuals as heuristic tools were at the disposal of Fiat managers in 1969 and 1989. Had been that the case, both the specialist literature on Fiat and Fiat strategists would have probably produced different strategic advice as well as different strategic actions. We might try, nevertheless, to use the concept of intangible specialization to illuminate the next strategic step.

### **The 2000s: Crisis, recovery and future outlook**

After years of low profitability and break-evens during the 1990s, Fiat entered a period of crisis at the beginning of the 2000s. The analysis of stagnation and crisis goes far beyond the scope of this paper. Here, it suffices to say that chronic overcapacity, poor product renewal strategies and a redundant and ineffective managerial structure were all important explanatory variables for the poor performance of the company. However, output-mix optimization has been regarded as a key element in the recent crisis as well as in the future perspective of the company (Maxwell 2007). After intensive restructuring and after dissolving an ill-designed and unsuccessful partnership with the American giant General Motors in 2005, the company has returned to profit (Maxwell 2007). In the context of this paper, two elements of the Fiat strategy are of interest. On the one hand, Fiat invested in the renewal of its range of small cars, regaining the leadership in Europe with models such as the New Panda and the Grande Punto. On the other hand, product renewal also focused on the Alfa Romeo range with the new 159 Saloon and Sportwagon, and the sports cars Brera, Spider and 156 Coupe. More interestingly, the new Fiat management has promoted knowledge transfer from Ferrari and Maserati.<sup>6</sup> Also, a number of managers were hired from Audi. It is relevant to point out that Ferrari is an independent company owned by the Agnelli family, with a techno-structure completely independent of Fiat. Also, Ferrari bought Maserati from Fiat in 1997 and restructured the company, which went on to regain its position in the same segment as Jaguar and Porsche. In 2006, Ferrari sold Maserati back to Fiat, which had originally bought the company from De Tommaso in 1988.

Thus, Fiat seems to be pursuing the following strategy: Ferrari will remain as an independent and very successful company in the niche market for dream cars; Maserati and Alfa Romeo will compete in the same segments as Mercedes and BMW, and Fiat will compete in the lower and medium segments of the market with Lancia as the premium brand. On the one hand, the strategy features a rational use of the various

brands and does not pose any particular risks in the lower end of the market or in the Ferrari niche. On the other hand, the success of Mercedes and BMW depends upon the fact that already in the 1960s, when Fiat refined its intangible specialization in the mass production of small cars, German companies managed to unlock the secret of combining large-scale manufacturing with high quality. It is relevant to remember that over the last few years the BMW 3 Series has outsold the Ford Mondeo in some European markets. This implied that in order to compete with BMW, a company like Alfa Romeo, currently producing about 100,000 units per year, should actually be able to produce 500,000 units per year. Considering intangible specialization at Fiat, Maserati and Ferrari, it seems that those companies embed the knowledge necessary either to mass-produce small cars, with a level of quality appropriate to the lower segments of the market, or niche cars produced in a limited number of state-of-the-art units. However, Fiat would have to be able to transfer the skills for both mass production and quality production to Alfa Romeo in order to produce 500,000 units per year at a level of quality and price that would be competitive with BMW. This appears particularly contentious, considering that Fiat's incentive to reinforce platform and engine sharing between Fiat and Alfa Romeo would increase with volume.

The current strategy is still based on a counterfactual type of argument according to which if the company were stronger in the upper end of the market, Fiat's outlook would be better. However, our historical analysis of intangible specialization patterns would suggest that even if Fiat achieves a stronger position in the upper end of the market, it could hardly achieve the same efficiency of Mercedes and BMW in terms of combining high volumes with high quality. Such a superfactual type of scenario would suggest an alternative strategy: Fiat could cash in from the sale of Maserati and Alfa Romeo to Mercedes or BMW (as long as the two Italian companies still have a brand appeal) and maximize intangible specialization in the lower end of the market with Fiat, and in the dream car niche with Ferrari. Only the future will tell whether Fiat's current strategy will be successful. At the moment we can see only that both Ferrari and Fiat (with the Grande Punto) are doing well. On the other hand, the performance of the Alfa Romeo 159, although promising, does not allow, as yet, the prediction that output will actually achieve the level of the German competitors.

## Conclusions

This article tries to show how the historical consciousness of evolutionary outcomes could help to identify structural repertoires, such as intangible specialization, which in turn might help managers and observers to develop scenarios based on counterfactual and superfactual narratives. The case of Fiat has been analysed to show how the analysis of historical outcomes of intangible specialization could explain the recursive failure of the Italian company to adjust its output mix upmarket. Two attempts to shift upmarket were based on the counterfactual type of argument that if Fiat had adjusted the output mix upmarket, the company outlook would have been better.

Historical analysis of evolutionary outcomes explains why Fiat failed twice to adjust output mix upmarket. Had Fiat management run an *ex-ante* analysis of evolutionary outcomes, managers would have recognized the implication of intangible specialization and developed the following superfactual: 'even if Fiat should attempt to shift upmarket, the outlook of the company will not improve'. Fiat would have probably avoided the attempt to shift upmarket. Would that have improved the company performance? Presumably, if all the resources were allocated to the maximization of intangible specialization towards enhancing the competitive advantage in the lower segment of the market, the company performance could only have been better as compared to the outcome of two unsuccessful attempts to shift upmarket. On this basis, the article contends that the current strategy of Fiat presents a high level of risk as it is still based on the counterfactual type of argument that the company would be better off if the output were more balanced toward the medium and higher segments of the market. The structural repertoires enabling German manufacturers to unlock the secrets of high-volume, high-quality production processes are still very different from the repertoires of a manufacturer such as Ferrari, which is specialized in low-volume, top-quality cars, and indeed very different from the intangible specialization of Fiat, revolving around the mass production of small cars. Of course, to criticize the current strategy of Fiat does not mean that the alternative strategy, which would entail the maximization of intangible specialization in the lower end of the market, will certainly lead to good performance in the long run. Historical consciousness of evolutionary outcomes might or might not help the devising of successful strategies, but certainly helps to restrict the strategic scope for manoeuvre, hence providing a negative heuristic. However, such a heuristic is not trivial.

## Notes

1. In their article Booth et al. (2008) distinguish between scenarios as modal narratives focusing on the future, and counterfactuals as modal narratives focusing on what might have been, had one or more variable changed in the historical process. This article, on the other hand, sees counterfactuals as part of scenarios of possibilities, thus structured as questions of what might be in the future if some variables change, rather than as questions of what will happen given a determined set of variables.
2. For an exhaustive taxonomy of scenario typologies see van Notten et al. (2003).
3. Clark (2006) uses the term 'superfactual' to refer to 'even if' type of propositions, which are used to underline the factors that would prevent 'what if' propositions from unfolding. However, the term superfactual was initially used in an unpublished paper (Clark et al. 2004) where the authors argued that superfactuals are analytical structured elucidations of 'even if' propositions, which are defined as semifactuals in philosophy.
4. Fiat is the largest Italian industrial group. Its core business, to which our case refers, is car manufacturing,
5. This is a scheme pioneered by De Dion Buoton, where gearbox, clutch and differential are separated from the front engine and fitted on the rear axle. The advantage is greater handling with rear-wheel drive cars.

6. In particular, Paolo Martinelli became Head of Power Train Engineering at Fiat at the end of 1996 after having directed the Engine Department at the Ferrari Formula 1 Team.

## References

- Abrahamson, E. 2000. Change without pain. *Harvard Business Review* July-August: 5–79.
- Baumol, W. 2002. *The free-market innovation machine: Analyzing the growth miracle of capitalism*. Princeton, NJ: Princeton University Press.
- Becchi Collidà, A., and S. Negrelli. 1986. *La transizione nell'industria e nelle relazioni industriali: l'auto ed il caso Fiat*. Milano: Franco Angeli.
- Booth, C., M. Rowlinson, P. Clark, A. Delahaye, and S. Procter. 2008. Scenarios and counterfactuals as modal narratives. *Futures* 40: forthcoming.
- Chandler, A.D. 1977. *The visible hand: The managerial revolution in American business*. Cambridge, MA: Harvard University Press.
- Chandler, A.D. 1990. *Scale and scope: The dynamics of industrial capitalism*, Cambridge, MA: Harvard University Press.
- Clark, P.A. 2000. *Organizations in action: Competition between contexts*, London: Routledge.
- Clark, P.A. 2003. *Organizational innovations*. London: SAGE.
- Clark, P.A. 2006. Superfactuals, structural repertoires and productive units: Explaining the evolution of the British auto industry. *Competition and Change* 10: 397–414.
- Clark, P., C. Booth, M. Rowlinson, S. Procter, and A. Delahaye, 2004. *Project hindsight: Exploring possibilities in cycles of structuration and co-evolution*. Paper presented at the seminar on Business History and its Value for Managers, Centre for Business Management, Queen Mary, University of London.
- Enrietti, A., and G. Fornengo. 1989. *Il Gruppo Fiat. Dall'inizio degli anni Ottanta alle prospettive del mercato unificato del 92*. Roma: La nuova Italia scientifica.
- Fiat, Dipartimento Relazioni Esterne. 1996. *Fiat: le fasi della crescita*. Torino: ISEDI.
- Hannah, L. 1994. Marshall's 'trees' and the global 'forest': Were giant redwoods different? In *Learning by doing in markets, firms and nations*, ed. N. Lamoreaux, D. Raff, and P. Temin, 253–293. Chicago, IL: University of Chicago Press.
- Lamoreaux, N., D. Raff, and P. Temin. 2003. Beyond markets and hierarchies: Toward a new synthesis of American business history. *American Historical Review* 108: 404–433.
- Maielli, G. 2003. Managerial culture and company survival: Technological change and output-mix optimization at Fiat 1960–1987. PhD Diss., The London School of Economics.
- Maielli, G. 2005a. Spot-welding technology and the development of robotics at Fiat, 1972–1987: A case of managerial discontinuity. *Business History* 47: 102–121.
- Maielli, G. 2005b. The machine that never changed: Intangible specialization and output-mix optimization at Fiat, 1960s–1990s. *Competition and Change* 9: 249–276.
- Maielli, G. 2006. History undercover: The problematic relationship between business management and the past. *Competition and Change* 10: 315–330.
- Maxwell, K. 2007. Fiat may run short of fuel. New model pipeline to go dry until 2009. Mini car mini profit? *Wall Street Journal* 30 April.
- Mosconi, A., and D. Valeo. 1982. *Crisi e ristrutturazione del settore automobilistico*. Bologna: Il Mulino.
- Nelson, R.R., and S.G. Winter. 1982. *An evolutionary theory of economic change*. Cambridge, MA: Harvard University Press.
- Van Notten, P.W.F., J. Rotmans, M.B.A. van Asselt, and D.S. Rothman. 2003. An update scenario typology. *Futures* 35: 423–443.
- Piore, M., and C.F. Sabel. 1984. *The second industrial divide*. New York: Basic Books.
- Volpato, G. 1996. *Il caso Fiat. Una strategia di riorganizzazione e di rilancio*. Torino: ISEDI.

- Whipp, R., and P. Clark. 1985. *Innovation and the auto industry: Product, process and work organization*. London: Pinter.
- Williamson, O. 1975. *Markets and hierarchies: Analysis and antitrust implications*. London: Free Press.
- Wilson, J. 2006. *British management in historical perspective*. Oxford: Oxford University Press.
- Zeitlin, J. 2003. Productive alternatives: Flexibility, governance and strategic choice in industrial history. In *Business history around the world*, ed. G. Jones, and F. Amatori, 63–82. Cambridge: Cambridge University Press.

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