How Do CEOs Make Strategy?

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Preliminary and incomplete: Do not cite or circulate

This version: October 15, 2019

Abstract: We survey 262 CEO alumni of Harvard Business School and gather evidence on three aspects of each executive's business strategy: how formalized it is, how it is developed, and how it is implemented. We report three main results. First, CEOs use a wide range of markedly different processes to make strategic decisions; some follow highly formalized, rigorous, and deliberate processes while others rely heavily on instinct and habit. Second, more structured strategy processes are associated with larger firm size and faster employment growth. Third, using a regression discontinuity centered around a change in the curriculum of the Harvard Business School's required strategy course, we show that differences in strategic decision making can be traced back at least partly to differences in managerial education.

Keywords: Strategy, management, productivity, CEO

JEL Classification: L2, M2, O32, O33.

Acknowledgements: Author names are in a randomized order. Financial support was provided by Harvard Business School. We would like to thank Michael Porter for helpful comments. We also thank seminar participants at Harvard Business School and the Empirical Management Conference for their comments and Tejas Ramdas for excellent research assistance.

Some of the results in this paper have been obtained while Yang was Special-Sworn Status Researcher at the Northwest Census Research Datacenter. Any opinions and conclusions expressed herein are those of the author(s) and do not necessarily represent the views of the U.S. Census Bureau. All results have been reviewed to ensure that no confidential information is disclosed

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1. Introduction

A fundamental premise across economics and management is that CEOs shape the outcomes of their companies through the strategic decisions they make (Andrews, 1971; Drucker, 1967; Porter, 1980; Tirole, 1988; Bertrand and Schoar, 2003). The strategy literature of the past four decades has revealed much about the consequences of particular strategic decisions and firm strategies, but prior research has produced remarkably little empirical evidence about how CEOs actually make those strategic decisions. While qualitative case studies and empirical work on small and selected samples of managers have captured how specific management teams made particular choices (e.g., Graebner and Eisenhardt, 2004; Mintzberg, 2008), to date large-sample empirical evidence on this topic is lacking.

Three main obstacles have limited empirical research on strategic decisions—and in particular, on the processes (or lack thereof) by which senior managers make strategic decisions. First, the top managers who usually make these decisions are rarely willing to complete in-depth surveys (Bandiera et al, 2019). Second, differences in how managers make strategic decisions are typically hard to capture systematically in large samples. While psychology research has shed significant light on individual decision-making, this laboratory-based research is ill-suited to examine the scale and complexity of strategic business decisions which often involve numerous individuals, require significant information loads, and can extend for months or even years. Furthermore, frameworks that would make data capture easier—such as a taxonomy of different strategy processes or an agreed-upon way to distinguish between "good" and "bad" ways to make strategic decisions—do not exist to our knowledge. Third, it is difficult to elicit truthful answers from top managers on how they really make decisions.

This paper addresses these challenges in a new, large-scale data collection effort that aims to measure, and explain differences in, the strategy practices of 262 CEOs of U.S. manufacturing firms. We overcome the first challenge—the reluctance of CEOs to complete surveys—by surveying alumni[1] of a business school, Harvard Business School (HBS), where three authors of the paper are based. We hoped that alumni would respond at a high rate to a survey invitation from

[1] We will use the word alumni to refer to both female and male graduates throughout the rest of the paper.

HBS faculty, and the hope turned out to be well-founded. While CEOs trained at HBS are by no means a representative sample of CEOs, evidence of heterogeneity in strategy practices within this highly selected set of managers would—if anything—represent a lower bound on the heterogeneity among the broader population of CEOs. We overcome the second challenge—the lack of a systematic way to classify differences in strategy processes—by creating a novel survey instrument that captures differences in the way managers develop, select, and implement new strategic ideas. Finally, we try to minimize biases on the part of both interviewees and interviewers by using open-ended survey questions rather than leading "yes/no" questions and by employing trained interviewers to double-blind score responses. This approach, modeled on the method of the World Management Survey (Bloom and Van Reenen; 2007; Bloom et al., 2019) helps us gather high-quality and comparable assessments of strategy practices across a wide variety of firms.

With this data, we ask three related questions. First, how do CEOs vary in terms of their approach to making strategic decisions? In particular, we envision chief executives as potentially on a spectrum when it comes to how they select, implement, and formalize strategy. On one end of the spectrum are CEOs who use highly structured "Strategy Practices" that promote consistent, proactive, and evidence-based decision making in the spirit of Simon (1947). These managers stand in contrast to executives who rely entirely on intuition ("gut driven") and simple heuristics (Davis, Eisenhardt, and Bingham, 2009; Eisenhardt and Sull, 2001), popularized by iconic CEOs like Steve Jobs. In other words, our first question is whether CEOs tend to be highly structured or gut-driven when it comes to making strategic decisions. Second, we investigate whether differences in Strategy Practices are correlated with firm performance. Third, we explore why managers adopt different approaches to Strategy Practices, focusing in particular on their exposure to different curricula while attending business school.

Our main findings map to our three questions. First, chief executives vary dramatically in terms of how structured they are as they make strategic decisions. Second, more structured strategy processes tend to arise in firms that are larger and faster growing. Third, we find evidence that management education appears to shape individuals' strategy processes, even decades after their training. In particular, executives who took the required HBS course in business strategy after it was restructured by Professor Michael Porter in the 1980s rely more heavily on information about

the external environment in their decision making than do CEOs who were educated at HBS earlier, but they also appear to be less systematic in the way their strategic decisions are implemented.

Our concept of Strategy Practices is distinct from two related concepts: "Management Practices" (Bloom and Van Reenen, 2007) and "Data-driven Decision-making" (Brynjolfsson, Hitt and Kim, 2011). On the one hand, Management Practices broadly capture practices to facilitate monitoring, target setting, and communication as well as incentives for employees. These practices are more about running operations efficiently than about the making and implementation of strategic decisions. On the other hand, Data-driven Decision-making captures "business practices surrounding the collection and analysis of external and internal data" and is therefore less relevant in contexts where the amount of potentially available data is limited. In contrast, our emphasis is on practices that promote rational decision-making and learning by CEOs even in the absence of large-scale data. In addition, we emphasize social dimensions of learning, such as the use of practices that facilitate honest discussions and consideration of alternatives, as well as practices that proactively address potential internal resistance—factors that encompass a broader set of factors beyond data collection and analysis.

2. Empirical Methodology

To explore systematically how chief executives formalize, develop, and implement strategy, we developed a new semi-structured survey instrument. As noted above, prior scholars have examined how specific executives made particular strategic decisions (e.g., Graebner and Eisenhardt, 2004; Mintzberg, 2008), and many popular articles and books give practitioners advice about how to make better decisions (for which there is little consensus) (Heath and Heath, 2013; Eisenhardt and Sull, 2015; Krogerus and Tschäppeler, 2012). But we know of no prior scholarly effort to delineate systematically the components of how top managers make strategic decisions. Nor is there sound, comprehensive evidence or theory that points conclusively to better or worse ways to make strategic decisions.

To develop the survey instrument, we relied on two inputs. First, we reviewed the management literature—much written for practitioners—that examines how executives do and should make strategic decisions (e.g., Drucker, 1967; Garvin and Roberto, 2001; Mankin and Steele, 2005 and 2006; Lafley et al., 2012; Lafley and Martin, 2013). We synthesized the main descriptions and prescriptions of that literature into a draft instrument. Second, we piloted the draft instrument with a set of former chief executives whom we know well and with dozens of participants in the senior-most executive education programs at HBS. These experienced "test pilots" helped us refine the instrument. In response to their input, we added questions about critical aspects of decision making that the literature review missed, eliminated questions deemed irrelevant in reality, and reframed questions so that practicing managers would more clearly understand them.[2]

The resulting instrument consists mostly of short, open-ended questions with no finite set of responses—questions like "Tell me about the discussions you have in order to select between strategies?" rather than yes-no questions like "Do you discuss strategy in monthly meetings?" We return below to why we use open-ended questions, what challenges such questions pose, and how we address those challenges.

2.1 Scoring structured strategic decision-making

This development process yielded a survey instrument that focuses on three different categories of Strategy Practice: Formalization, Development, and Implementation. Within each of these areas, we assess the extent to which the executive follows approaches that are consistent, proactive, and evidence-based.

To anchor CEO's responses to their actual process for making strategic decisions, at the beginning of the interview we first give the respondent a brief definition of a "strategic change" as any decision that "significantly impacts your business or changes your strategy." We then give examples such as "significant investments," "entering a new line of business," or "entering a new

[2] For example, some of the literature suggested that high-performing executive teams might conduct a "vote" among the team in order to finalize critical strategic decisions, and thus we asked executives during our pilot interviews if they ever voted to make strategic decisions. Virtually none of our pilot interviewees engaged in this practice, and many articulated compelling reasons as to why this was a potentially detrimental practice. In finalizing the survey instrument, we therefore eliminated questions around voting.

geographic area." We abstain from any more specific definitions of "strategic change," both because what constitutes a "strategic decision" can vary significantly between firms (e.g. small vs. large firms make strategy decisions on different scales) and to avoid confusing interviewees with excessively abstract concepts. To ensure comparability of responses, we also ask the respondent to give us three different examples of "typical strategic changes" in his or her firm from the previous five years. These examples served to ground interviewees in their actual process for making strategic decision and kept the conversation from becoming more abstract. We referred back to these examples throughout the interview to keep the conversation grounded. We also classified these decisions independently into potentially overlapping sets of 17 different decision types, including "M&A," "new business," "geographic expansion," and so on. Appendix 1 provides details on the 17 different types of strategic changes into which we categorize the example decisions.

After this brief introduction, we proceed to the first section of the instrument—on strategy formalization (henceforth: Formalization). This section focuses on the question, "How deliberate and distinct is the strategy of the interviewee's company?" We consider three factors:

(F1) **Strategy statement:** the ability of the executive to state concisely the goals, scope, and competitive advantage of his or her company (Collis and Ruckstad, 2008);

(F2) **Deliberate scope and advantage:** whether the executive can articulate clearly the markets the companies prioritizes and the way it intends to win in those markets; and

(F3) **Deliberate strategic distinctiveness:** whether the executive can say how the company differs from its main competitors.

The Formalization section therefore allows us to capture ideas that are related to fundamental concepts of strategy, such as strategy as the deliberate choice of "a different set of activities to deliver a unique mix of value" (Porter, 1996) or strategy as "key choices that guide other choices" (Van den Steen, 2017).

The second section—on strategy development (henceforth: Development)—focuses on the questions, "How do executives come up with alternative strategic ideas, and how do they choose

among alternatives?" Here we assess whether the decision-making process at the interviewee's firm includes:

(D1) **Proactive scanning:** whether firms actively search the competitive environment for opportunities or respond to threats or performance downturns;

(D2) **Evidence-based decisions:** whether firms utilize data to inform their strategic initiatives (and if so, which types of data) and explicitly formulate assumptions if information is missing;

(D3) **Regular strategy meetings:** whether decision-making is embedded in routines and connects strategy with implementation;

(D4) **Effective strategy meetings:** whether decisions are considered in well-prepared, discussion-based strategy meetings;

(D5) **Exploration of alternatives:** whether there is a routinized processes to generate new strategic alternatives and ensure information on the feasibility and benefits of each alternative; and

(D6) **Systematic risk evaluation:** whether there are processes for executives to voice potential concerns.

The section on Development therefore measures the degree to which a firm creates a structured (or unstructured) context that facilitates rational decision-making.

These Development practices are related to the rational decision-making requirements that Simon (1947) identifies. Rational decision makers—Simon argues—list all alternatives, determine the consequences of alternative choices, and compare the evaluations of all alternatives.[3] These practices also shed light on the extent to which the executive proactively tries to counter psychological and social biases in decision making.[4] Further, this survey section incorporates

[3] Specifically, proactive scanning for opportunities (D1) and the exploration of strategy alternatives (D8) directly expedite listing of all alternatives. Similarly, practices to base decisions on evidence or explicit initial assumptions (D2) as well as regular discussions on operational feasibility (D3) lead to a better understanding of the consequences of different strategic choices. Finally, to promote the objective evaluation of different alternatives, meetings on strategy development should be well-prepared and structured to enhance discussions (D4) and should systematically seek out potential concerns (D6).

[4] Examples of biases these practices address are inattention (e.g. through regular strategy meetings, (D6), and well-structured meetings (D7)), overconfidence (e.g. through evidence-based analysis, (D2), exploration of alternatives, (D5), systematic risk evaluation (D6)), narrow framing (through exploration of alternatives, (D5)), myopia or

direct measures of whether firms explicitly formulate initial assumptions when data are lacking (D2) and when new alternatives are explored (D5). These practices are related to the ability to formulate working hypotheses about the effect of strategies, which are especially important in the context of very novel strategies for which data are scarce (Lafley, Martin, Siggelkow and Rivkin, 2012; Zenger, 2013).[5]

The third section of the survey—on strategy implementation (henceforth: Implementation)—aims to answer the questions, "How are strategies executed, and how do executives learn from strategy outcomes?" In particular, this section assesses the following factors:

(I1) **Implementation planning**: whether executives anticipate potential implementation problems when they make decisions;

(I2) **Effective strategy reviews**: whether the firm conducts regular reviews of outcomes and comparison to initial assumptions;

(I3) **Learning from outcomes**: whether the firm routinizes systematic validation of mechanisms and learning in the wake of surprises;

(I4) **Strategy communication**: whether executives regularly communicate strategies to employees outside top management; and

(I5) **Resistance accommodation**: whether executives anticipate potential resistance to change outside of top management.

These questions allow us to measure how structured strategy execution is, which in turn is broadly related to two ideas of effective execution from Drucker (1967). In particular, Drucker argues that an effective decision process requires anticipation of key implementation issues[6] as well as

competitor neglect (though proactive scanning of the competitive environment (D1)) and group-think (though exploration of alternatives, (D5) and systematic risk evaluation, (D6)).

[5] This practice can also be considered a necessary step to effectively learn from data and strategy outcomes as will be captured in the section on implementation, which is described below.

[6] Drucker (1967) summarizes this recommendation for the need to anticipate key implementation issues as follows: "In fact, no decision has been made unless carrying it out in specific steps has become someone's work assignment and responsibility. (...) One has to make sure that their measurements, their standards for accomplishment, and their incentives are changed simultaneously." In our context, anticipation of key implementation issues is captured by the extent of implementation planning (I1) and the degree of proactive strategy communication (I4) as well as proactive defusing of possible resistance to change in (I5). Mechanisms to track and learn from strategy outcomes are captured in the practices of effective strategy reviews (I2) and learning practices (I3).

mechanisms to track and learn from outcomes.[7] These questions also capture the extent to which executives formulate and test hypotheses while developing a strategy. Specifically, the data captured in (I2) and (I3) measure the degree to which a firm compares initial assumptions to outcomes and seeks to understand the mechanisms through which strategy affects performance, including through targeted key performance indicators (KPIs) or explicit experimentation. In addition, we measure whether executives systematically analyze the implications of surprising outcomes, by separating design from luck and formulated strategy from implementation issues. This is especially worth emphasizing in light of recent studies on the "scientific approach to learning" as in Lafley, Martin, Siggelkow and Rivkin (2012), Zenger (2013), and Camuffo, Cordova and Gambardella (2017) as well as the increased popularity of A/B testing among companies (Athey, 2018).

Figure 1 shows our detailed scoring grid for strategy formalization, strategy development, and strategy implementation as well as the open-ended questions with which we start the interview.

2.2 Additional survey questions

Strategy decisions: number and speed

The survey also captures data on strategic decision and implementation characteristics, as well as on the type of competitive advantage the company pursues. To measure how quickly each firm makes and implements strategic decisions, we ask the respondent to estimate the average number of strategic decisions made over the previous five years as well as the time it took to make and implement strategic decisions for each of the three typical examples of strategic decisions the respondent mentions.

[7] Drucker (1967) motivates the need for learning within the decision process as follows: "Finally, a feedback has to be built into a decision to provide a continuous testing, against actual events, of the expectations that underlie the decision. (…) One needs organized information for the feedback. One needs reports and figures. But unless one builds one's feedback around direct exposure to reality—unless one disciplines oneself to go out and look—one condemns oneself to a sterile dogmatism and with it to ineffectiveness."

Firm characteristics

We collect data on ownership at the end of our interviews. We employ the ownership classification used in Bloom and Van Reenen (2007), which distinguishes between companies that have dispersed shareholders (i.e. none of the owning entities holds a stake that is equal to or greater than 25%) and those with a controlling shareholder, and within the latter provides detailed classifications on the basis of who holds the controlling stake (e.g. family, founder, private equity). Finally, we ask for the number of full-time employees at the respondent company.

CEO characteristics

We also have three measures of CEO experience, two from survey responses and one from external data. From the survey, we know the CEO's tenure at the company and their tenure in the top position. We do not directly ask for the respondent's age during the interview in order to avoid any awkwardness. Instead, we use the following protocol to estimate respondent age from public sources. We search for the CEO's LinkedIn page, record their college graduation year, and estimate age assuming that the CEO graduated at age 21. If there is no information on the college graduation year, we go to the date of graduation from HBS for MBAs. Since HBS requires work experience before entering the MBA program, we assume that HBS MBAs are 27 when they graduate. If neither of these steps yields an approximate age, we revert to the interviewer's initial guess of the respondent's age.

Noise controls and interviewer effects

Following the interview practices of Bloom and Van Reenen (2007), we also record data that serve as noise controls, such as the time of day, interview duration, and interviewer scores of respondent expertise about strategy practices and respondent honesty. In addition, since each interviewer conducted multiple interviews, we are able to control for interviewer fixed effects (none of which were significant in our models).

2.3 Sampling frame

Since we are interested in strategic decision making by the top decision makers within firms, our ideal interviewees are CEOs or equally senior managers. Our sampling frame was drawn from the population of alumni of Harvard Business School. While HBS alumni are not a representative

sample of all managers, focusing on HBS alumni presents several benefits. First, the fact that three coauthors are affiliated with HBS helped us better reach and advertise the survey to a type of manager who is notoriously hard to engage in surveys. Response rates of around 10% are not unusual in CEO surveys (Ben-David, Graham and Harvey, 2013). Second, variation in Strategy Practices among managers who were exposed to a similar educational experience will likely represent a lower bound to the actual variation that exists in the general population of managers. Third, this sample allows us to match the survey data with detailed information on the respondents' background and education, which allows us to conduct analyses that would be impossible otherwise. For instance, we can study the relationship between among education, Formalization, and Implementation.

We started with a sample of 3,100+ HBS MBA and Executive Education alumni who were listed as working in the manufacturing sector in the U.S., U.K., and Canada, obtained from the HBS alumni database. From this list, we selected managers with the title of CEO or equivalent (e.g. managing director). As the information in the alumni database is self-reported, we took several steps to further vet and verify the data. First, we extensively researched each executive on our list using CapitalIQ, Factset, LinkedIn, and company websites to ensure that each individual was still employed at his or her respective firm, in the target role of CEO or other C-Suite officer (or equivalent). We required each executive to be employed at his or her respective firm for at least a year. Next, we collected information on each of the listed firms in the database in order to confirm that they were active in the manufacturing sector (e.g. a manufacturer of goods, as opposed to a distributor of manufactured goods). Our research on individual firms also allowed us to collect additional data on these respective firms, including six digits NAICS codes (from CapitalIQ and Orbis), as well as location and contact information. Ultimately, these selection criteria left us with a total of 863 CEOs and equivalent managers for our sampling frame. Of these, 63% were alumni of the HBS MBA program, and 37% were alumni of HBS's various certificate-granting executive education programs.

2.4 Collecting accurate responses

We followed a simple protocol to recruit executives to participate in our interviews. We first emailed each executive in our sampling frame a brief message explaining the purpose of our

research and inviting him or her to participate in an hour-long interview. Individuals who did not respond to our initial email received a follow-up request a week later. Next, we telephoned the remaining executives in our frame to invite them to participate in our study, following up again a week later if we did not receive a response. Executives who did not respond to our two rounds of emails and telephone calls were not contacted further. Ultimately, we were able to conduct interviews with 262 executives from our sample frame. The resulting 30% response rate is three times the average response rate usually obtained in CEO surveys (Ben-David, Graham and Harvey, 2013).

The survey was administered from Harvard Business School by a team of 6 surveyors—mostly Harvard MBA graduates—trained for a total of 5 days, including several one-on-one practice sessions and mock interviews.

To ensure accurate responses, we built on the survey methodology of Bloom and Van Reenen (2007). In particular, to avoid leading respondents and to reduce social desirability bias, we started with open-ended questions. Generally, we explained to interviewers that we do not know what a "best practice" is and are mainly interested in categorizing the strategy process of different companies. We also instructed the interviewers to be supportive and positive about any answers, irrespective of the nature of responses.

To reduce pressure to provide socially desirable answers, the interviewees were not told that they were being scored during the interview, and we also informed interviewees that we would not be asking for any performance-related information (to reduce any sense that interviewees might be assessed or judged according to their firms' performance during the interviews). Additionally, to allow us to review the content of the interviews at a later date, we asked the interviewees permission to record our conversations. The vast majority of our executives agreed.

Answers to each question were scored by the interviewers using five-point scales: higher scores reflected a greater use of Strategy Practices. A drawback of open-ended questions is that interviewers must use judgment in scoring answers to such questions. To minimize the risk that subjective interpretations of the interviewer were driving the scoring, two people—a main

interviewer and a second listener—scored each interview independently. Throughout each interview, the interviewer and the second listener were connected through a chat program so the second listener could suggest clarification or follow-up questions in case a respondent's answers were vague or not sufficiently clear. After each interview, the interviewer and second listener compared their scoring, discussed and reconciled any differences, and recorded consensus scores.

To improve the accuracy of scoring further, we also extended the Bloom and Van Reenen methodology by introducing software-supported funneling of responses: responses that suggested structured strategy process automatically triggered follow-up questions on details of practices or specific examples. Appendix 2 discusses this practice in more detail.

We aggregated the answers from each interviewee into a single metric—the Strategy Practices score—by first standardizing the answer to each of the 14 survey questions and then taking the average of responses across all questions. These constructed z-scores were then standardized again for ease of interpretation. We experimented with different ways to aggregate the data, such as principal component analysis and clustering, and found that our pre-specified way to group the questions was very similar to these alternatives.

2.5 Final sample

Some features of our 262 interviewees and their firms are summarized in Table 1, Panel A. First, the average firm in our sample reports around 2,000 employees and is more than 47 years old, which highlights that our sample is dominated by very large and successful firms. However, the large reported standard deviations show that our sample exhibits a high degree of heterogeneity across firms. Second, ownership patterns are evenly distributed, with the largest fraction of firms owned by private companies.[8] Publicly listed companies constitute around 11% of the sample and are therefore strongly overrepresented compared to the U.S. economy.[9] None of the CEOs we interviewed work for a government-owned company, and 20% work in a family-owned firm.

[8] The five main types of ownership we observe are founder ownership, family ownership, other private ownership, ownership by other companies (such as venture capital or private equity firms), and the distributed ownership of a publicly traded company.

[9] There are over 7 million employee firms in the US and 4,000 publicly listed companies, so public companies represent less than 0.1% of all US employee firms.

Third, most firms in our sample sell at least some of their products or services to other businesses, while a large portion sell at least some of their products to consumers.

Among the executives we surveyed, 91 percent are male. The average respondent is 57 years old, has been with the same company for 17 years, and has been in his or her current position for nearly 14 years. Around 30 percent our interviewees report having an undergraduate degree in either business, economics, finance, or accounting. Over 70 percent of respondents hold an MBA from HBS, while the rest attended executive education courses at HBS.[10]

3. Heterogeneity of Structured Strategy Process

We now move to the first of our three sets of findings: a description of how much strategy processes vary across firms. We approach this question in two steps. First, we characterize the overall distribution of strategy processes. Second, we contrast within-industry heterogeneity in the degree of structured strategy process versus across-industry heterogeneity.

3.1 Overall distribution of strategy practices

Table 1, Panel B provides the summary statistics for the strategy scores, which we computed based on the full range of possible responses. We use the 1-to-5 scale from Figure 1 and display the average across questions in each section for each CEO. We observed a minimum average score of 2.72 and a maximum of 4.00 for the overall Structured Strategy Process score. Even in our very selected sample of HBS alumni, Strategy Practices ranged from highly gut-driven to very structured. The table also provides breakdowns into subcategories of Formalization, Development, and Implementation, as well as even more detailed breakdowns by question. Overall, Development scores display the greatest dispersion, followed by Implementation and Formalization. All questions display the full range of possible values, highlighting that our survey instrument captures a realistic range of practices and that no practice had entries so very high that no company attained them.

[10] Executive education participants at HBS can attain alumni status only if they have attended one of the so-called "comprehensive leadership programs". These are long programs, typically 8-12 weeks in duration.

Figure 2 displays a histogram of the Strategy Practice score as well as histograms for the sub-scores. The overall distribution of our Strategy Practice scores are continuously distributed along our scoring grid. This suggests that our measures capture more than just the extreme differences between purely intuitive and highly structured decision-making. If this were the case, one would have expected bunching at the extremes in the histograms.

We also analyzed correlations among the strategy sub-scores. Development is strongly correlated with both Formalization and Implementation, while Formalization and Implementation are negatively and insignificantly correlated. This same pattern can be found at the level of individual questions: companies that are strongly structured on some dimensions can be relatively unstructured on other dimensions. This is in contrast with prior surveys (Bloom and Van Reenen, 2007), where different dimensions of management practices (e.g., operations and HR) tended to be highly correlated with each other. This finding has at least two different interpretations. First, in contrast to the operational practices measured in the World Management Survey, there may be less complementarity between different dimensions of strategic decision making. Alternatively, different aspects of strategic decision making may be complementary (e.g., having a more systematic way to choose among alternative strategies may provide more benefit to firms that are also more systematic in strategy implementation), but executives might not have appreciated these complementarities and adopted the complementary practices together. Our data does not currently allow us to distinguish fully between these two possible explanations.

3.2 Within- vs across-industry variation

It is well known that firms in the same narrow industry can deliver very different economic performance and that industry effects often play only a limited role in explaining performance differences (Porter and McGahan, 1997; Ruefli and Wiggins, 2003; Syverson, 2011; Gibbons and Henderson, 2012). In this context, a natural question is to ask how important industry differences are for understanding differences in Strategy Practices. One reason to think that industry effects might be rather limited in our current data is our targeted sample includes only manufacturing firms. On the other hand, the manufacturing sectors in our sample includes data-driven and capital

intensive industries such as Pharmaceuticals and Biotechnology as well as more traditional manufacturing industries such as apparel and textile mills.

In practice, industry effects appear to have moderate explanatory power for the strategy scores. When we regress the strategy scores on three-digit NAICS industry fixed effects, industry effects have very low adjusted R^2s, such as -0.02 for the overall structured strategy score, -0.04 for the strategy formalization score, -0.01 for the strategy development score, and -0.00 for the strategy formalization score. Even at finer industry aggregations, such as 6-digit NAICS, the adjusted R^2 for the overall structured strategy score is only 0.0457, which is very low considering that we use 132 industry categories for a sample of over 260 firms.[11] Overall, a CEO's specific industry environment appears to offer little explanatory power for the differences we observe in how firms structure their strategic decision-making process.

4. Structured Strategy Process and Firm Performance

In our second set of findings, we examine the degree to which Strategy Practices are correlated with firm performance, using as proxies firm size (measured in terms of number of employees), growth, and the number and speed of strategic decisions made in the firm.

4.1 Firm size

We start with an analysis of the relation between Strategy Practices and firm size. The basic measure of firm size we utilize here comes from the end of our survey, where we ask about the number of full-time employees at the respondent company. Firm size as measured by employment is informative about the underlying productivity of firms, as it is well-documented that larger firms tend to have higher productivity (Bartelsman and Doms, 2000). Our baseline regression analysis of size controls for 3 digit NAICS industry effects.

Figure 3 shows the unconditional correlation between firm employment and our Strategy Practices score. Table 2, column (1) provides statistical evidence that larger firms exhibit systematically

[11] Generally, F-tests of the joint significance of industry dummies hovers around a value of 1 across specification, so industry fixed effects stay insignificant.

higher levels of Strategy Practices, even when we include other firm and CEO controls, industry fixed effects and noise controls. Column (2) shows the robustness of the relationship to the inclusion of log firm age, and column (3) to other controls that are correlated with the adoption of different Strategy Practices, and may at the same time correlate with firm size, such as CEO age, CEO tenure in the firm, whether the firm is publicly listed, and whether the firm is family-owned.[12]

The table also shows the breakdown of Strategy Practices into its components of Formalization, Development, and Implementation. As columns (4)-(6) show, all subcomponents are positively and significantly correlated with firm size. Furthermore, the results in column (7) indicate that the three sub-components—with the exception of Implementation—capture at least some variation that is independent of each other.

The quantitative implications of the correlation between firm size and Strategy Practices are substantial. To interpret the coefficients, remember that the measures we used are standardized z-scores, which implies that the coefficients capture a one standard deviation association of the independent variable to the Strategy Practice score. Specifically, a one standard deviation increase in Strategy Practices is associated with a 1.99-fold ($= \exp(0.692)$) increase in firm size (using the coefficient from column 3). Of course, we cannot interpret this as a causal relationship. More formalized strategy processes may help firms expand, or larger firms may formalize their strategy processes, or some other factor may drive both.

4.2 Firm size/growth in administrative data

To strengthen the external validity of our Strategy Practices measures, we merged our data into the Longitudinal Business Database (LBD), maintained by the US Census Bureau. The LBD data offers several attractive features that are helpful in evaluating the analysis of Strategy Practices and firm performance. First, the source of the data are IRS tax files, which are independently gathered from our survey measurement efforts and associated performance data are therefore plausibly free of any survey bias in the reporting of performance. Second, both the reporting firms and the IRS have strong incentives for truthful reporting, while the Census is strongly investing in

[12] We examine the correlation between Strategy Practices and these variables in Appendix Table A.1. We find that the Strategy Practices score is significantly higher in publicly owned firms and significantly lower for older CEOs and CEOs who have been in this position for a longer time period.

maintaining longitudinal links in the data, which enable us to reliably measure firm growth. On the other hand, confidentiality considerations force us to drop some of the largest observations. Additionally, the current vintage of LBD data end in 2016, which implies that we are not able to find especially very small and very young firms in the Census data. Both of these factors are likely to reduce the overall variation in our data and might therefore plausible attenuate our baseline results

The first two columns of Table 3 report the correlation results for firm size, that correspond to similar regressions in Table 2. Compared to results using our survey-internal measures of firm size, effects are somewhat weaker, yet still economically significant. According to column (2), a one standard deviation increase in Strategy Practices is associated with a 1.58-fold ($= \exp(0.464)$) increase in firm size, which is only slightly weaker than the relationship we find in table 2.

We also investigate the relationship between the structured strategy process score and firm growth. We measure firm growth in the LBD by using symmetric firm growth measures proposed by (Davis, Haltiwanger and Schuh, 1996) $g_t = 2 \cdot \left(\frac{x_t - x_{t-k}}{x_t + x_{t-k}}\right)$ for $k = \{1, 5\}$. Additionally, we control for initial firm size, to capture any mean-reversion effects in firm growth patterns (Dunne, Roberts and Samuelson, 1987; 1989) and use firm-level clustering for standard errors. The last four columns of Table 3 report the results. Columns (3) and (4) display short-run correlations of Strategy Practices and firm growth as measured in annual growth rates. These results are quantitatively and statistically significant. According to column (4), a one standard deviation increase in the Strategy Practices score increases annual growth rates by an average of 4.7%. These results continue to hold for long-run growth rates, as measured by overlapping 5-year growth rate measures in columns (5) and (6), albeit with weaker effects than in the annual specifications. In the long-run growth analysis, a one standard deviation increase in the Strategy Practices score is associated with a 9.5% increase in the firm growth rate over a 5-year horizon, which is still an economically important effect.

4.3 The number and speed of strategic decisions

We also analyze the extent to which more structured Strategy Practices are related to the number of strategic changes a firm undertakes or the speed of its decision-making and implementation.

The outcome we examine here is, in essence, a management team's capacity to make and execute decisions. On a conceptual level, the idea that "getting things done" is a key task for effective executives can be traced back at least to Drucker (1967) and continues to be popular (Gibbons, Matoushek and Roberts, 2012). Indeed, authors such as Mankins and Steele (2006) have argued that the number of decisions made by an organization is a natural metric to evaluate the quality of any strategic decision-making process. The speed of decision-making and implementation matters for almost any context but is especially valuable in very competitive and fast-changing environments (D'Aveni, Dagnino and Smith, 2010).

This section sheds light on whether a more structured strategy process is positively or negatively correlated with executives' capacity to make and execute decisions. Either is possible in theory. On the one hand, a management team with structured processes may possess well-honed routines (Nelson and Winter, 1982) that allow them to work through a large number of decisions effectively and quickly. On the other hand, structured processes may cause "paralysis by analysis" and delay strategic change (Peters, Waterman, and Jones, 1982; Lentz and Lyles, 1989). This is a major criticism of the traditional long-range strategic planning systems of the 1970s (Mintzberg, 1994). Intuitive decision-making, in contrast, may lead to almost immediate and surprisingly accurate decisions, as cognitive psychologists such as Klein (2004) and other researchers (Eisenhardt & Bingham, 2017) have argued.

As described in Section 2.2, we collect data on the number of strategic changes as well as decision and implementation times together with information on what types of strategic changes the company pursued in the last five years. In Table 4, we report that more structured Strategy Practices are positively associated with significant differences in the number of decisions made, but a higher score is also associated with longer time spent in decision-making (all regressions include the basic firm, CEO and noise controls included in Table 2). A one standard deviation increase in the overall structured strategy processes score is associated with a 13% increase in the number of decisions made (with the results driven by the Implementation score), and 28% longer

time required to reach a decision (driven by the Development score). Implementation speed is not significantly different for firms with highly structured decision processes.

These results suggest that firms with higher Strategy Practice scores are able to multi-task and pursue several strategic initiatives at the same time, but their deliberations do take extra time. Once a decision is made, structured processes do not appear to delay implementation.

5. The Impact of Business Education on Strategic Decision Making

The vast heterogeneity in the Strategy Practices that CEOs employ raises a question. What accounts for the large differences? In this section, we examine one mechanism that may have contributed to the heterogeneity: the CEOs' exposure to different business curricula. To do so, we take advantage of the fact that our interviewees who obtained their MBA at HBS collectively experienced a sharp discontinuous change in the MBA strategy curriculum: the 1983 appointment of Michael Porter—a leading strategy academic —as head of the required HBS MBA strategy course.

We examine whether this "shock"—which is plausibly exogenous to cohorts that joined HBS just before and just after Porter was appointed head of the strategy course—alters parts of the WSS score for which the curriculum change is likely to have been most consequential: Formalization and Implementation. In particular, we argue that Porter and the HBS instructors who followed his lead gave students a framework to analyze the external competitive environment systematically as they crafted strategy. As the curriculum shifted to focus on analyzing the external environment and formulating strategy, it paid less attention to implementing strategy. Therefore, we would expect interviewees trained after Porter's appointment to rely more on deliberate considerations as they make strategic scope choices in the formulation of their strategies; the curriculum changes should particularly influence answers to question F2 of our survey. We would also expect interviewees trained after Porter's overhaul of the strategy course to have less structured implementation practices (I1-I5), due to the topic's de-emphasis in the curriculum.

Thus, our sample allows us to conduct a unique event study to estimate the causal impact of business education on strategy processes and decision-making.

5.1 Institutional history

A longtime hallmark of the Harvard Business School MBA curriculum was the Business Policy course. Launched in 1912, the course emphasized from its earliest days features that would become central concepts in business strategy, such as a focus on "the intimate connection of [functional] groups" and "the substitution of careful, conscious analysis of managerial problems for unconscious analysis" (Harvard University, 1915: 35-36). Business Policy became a required course in 1920-21 and soon stretched across the entire second year of the MBA curriculum. In the 1950s and 1960s, professors such as C. Roland Christensen, Kenneth Andrews, and Edmund Learned used Business Policy to implant the term "strategy" in management education (Andrews, 1971). As Kiechel (2010) writes, the Business Policy course through the 1970s emphasized general managerial skills instead of analytic frameworks to understand the situation of a company.[13] Analysis in the course was careful and conscious, but it was hardly structured or systematic. Moreover, analysis focused more on the inside of a company than its external environment.

In 1979, a desire to have an integrative course earlier in the MBA curriculum caused HBS faculty to split Business Policy in two (Porter and Siggelkow, 1999). Business Policy I would be taught in the second term of the MBA's first year and would emphasize the formulation of formal strategy. Business Policy II would remain in the second year and focus on strategy implementation. In 1983, Michael Porter became the head of Business Policy I in what traditionalists at HBS saw as a Dean-mandated takeover. A young upstart economist, Porter had used deep contact with managers when teaching executive education courses, as well as an MBA elective, to pioneer

[13] Kiechel (2010) summarizes the philosophy behind the pre-Porter HBS "Business Policy" education as follows: "What Andrews and his colleagues in the Business Policy course resolutely refused to do—and the main reason his ideas largely disappear from the subsequent history of strategy—was to agree that there were standard frameworks or constructs that could be applied to analyzing a business and its competitive situation. Oh, they might allow one, perhaps because they had helped develop it: so-called SWOT analysis, which called for looking at the strengths, weaknesses, opportunities, and threats besetting an enterprise. But nothing more schematic and hard-edged than that. Individual companies and industries were just too idiosyncratic, and the ambitions and values of their managers too rich and varied to be mapped on any single template."

insights on industry analysis (Porter, 1979) and to define the elements of strategic choice (Porter, 1985). In sharp contrast to the fuzzier notions of historical Business Policy, Porter offered a holistic framework to evaluate the attractiveness of an industry, drawing on insights from the literature on Structure-Conduct-Performance in Industrial Organization. A key innovation of this framework was that it took a broad view of potential sources of competition. Porter's course encouraged students to go beyond incumbent rivals and take into account firms that might not yet exist (potential entrants) or firms that offer different products but satisfy similar underlying needs (substitutes). Furthermore, while firms cooperate with upstream suppliers and downstream customers to create value, they also compete with suppliers and customers to claim value in the form of profits.

Using material from the HBS archives, we examined the course descriptions of the Business Policy course over the full-time span when our MBA alumni interviewees attended HBS. While most changes to the strategy curriculum were incremental in nature, Porter's restructuring was a complete overhaul of the course and its content. Appendix 4 compares the course description for the year prior to Porter's restructuring (1982) to the course description for his first year (1983). The contrast is striking. While the 1982 course pays little attention to a firm's external context ("competition or adverse circumstances"), the overhauled 1983 course devotes substantial attention to analyzing and understanding a firm's competitive environment as a determinant of its success and performance. While the 1982 course description places heavy emphasis on the importance of general management of the entire enterprise (i.e. "what needs to be done"), the 1983 course description clearly moves away from any deep focus on issues related to management, execution, and implementation.[14]

Porter's version of Business Policy I, soon renamed Competition & Strategy, would go on to become one of the most influential courses at HBS and to be formative for an entire generation of CEOs. Overshadowed, Business Policy II, with its focus on implementation, struggled and was dropped from the curriculum. We use this sudden, radical, and exogenous (to the students) change

[14] In order to confirm this de-emphasis of implementation topics in the curriculum, we interviewed veteran faculty at HBS who confirmed that following Porter's changes to the course, discussions of implementation faded from the curriculum.

in the core strategy curriculum at HBS as the source of a regression discontinuity that allows us to quantify the causal impact of MBA education on Formalization and Implementation.

5.2 Econometric specifications

We use HBS MBA cohort years as the running variable for a regression discontinuity design (RDD). To fix ideas, let C_i be the MBA cohort year of CEO i and X_i different outcomes, such as strategic choices or a measure of strategy formalization. Using the potential outcomes framework, the econometric specification can be written as

$$X_i = f(C_i) + \beta_1 \cdot 1_{\{C_i \geq 1983\}} + \epsilon_i \qquad (2)$$

where ϵ_i is a random error and $f()$ is a continuous function. The key identification assumption in this approach is that unobserved characteristics of MBAs entering HBS are continuous, while only the change in the HBS strategy curriculum is discontinuous. We use a step function $1_{\{C_i \geq 1983\}}$ to estimate the effect, both because it is less problematic in terms of potential model misspecification and because data requirements for estimation are less demanding, which is important for our application. Our baseline specification uses a local, non-parametric RD design using the optimal bandwidth selection procedure of Imbens and Kalyanaraman (2012). Equation (2) is the main specification we will use to estimate the impact of Porter's restructuring of core strategy classes on strategy formalization and implementation.

5.3 Results

We start by reporting the distribution of the MBA subsample of CEOs across graduation years.[15] Figure 4 shows the number of potential and realized MBA interviewees in the HBS alumni database by graduation year. Importantly, the response rates do not seem to differ significantly for the cohorts immediately before 1983 compared to the cohorts following 1983. This is reassuring, as it is consistent with the view that selection implies only continuous changes along unobservable dimensions.

[15] We restrict our sample for this analysis to only the MBA graduates in our sample because we are unable to collect data on and therefore observe and specify which, if any, comparable changes may have occurred in HBS's executive education programs.

We then estimate the effect of the HBS strategy curriculum restructuring on two subsets of the Strategy Practices included in our survey that are more likely to have been affected by the curriculum change: strategy Formalization and Implementation. Specifically, given the curriculum changes, one would expect Porter's influence to make aspects of strategy related to scope of the firm, competitive advantage and strategic distinctiveness (captured in questions F2 and F3) to be more salient to managers, and implementation practices (captured in questions I1 to I5) to be less relevant to them.

The main results are shown in Table 5, Panels A and B, which presents the RDD results. Starting with the top left of Panel A, we show that CEOs who were exposed to the restructured HBS MBA core curriculum were more likely to make deliberate strategy scope choices and therefore had higher degrees of Formalization. Table 5 also provides additional results regarding the robustness of these findings. First, one might suspect that some of the effect we identify in the RDD may be driven by general time trends towards adoption of more Strategy Practices. Consequently, our findings might not reflect the specific impact of Porter's strategy course restructuring but instead the general tendency of more recent MBA graduates to be more "analytically oriented" and therefore more deliberate in their strategy process. If this were the case, the results should continue to hold if we use placebo years of 1982 or 1984 instead of the actual cutoff year of 1983. But, as columns (2) and (3) of the top panel show, these placebo specifications, though qualitatively similar, are statistically insignificant. Second, larger firms tend to be more data and analytics oriented and therefore might exhibit more deliberate strategies. To control for this issue, we add firm size as a control variable and again find that our baseline results are mostly unaffected.

We then investigate how Porter's changes to the curriculum affect implementation-related Strategy Practices, represented in questions I1-I5, as our observation of curriculum changes suggested the possibility of additional effects. The results are shown in Table 5, Panel B, which reproduces the same basic specification of Table 5, Panel A but for the Implementation score. In line with the changes to the course curriculum described above, we find that the cohort of students first exposed to Porter's courses appear to have significantly lower Implementation scores, even when we include a control for firm size. The effects are absent in both the placebo specifications of columns

(2) and (3). In other words, the apparent de-emphasis of implementation-related topics which we observe from the Business Policy/Strategy course descriptions appears to have had the effect of de-emphasizing these practices among the firms in our sample.[16]

6. Conclusion

A fundamental task of managers is to make decisions, and no decisions of top executives are more consequential than the decisions that set a firm's strategic direction. Yet prior empirical literature in strategy is largely silent on the question of how chief executives make strategic decisions. In this paper, we have aimed to begin to answer that question.

Our first contribution is to develop techniques to collect data systematically on the strategy-making processes of chief executives. Toward this end, we devised a novel survey instrument that examines the formalization, development, and implementation of strategy. We used open-ended questions and highly trained interviewers to gather data on how 262 Harvard-educated chief executives make choices. In particular, we assessed the degree to which they use structured Strategy Practices that promote consistent, proactive, and evidence-based decision making.

Our second contribution is to demonstrate that these CEOs display profound heterogeneity in their Strategy Practices. Even though the CEOs share a similar educational background, their processes span the spectrum from highly structured to highly gut-driven and intuitive.

Our third contribution is to show that, along this spectrum of decision-making processes, the CEOs who use more structured processes tend to share certain characteristics. Compared to their gut-driven counterparts, they lead firms that are larger and faster growing. They make more strategic decisions in total, but also take more time to make each decision. These findings are correlative, not causal, relationships.

Our fourth contribution is to suggest one possible source for the variation among executives' processes for making strategic decisions. Thanks to a unique aspect of our sample—its focus on

[16] We show the results for all the individual questions included in the survey in Appendix Table 2.

Harvard Business School alumni—we have some causal evidence that management education matters. In particular, CEOs exposed to a curriculum that emphasized systematic analysis of the external environment make their strategy scope decisions more deliberately than do their predecessors who received a less analytical education. The data also show that the more intense focus on scope might have crowded out attention to practices related to strategy implementation. Remarkably, the impact of this sudden change in HBS's curriculum can be discerned decades after the shift occurred.

Much remains to be learned about how chief executives make strategic decisions. Further investigation of executives' process for making strategic decisions in other geographies, in other sectors of the economy, or among non-HBS graduates, for instance, will likely reveal additional insights on this important topic. Subsequent studies might aim for more causal evidence, of either the antecedents or the consequences of differences in decision-making processes. We hope that this paper makes the case that follow-up work is worthwhile and clarifies how such work might be conducted.

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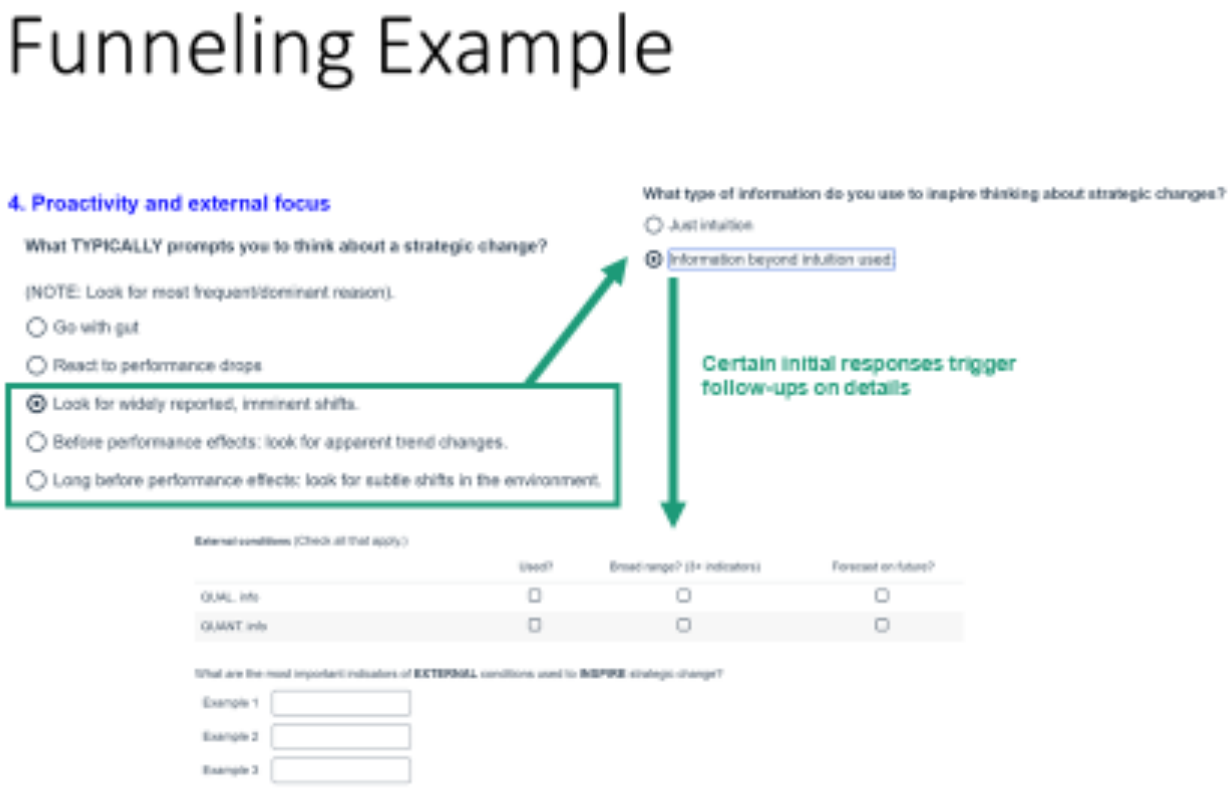
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Appendix 1: Types of Strategic Changes

M&A: merger or acquisition
Geographic expansion
New technology (including IT)
Large capital expenditure
New product or business line
New business process
Organizational restructuring
Focusing business (divestiture)
Outsourcing
Cooperation with other firms (e.g. joint venture, alliance etc)
Moving service in-house (in-sourcing, vertical integration)
Re-orientation of priorities (market/business lines)
Supply chain re-orientation
Change in distribution channels
Hiring
IPO
Significant change in funding sources
Other

Note: Types of strategic changes are not mutually exclusive, and all types of changes relevant to a particular decision, as described by an interviewee, were selected. For example, if a decision to enter a new product market required both vertical integration into new manufacturing processes and expenditure on new manufacturing equipment, we would categorize the strategic decision as involving (1) New product or business line, (2) Large capital expenditure, and (3) Moving service in-house.

Appendix 2: Software-supported Funneling of Responses



Appendix 3. Additional results

A3.1 Relationship Between Strategy Practices and CEO Tenure and Age

Executives can learn though trial and error and form adaptive expectations, as more experience increases the potential sample size of subjective data. As a result, very experienced CEOs might more reliably use their intuition or heuristics developed through experience instead of a structured strategy process. This section therefore explores whether reliance on structured strategy processes is systematically correlated with CEO (lack of) experience.

Appendix Table 1 reports our results from regressing our strategy scores on logged executive age as well as logged measures of tenure in the executive's current position or company. To reduce collinearity across measures, we compute relative position tenure as tenure at the current position divided by tenure at the current company. Similarly, we define relative company tenure as tenure in the current company divided by executive age.

Columns (1) to (4) show that CEOs with more experience report systematically lower levels of structured strategy process. We find a negative association for both relative tenure in the CEO position and executive age, which is likely to proxy for overall work experience. This is consistent with the view that more experience might lead to more intuition or heuristics-based decision-making. Correspondingly, we find that the negative correlations between CEO position tenure and structured strategy process are strongest for the strategy development part of our survey, which focuses on decision-making practices.

A3.2 Firm ownership

We also considered the difference between public and private firms. Publicly traded companies are subject to a host of regulatory requirements and investor demands about transparency and comprehensibility of strategic choices. Consequently, public firms might adopt more consistent and formalized strategy processes in order to legitimize their strategic choices in the eyes of investors. Since we are most interested in public firms, we use all private firms as a baseline and only contrast public firms with family firms.

Column (5) of **Appendix Table 1** displays the results of our analysis of the relationship between Strategy Practices and firm ownership. Publicly traded firms adopt more Strategy Practices than private firms, even when we include of number of employees as measure of firm size. One way to understand this correlation is that public firms are subject to a high demand for comprehensibility by professional investors and monitoring pressures which encourage firms to develop and demonstrate rational strategic decision-making processes. In contrast, we find no significant difference between family firms and other privately owned organizations and firm age (unconditional on size).

Appendix 4: Changes in the HBS Strategy Curriculum*

Business Policy I Course Description (1982)	Business Policy I Course Description (1983)
Business Policy is the study of the **functions and responsibilities of general management** and the problems which affect the character and success of the total enterprise. The problems of policy in business have to do with the **choice of purposes**, the molding of **organizational character**, the definition of what needs to be done, and the **mobilization of resources** for the attainment of goals in the face of competition or adverse circumstances. In Business Policy, the problems considered and the point of view assumed in analyzing and dealing with them are those of the **chief executive officer or general manager** whose primary responsibility is the **enterprise as a whole**. Cases are drawn from companies of various sizes and industries. The purpose of instruction is to develop in students a **general management point of view** rather than a specialist or departmental orientation. Business Policy builds upon and integrates the total work of the school.	Business Policy I is a course about competition. It examines the **competitive forces in industries**, and the way in which companies can **create and sustain competitive advantage** through strategy. Reflecting a company's competencies, competitive strategy is a set of goals and integrated policies in each functional area that define how the company will compete in an industry, taking the point of view of the enterprise as a whole. A major theme of the Business Policy I is than **an acute understanding of competitive forces** will allow companies to shape competition in their favor. The primary focus of Business Policy I is on **competitive strategy in the industry environment, the primary arena in which competitive advantage is either won or lost**. Government's effect on competition is examined both domestically and internationally. The course also considers how competitive advantage may be enhanced through the combination of business units in a multibusiness company, an important task in corporate strategy. Cases are drawn from a wide variety of U.S. and global industries illustrating the range of competitive situations companies face. In its concern with how a **total enterprise can be related to its environment**, Business Policy I aims to integrate the work of other functional courses. …

***Emphasis Added**

Note: Following Porter's overhaul of the Business Policy I course in 1983, it was renamed "Competition and Strategy" in 1986.

Table 1: Descriptive Statistics

	Obs	Mean	Standard Deviation	min	max
Panel A: Firm and Executive Characteristics					
Firm characteristics					
Number of employees	262	2088	8343	1	96500
Firm age	262	47.96	46.30	1	395
Public ownership	262	0.11	0.31	0	1
Family ownership	262	0.20	0.40	0	1
Executive characteristics					
Female	262	0.09	0.28	0	1
Age of executive	262	57.34	12.14	24	95
Tenure in position	262	13.86	11.31	0	51
Tenture in company	262	17.31	14.23	0	69
Bachelor degree in Business, Econ, Finance or Accounting	262	0.31	0.34	0	1
Bachelor degree in Engineering	262	0.04	0.15	0	1
MBA dfrom HBS	262	0.71	0.45	0	1
Panel B: Strategy Practices	262	2.72	0.57	1.00	4.00
Formalization	262	3.02	0.57	1.00	4.33
F1: Strategy Statement	262	2.51	0.71	1.00	5.00
F2: Strategy Scope	262	2.89	0.94	1.00	5.00
F3: Strategic Differentiation	262	3.68	0.95	1.00	5.00
Development	262	2.72	0.81	1.00	4.33
D1: Proactivity and External Focus	262	2.63	0.86	1.00	5.00
D2: Information for Strategy Selection	262	2.74	0.81	1.00	5.00
D3: Strategy Meetings: Frequency	262	2.60	1.33	1.00	5.00
D4: Strategy Meetings: Involvement	262	2.51	1.32	1.00	5.00
D5: Consideration of Alternatives	262	2.98	1.34	1.00	5.00
D6: Structured Criticism	262	2.85	1.23	1.00	5.00
Implementation	262	2.54	0.70	1.00	4.40
I1: Implementation Planning	262	2.09	0.94	1.00	5.00
I2: Strategy review and Follow-ups	262	3.02	1.20	1.00	5.00
I3: Learning from Strategy Outcomes	262	2.81	1.02	1.00	5.00
I4: Strategy Communication	262	2.83	1.21	1.00	5.00
I5: Resistance to Change	262	1.94	0.86	1.00	5.00

Notes: Strategy questions are scored with values between 1-5. Strategy practices (all questions), Formalization (F1-F3), Development (D1-D6) and the Implementation (I1-I5) are averages of the underlying questions. Missing observations are imputed at sample mean.

Table 2: Strategy and firm size

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dependent variable				log employees			
Strategy Practices	0.980***	0.864***	0.692***				
	(0.141)	(0.126)	(0.132)				
Formalization				0.340***			0.256**
				(0.117)			(0.109)
Development					0.597***		0.501***
					(0.131)		(0.142)
Implementation						0.391***	0.162
						(0.134)	(0.145)
log firm age		1.109***	0.996***	1.103***	0.969***	1.056***	1.031***
		(0.119)	(0.146)	(0.151)	(0.149)	(0.150)	(0.149)
Noise controls	YES	YES	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES	YES
Additional Firm and CEO controls	NO	NO	YES	YES	YES	YES	YES
Obs	262	262	262	262	262	262	262

Notes: Strategy Practices score is a normalized z-score with unit variance which is the sum of all 14 normalized strategy questions with mean zero and unit variance. Formalization (F1-F3), Development (D1-D6) and Implementation (I1-I5) are also z-scores with unit variance. Noise controls include interviewer fixed effects, time of day, interview duration, ratings of interviewee expertise and interviewee honesty and non-CEO dummy. Industry fixed effects are 3 digit NAICS dummies. Additional firm and CEO controls include: family ownership dummy, public ownership dummy, CEO age, CEO tenure in company, CEO tenure in position. Missing observations are imputed at sample means with imputation dummies included whenever observations are imputed. Significance levels are: *: 10%, **: 5%, ***: 1% and robust standard errors are reported in parentheses.

Table 3: Strategy practices and firm size / firm growth in Census data (LBD)

Dependent variable	(1) log employees	(2) log employees	(3) 1-year firm growth	(4) 1-year firm growth	(5) 5-year firm growth	(6) 5-year firm growth
Strategy Practices	0.476**	0.464**	0.046***	0.047***	0.096***	0.095**
	(0.190)	(0.198)	(0.012)	(0.012)	(0.035)	(0.037)
log firm age	1.076***	1.145***				
	(0.138)	(0.155)				
log initial employees			-0.048***	-0.049***	-0.096***	-0.095***
			(0.007)	(0.007)	(0.018)	(0.019)
Noise controls	YES	YES	YES	YES	YES	YES
Industry FE	NO	YES	NO	YES	NO	YES
Obs (rounded)	200	200	2000	2000	1300	1300
No of firms (rounded)	200	200	200	200	150	150

Notes: Results are based on merging the strategy practice data into the Longitudinal Business Database (LBD) and aggregating the data to the firm level. Strategy Practices score is a normalized z-score with unit variance which is the sum of all 14 normalized strategy questions with mean zero and unit variance. Growth rates are based Davis, Haltiwanger and Schuh (1996) formula. Industry fixed effects are 2 digit NAICS dummies. Additional firm and CEO controls include: family ownership dummy, public ownership dummy, CEO age, CEO tenure in company, CEO tenure in position. Missing observations are imputed at sample means with imputation dummies included whenever observations are imputed. Significance levels are: *: 10%, **: 5%, ***: 1%. Robust standard errors are used for columns (1) and (2), while all other columns have standard errors clustered at the firm-level. Standard errors are reported in parentheses.

Table 4: Strategy Practice Scores and strategic changes

	(1) log number of strategic changes	(2) log decision time (weeks)	(3) log implementation time (weeks)
Strategy Practices	0.132*	0.281***	0.103
	(0.067)	(0.107)	(0.079)
Formalization	-0.004	0.083	0.021
	(0.070)	(0.093)	(0.081)
Development	0.061	0.269**	0.104
	(0.065)	(0.107)	(0.078)
Implementation	0.190***	0.131	0.055
	(0.058)	(0.095)	(0.069)

Notes: Each coefficient corresponds to a different regression. Number of strategic changes is the estimated number of changes over a 5 year horizon. Strategy Practices score is a normalized z-score with unit variance which is the sum of all 14 normalized strategy questions with mean zero and unit variance. All columns include controls for noise controls (interviewer fixed effects, time of day, interview duration, ratings of interviewee expertise and interviewee honesty and non-CEO dummy), and firm and CEO controls (firm age, family ownership dummy, public ownership dummy, CEO age, CEO tenure in company, CEO tenure in position). All columns include controls for decision type fixed effects include dummies for 17 non-exclusive types of strategic changes pursued. All columns include controls for industry fixed effects, which are 3 digit NAICS dummies. Missing observations are imputed at sample means with imputation dummies included whenever observations are imputed. Significance levels are: *: 10%, **: 5%, ***: 1% and robust standard errors are reported in parentheses.

Table 5: Porter RDD Estimates

Panel A: Formalization

Dependent Variable:	(1)	(2)	(3)
	Formalization Score		
	Baseline: 1983	Placebo 1: 1982	Placebo 2: 1984
Baseline	0.845**	0.413	0.056
	(0.424)	(0.363)	(0.601)
Firm size control	0.790**	0.361	0.075
	(0.393)	(0.357)	(0.544)
Obs	185	185	185

Panel B: Implementation

Dependent Variable:	(1)	(2)	(3)
	Implementation Score		
	Baseline: 1983	Placebo 1: 1982	Placebo 2: 1984
Baseline	-1.165***	-0.499	0.139
	(0.302)	(0.577)	(0.565)
Firm size control	-1.004***	-0.283	0.004
	(0.262)	(0.524)	(0.483)
Obs	185	185	185

Notes: Effects show the impact of MBA cohort year after the cutoff date shown on top. Local regressions use constants only. Noise control is non-CEO dummy. Firm size control is log of number of employees. Formalization (F2-F3), Development (D1-D6) and the Implementation (I1-I5) are averages of the underlying questions, normalized to zero mean and unit variance. Sample includes only HBS MBA alumni. Significance levels are: *: 10%, **: 5%, ***: 1% and robust standard errors are reported in parentheses.

Appendix Table 1: Other Firm and CEO Correlates of the Strategy Score

	(1)	(2)	(3)	(4)	(5)	(6)
	Strategy Practices					
log rel. tenure position	-0.272**					
	(0.117)					
log rel. tenure company		-0.101				
		(0.083)				
log executive age			-1.440***			
			(0.290)			
Family ownership				-0.047		
				(0.156)		
Public firm					0.742***	
					(0.200)	
log firm age						0.095
						(0.069)
Noise controls	YES	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES
Obs	262	262	262	262	262	262

Appendix Table 2: Porter RDD estimates for all questions

	Baseline 1983		Placebo 1982		Placebo 1984	
Dependent variable	Estimate	p-Value	Estimate	p-Value	Estimate	p-Value
F1: Strategy Statement	0.031	(0.244)	-0.202	(0.284)	0.261	(0.235)
F2: Strategy Scope	0.601**	(0.304)	0.253	(0.435)	0.430	(0.386)
F3: Strategic Differentiation	0.370	(0.456)	0.360	(0.407)	-0.041	(0.510)
D1: Proactivity and External Focus	0.549	(0.406)	-0.424	(0.544)	0.255	(0.465)
D2: Information for Strategy Selection	0.056	(0.316)	0.142	(0.418)	-0.065	(0.410)
D3: Strategy Meetings: Frequency	-0.144	(0.328)	-0.391	(0.492)	0.507	(0.357)
D4: Strategy Meetings: Involvement	-0.398	(0.366)	-1.153**	(0.586)	0.238	(0.339)
D5: Consideration of Alternatives	-0.225	(0.286)	-0.610	(0.471)	0.265	(0.280)
D6: Structured Criticism	-0.073	(0.316)	-0.211	(0.323)	0.224	(0.389)
I1: Implementation Planning	-0.986**	(0.439)	-0.153	(0.423)	-0.179	(0.523)
I2: Strategy review and Follow-ups	-1.565***	(0.416)	-0.552	(0.546)	0.586	(0.777)
I3: Learning from Strategy Outcomes	-0.299	(0.318)	-0.655	(0.402)	0.508	(0.346)
I4: Strategy Communication	-0.929***	(0.288)	-0.294	(0.405)	-0.040	(0.450)
I5: Resistance to Change	-0.562**	(0.275)	-0.370	(0.276)	-0.321	(0.268)
Formalization	0.845**	(0.424)	0.413	(0.363)	0.056	(0.601)
Development	-0.025	(0.250)	-1.042***	(0.279)	0.333	(0.222)
Implementation	-1.165***	(0.302)	-0.499	(0.577)	0.139	(0.565)