

SUPPLEMENTARY FILES

APPENDIX 1. Method for Coding Generic Strategy Emphasis for Each Focal Firm and Focal New Outside Director

As we mentioned, the dependent variable of directional *strategic change* is operationalized as the difference between (a) the squared root of the squared difference between the firm's strategic emphasis at t_0 and the director's strategic emphasis at t_0 , and (b) the squared root of the squared difference between the firm's strategic emphasis at t_1 and the director's strategic emphasis at t_0 . Thus, this measure captures the difference between two Euclidean distances: that between the firm and the new director both at appointment, and that between the firm at one year after director appointment and the director at appointment. Formally, the measure of directional strategic change is:

$$\sqrt{(Firm\ Strategic\ Emphasis\ t_0 - New\ Outside\ Director\ Strategic\ Emphasis\ t_0)^2} - \sqrt{(Firm\ Strategic\ Emphasis\ t_1 - New\ Outside\ Director\ Strategic\ Emphasis\ t_0)^2}$$

where t_0 represents the year of appointment of the new outside director, while t_1 represents the following year. We defined strategy S_i to be that strategy with the highest emphasis (as measured by the Likert score) for a new outside director in the year of nomination and calculated the degree to which the firm moves emphasis toward that of S_i (please see note under Appendix 1c Step 3, illustrating the calculation of emphases for a director's strategic portfolio). This measure's advantage is that it accounts for the difference between the director's and firm's original strategic emphases (at the time of appointment t_0).

Below we explain how we assessed tactical and strategic emphasis at the focal firm level and for each focal new outside director using a two-stage manual/automatic coding process.

Manual Coding of Tactical Emphasis at the Focal Firm Level

We started with manual coding of firm-level tactical emphasis because the number of firms involved was manageable and this step enabled the construction of a tactics-level dictionary for subsequent, automatic coding. In line with this, we first recorded the emphasis (on a 7-point Likert scale) placed on 60 business-level *tactics* by our sample of 472 focal firms that went public in 1997, 2001, or 2004. As mentioned in the Methodology section, we tracked the yearly evolution of our firms up to 2011, for a total of 3,422 10-K reports. The 60 business-level tactics are consolidated under seven generic business-level *strategies*: Innovative Differentiation, Marketing Differentiation, Cost Leadership, Breadth, Quality Differentiation, Service Differentiation, and Corporate Strategy. Zott and Amit (2008) provide the list of business-level tactics, their definition, and their correspondence to the seven generic-business-level strategies; we present all of these items in Appendix 1-a. As in Zott and Amit (2008), we used scores calculated for the seven generic strategies in our empirical analysis (as discussed in the next section).

As a first step, the authors and six raters first manually coded perceived emphasis on all 60 business-level tactics for the entire sample of focal firm-years. We trained the raters to analyze 10-K reports and code the emphasis placed on each business-level tactic by each company in each report. Specifically, for each business-level tactic, we provided raters with the corresponding definition and set of keywords. Raters were

instructed first to read the annual reports of the focal firm for all years under analysis, and then to assess the level of emphasis placed on each tactic in each year. The process required that the rater move successively through the tactics, finishing the coding for one tactic for *all* years under study before coding the next tactic. This process ensured that decisions on a tactic's emphasis in a particular year were made relative (1) to ratings for that tactic for other years for the same firm and (2) to ratings for other firms in the same industry and year. Raters were also required to finish coding firms from the same industry before coding firms in another industry, to ensure consistent ratings within a given sector.

As described above, our process required examining a large number of 10-K reports (3,422) to decide the level of emphasis each represented for all 60 business-level tactics; given the time-consuming nature of this analysis, we could not use parallel scoring to establish interrater reliability. Instead, we decided to establish rating consensus at three-month intervals by asking all six raters to code the same two new firms in the industry currently being coded, for all 60 business-level tactics. One of the authors also coded these two firms and met with all raters to discuss and resolve coding differences. The maximum difference between the scores *any* two raters assigned was two points on the 7-point Likert scale; this occurred only for Innovative Differentiation tactics and only for biotechnology firms (6 business-level tactics were dropped due to their quantitative nature). Therefore, for the Innovative Differentiation tactics, we broadened the scale of our consensus rating exercise to six new firms in the biotechnology sector. We stipulated that the consensus exercise had to reflect very high agreement among raters, as defined as *six-way agreement* on the exact Likert rating assigned for the tactics rated for two companies (or six companies in the case of the biotechnology sector), using the updated dictionary. The raters were then required to recode the business tactics using the most updated dictionary, as discussed below.

An additional goal of our effort to establish rating consensus was to update the dictionary of words we used to assess emphasis on a given tactic. This process enabled us to be confident that raters would interpret and code tactics similarly. Thus, while we were unable to use parallel coding of each tactic by multiple raters for all firm-years, our process allowed us to reach consensus by updating our dictionary iteratively and recoding tactics accordingly, ensuring that our coding of tactics was (a) congruent across all raters and (b) reflected differences in emphasis of tactics across industries and years within and between the firms under study. We also checked raters' manual codings with the subsequent results of automatic coding, as described below.

Automatic Coding of Strategic Emphasis at the Firm and New Outside Director Levels

In the second stage of coding, we developed an automatic coding process based on Python programming language to recode tactical emphasis at the firm level (and check these ratings with those generated manually) and to use the automatic tactics ratings to determine strategic emphasis at the firm level, as well as to code strategic emphasis for new outside directors. The latter task required rating emphasis (on a 7-point Likert scale) placed on each business-level tactic by our sample of 750 focal new outside directors for a total of 9,355 10-K reports. We describe the entire process in detail below.

First, we used the dictionary we had created for each business-level tactic and a *bag-of-words* model to process the entire sample of 3,422 focal firm 10-K reports that we had already coded manually. The bag-of-words model is typically used in text-processing and is agnostic to word order. Appendix 1-b provides an example: the coding dictionary for the tactic "Tendency to beat competitors to the market," which falls under the Innovative Differentiation generic strategy. The level of emphasis coded is based on how many times

specific words or word sequences appear in the document, and how many times specific two-word combinations appear in the same sentence (regardless of exact sequence).

Because the automatic coding process provides us with counts for each document that are not normally distributed across the 3,422 documents, we normalized the sum of counts using the standard logarithm. Next, we calculated the minimum and maximum of the normalized sum of counts across the 3,422 documents and for each industry separately (as denoted by SIC1 code). We repeated the process above for each industry because firms in certain sectors may use specific words more frequently to describe their business itself, rather than to emphasize the use of a certain business-level tactic. Limiting this differentiation to SIC1 codes is sufficient for our purposes. Note that this industry-based normalization matches the procedure we used with our manual raters, whereby each was required to finish coding all firms in one industry before moving on to the next sector, to ensure consistency of ratings within a given industry. Finally, we divided the difference between the maximum and minimum values observed by seven, thus obtaining a 7-point Likert scale for the level of emphasis placed on a particular business-level tactic.

Thus for our hypothesis-testing analyses we used the ratings generated by the automatic coding. We used a 7-point Likert scale for two reasons. First, we felt it was important to follow as closely as possible the prior research of Zott and Amit (2008). Second, given that the output of the automatic coding was word counts, while the raters used 7-point Likert scores, transforming the automatic coding results to a 7-point Likert scale allowed us to directly compare rater and automatic coding. We used the firm-level tactical emphasis ratings generated by the automatic coding process to check the manual ratings coded earlier and found sufficient reliability. The automatic tactics ratings were aggregated under their respective strategies to yield a score for each strategy for a given firm in a given year; the strategy with the highest score was considered the firm's strategic emphasis for that year.

Next, we used the dictionary to code a director's strategic emphasis. For each director, we coded the public company, position, and period in which s/he worked. Because the SEC started to publish firm reports online in 1994, our observations were made for reports as early as that year. Our focal new outside directors had worked a total of 9,355 firm-years, and we downloaded the corresponding 10-K files from the SEC database. The SEC File Transfer Protocol (FTP) server allows access to the SEC's EDGAR filings. We then used the dictionary to code emphasis automatically on each business-level tactic in each prior firm and year in which a focal director held an executive position prior to a focal appointment.

Then, for each prior firm-year, we combined the business-level tactics under each generic business-level strategy (i.e., Innovative Differentiation, Marketing Differentiation, Cost Leadership, Breadth, Quality Differentiation, Service Differentiation, and Corporate Strategy). This provided us with the overall emphasis placed on each generic strategy at a prior firm-year level. An individual can be a manager in one firm at a time, but may be nominated as a director for multiple firms, and both roles can cover multiple years. Therefore, for each director, we first calculate each strategy's average score across years of service and then calculate the average of the resulting score across firms in which the director worked. Thus, strategic emphasis is weighted by the number of years a director promoted a given strategy across years and firms. This provided us with the level of emphasis placed on each generic business-level strategy for each focal new outside director. Appendix 1-c provides a stylized example of how we calculated the this strategic emphasis for a given new outside director.

APPENDIX 1-a Generic strategies and related business-level tactics

Generic business-level strategy	Business-level tactic
<i>S1: Innovative differentiation</i>	Use of major and frequent product-service innovations Tendency to beat competitors to market Innovative orientation Competitive aggressiveness R&D expenditures for product development R&D expenditures for process innovations Rate of product innovations Nonimitability of a firm's own products and processes New product development Product R&D The creation of state-of art products Continual refinement of product lines Selling high-priced products Obtaining patents/copyrights Innovative marketing techniques Marketing of new products
<i>S2: Marketing differentiation</i>	Advertising extensiveness Use of market segmentation Use of prestige pricing Advertising expenditures Emphasis on marketing department organization Emphasis on strong sales force Innovation in marketing techniques Use of advertising Brand identification Attractive design and packaging Securing reliable distribution channels Improvement of existing products Producing a broad range of products
<i>S3: Cost leadership</i>	Measuring the use of cost centers Fixing standard costs by analyzing variances for cost control Price cutting Minimization of advertising expenses Risk proclivity Boldness of decisions Efforts to achieve economies of scale Capacity utilization Reducing costs through the firm Reducing manufacturing costs primarily Improvement of existing manufacturing process New manufacturing process Modernization and Automation of production process Cost leadership measured by two items assessing the position of the firm in

	terms of cost and price
	Use of efficient inventory management techniques
	Cost reduction efforts
	Just-in-time manufacturing
<i>S4: Breadth</i>	Number of distinctly different product lines
	How different technologies for these products lines
	Product's lines marketing
<i>S5: Quality differentiation</i>	Strict product quality control
	Benchmarking best manufacturing processes in industry
	Benchmarking best manufacturing processes in anywhere
	Immediate resolution of customers problems
	Product improvements based on gaps in meeting customer expectations
<i>S6: Service differentiation</i>	New customer services
	Improvement of existing customer services
	Improvement of sales force performance
<i>S7: Corporate Strategies</i>	Breadth of markets in which the firm competes
	Breadth of businesses in which the firm competes
	Breadth of geographies in which the firm competes

APPENDIX 1-b Coding dictionary for the business-level tactic " Tendency to beat competitors to the market " (part of Innovative Differentiation generic strategy)

Dictionary		
Definition: Measuring tendency to follow competitors in introducing new things or ideas OR being ahead of competitors in product novelty or speed of innovation		
Scaled 1 = there is a strong tendency to follow competitors in introducing new things or ideas, to 7 = we always try to be ahead of competitors in product novelty or speed of innovation and usually succeed		
Sequence of words	Two-word combinations within the same sentence	
new market	base	increas
product acceptance	earl	presence
secure customer	enhanc	position
increas penetration	enter	market
increas presence	entry	market
maintain leadership	expan	market
market acceptance	grow	share
market entry	increas	penetrat
market leadership	increas	presence
market opportunit	increas	share
market penetration	lead	maintain
market position	lead	market
market presence	lead	position
market share	leverag	position
	market	opportunit
	market	position
	market	pursu
	market	reach
	market	underserved
	channel	increas
	build	market
	increas	market
	market	penetrat
	market	presen
	market	serve
	market	share
	position	share

APPENDIX 1-c Steps to compute the strategic emphasis of a new outside director (stylized example)

New public firm (NPF) went public in 2004. NPF appointed a new outside director named John Smith in 2010. Before appointment, John Smith has been a director in 3 other companies (A, B, and C) for the periods 1999-2004, 2004-2010, and 2005-2010 respectively, and has been the CEO of company A for the period 1995-2004.

Step 1*: Determine the emphasis (7-point Likert score) for each prior company, year of service, and generic strategy** for new outside director John Smith

Company Name	Year of Service	Position	S1	S2	S3	S4	S5	S6	S7
A	1995	CEO	1	1	2	1	4	2	1
A	1996	CEO	1	1	2	1	4	2	1
A	1997	CEO	1	1	2	1	4	2	2
A	1998	CEO	2	1	2	1	3	3	2
A	1999	CEO & Director	2	1	2	2	3	3	2
A	2000	CEO & Director	1	1	3	3	3	3	3
A	2001	CEO & Director	2	1	4	3	4	3	3
A	2002	CEO & Director	2	3	4	3	4	3	3
A	2003	CEO & Director	2	3	4	4	4	3	2
A	2004	CEO & Director	2	2	5	4	4	3	2
B	2004	Director	3	2	3	3	4	3	2
B	2005	Director	2	1	2	3	3	2	1
B	2006	Director	1	1	1	2	3	2	1
B	2007	Director	1	1	2	2	3	2	1
B	2008	Director	2	1	2	1	3	2	1
B	2009	Director	1	1	3	1	3	2	1
B	2010	Director	2	1	3	1	3	2	1
C	2005	Director	3	3	1	5	4	4	2
C	2006	Director	4	4	2	5	4	5	2
C	2007	Director	4	3	2	6	4	5	3
C	2008	Director	4	4	2	6	4	5	3
C	2009	Director	3	3	1	6	4	4	3
C	2010	Director	4	5	3	6	4	5	3

*Note: The emphasis that a prior company places at any one year on a particular generic strategy is computed as the average of the emphasis (Likert score) of their constituent business-level tactics. For example, S1 (Innovative Differentiation) contains 14 business-level tactics (see Appendix 1-a). This emphasis (Likert score) on each business-level tactic was coded automatically from the 10-K report, as we explained above.

**Note: S1: Innovative differentiation; S2: Marketing differentiation; S3: Cost leadership; S4: Breadth; S5: Quality differentiation; S6: Service differentiation; S7: Corporate Strategies

Step 2: Compute the average emphasis for each prior company and generic strategy for John Smith

Company Name	S1	S2	S3	S4	S5	S6	S7
A	1.60	1.50	3.00	2.30	3.70*	2.70	2.10
B	1.71	1.14	2.29	1.86	3.14	2.14	1.14
C	3.67	3.67	1.83	5.67	4.00	4.67	2.67

Step 3: Compute the average emphasis for each strategy. The outcome represents the overall strategic emphasis for John Smith:

	S1	S2	S3	S4	S5	S6	S7
Emphasis score	2.33	2.10	2.37	3.27	3.61*	3.17	1.97

*Note: Strategic emphasis is on S5. It is this strategy that will be considered dominant in the director's strategic portfolio and considered in the Euclidean distance equations for *directional strategic change*

Appendix 2. Information on Selection Equation

We address endogeneity in new director selection through a two-stage Heckman regression model (Heckman 1979). The procedure involves constructing a probit model to predict *director selection* (1 if the focal firm nominates a new outside director on the board in the year of observation; 0 if the focal firm does not nominate a new outside director on the board in the year of observation) (Acharya and Pollock 2013), and then employing an OLS model to separately predict *non-directional strategic change* and *directional strategic change*, respectively. We use two instruments uncorrelated with the second-stage dependent variable and used only in the first stage. The first instrument is *count prestigious outside directors* which captures the intuitive notion that a new director would be particularly attracted to join a company with prestigious directors, which we operationalize as the number of incumbent outside directors that are prestigious. The second instrument is the *need for strategy experience* which captures whether firms actively seek to select a new outside director whose strategic knowledge fills the firm's need for someone experienced with a specific strategy; it is measured for each strategy as 1 when incumbent directors' experience with that strategy is significantly lower than the population average (i.e., more than one standard deviation below the mean for all outside directors) and 0 otherwise. In addition, we control for *board size* and *CEO prestige*.

Bivariate Correlations between Strategic Change and Variables Included in the First Stage Heckman Selection Equation

	Non-directional strategic change	Directional strategic change
Non-directional strategic change		
Directional strategic change	0.04	
Count prestigious outside directors	-0.04	0.12
Firm needs Innovative Differentiation	0.05	-0.07
Firm needs Marketing Differentiation	0.02	-0.06
Firm needs Cost Leadership	0.04	-0.01
Firm needs Breadth	0.02	-0.03
Firm needs Quality Differentiation	0.05	-0.06
Firm needs Service Differentiation	0.06	0.00
Firm needs Corporate Strategy	0.03	-0.04
Board size	0.01	0.07
CEO prestige	0.00	0.17

First-Stage Heckman Selection Regression

	Director selection
Count prestigious outside directors	0.89*** (0.02)
Firm needs Innovative Differentiation	-0.11 (0.09)
Firm needs Marketing Differentiation	-0.02 (0.10)
Firm needs Cost Leadership	0.25* (0.11)
Firm needs Breadth	-0.21* (0.11)

Firm needs Quality Differentiation	0.10 (0.09)
Firm needs Service Differentiation	0.15+ (0.07)
Firm needs Corporate Strategy	0.12 (0.08)
Board size	0.21** (0.01)
CEO prestige	0.03 (0.05)
Constant	-1.73*** (0.05)
Observations	3422
Wald Chi2	265***

All, except Constant, are standardized beta coefficients. Robust standard errors are in parentheses. Two-tail effects. + p < 0.1 * p < 0.05 ** p < 0.01 *** p < 0.001

Appendix 3. Robustness Checks and Post-hoc Analyses

In additional analyses, we also account for firm success using various measures such as firm revenues and Tobin's Q. These measures were not significant, and their inclusion/exclusion did not affect our results. We also controlled for a larger number of director attributes. We control for the ratio of prestigious outside directors out of total number of directors, for how busy incumbent directors are by using the ratio of outside directors on the board that are also directors of at least one other firm, and *for outside director tenure (average and variance)*, expressed in years. At the CEO level we controlled for *CEO Ownership* and *CEO change*. Lastly, we controlled for top management team (TMT) characteristics which included *TMT size*, *TMT ownership*, and the *proportion of senior managers with functional backgrounds* in either *general business* (business development, strategy, and sales), *marketing* (including public relations), *finance* (including accounting and law), and *R&D* (including production, operations, and engineering). None of these controls were not statistically significant and results were not affected by their inclusion/exclusion.

We also considered other instruments for the first-stage Heckman model predicting director selection. Models using number of director departures only, strategic needs only, or VC backing only (on the assumption that VCs, when present, will guide selection of expert directors) provided results similar to those reported here. Given potential concerns that depth/breadth effects might possibly be the result of unobserved firm-specific characteristics, we also considered supplementing our Heckman two-stage estimation procedure with a 2SLS estimation procedure. We used the Wu-Hausman F-test and Durbin-Wu-Hausman χ^2 statistics to determine whether the exogenous regressor in the model (i.e., depth/breadth) is in fact endogenous (stata command *ivregress 2sls* followed by the *estat endogenous* postestimation command). We used two hold-out variables that do not seem to affect strategic change in our original analyses but might be relevant in assessing a new outside director's depth/breadth: *consulting* and *graduate education*. Perhaps, as Barnett and Koslowski (2002) suggested, consultants appear to engage in theory-based reasoning and to use more causal discussion and argumentation to support their recommendations, consistent with our notion of depth/breadth. Perhaps graduate education, as Useem and Karabel (1986) and Palmer and Barber (2001) have argued, can provide social network connections that contribute to the dissemination of varied knowledge, which in turn can increase depth/breadth. However, the Wu-Hausman F-test [1.55, d.f.(1,674); p = .21] and Durbin-Wu-Hausman χ^2 [1.72(1); p = .19] test statistics for non-directional strategic change and the Wu-Hausman F-test [.09, d.f.(1,674); p = .77] and Durbin-Wu-Hausman χ^2 [.10(1); p = .75] test statistics for directional strategic change indicate that our Heckman/OLS estimation procedure is appropriate.

As discussed, our first outcome of interest has been non-directional strategic change, i.e., the extent to which the deep/broad new outside director's influence can be seen in moving a firm's strategy in *any* new direction. We conducted supplemental analyses to test for the influence of deep/broad directors on non-directional strategic change, using two additional indicators. The first indicator is binary, capturing whether a firm has changed ($I = \text{yes}; 0 = \text{no}$) its own dominant strategy (using the seven generic strategy types discussed earlier). The second indicator examines changes in the proportional weight assigned to each of the seven generic strategies, rather than the scores themselves, again measured in absolute difference terms (t_1 to t_0) and then summed (Lungeanu et al. 2016). We found supportive results for each of these two indicators at $p < 0.05$, adding confidence to our results showing that deep/broad directors do exert an outsized influence on firm strategy.

We also address potential endogeneity concerns, such as the possibility that firms may be seeking greater strategic change and seeking out new outside directors who are particularly broad and deep, relative to the population of directors from which they are selected. To address this possibility, we first calculated the depth/breadth score for the entire sample of new outside directors in our focal firms (who make up the population of IPO firms in our period). We then calculated whether a focal new outside director has a depth/breadth level above or below the median of the population, and we used this distinction to run two separate analyses predicting strategic change. New outside directors with depth/breadth levels below the population median (using the average produced similar effects) affected both indicators of strategic change. This analysis shows that the effect of depth/breadth on strategic change is strong even when new outside directors are less deep/broad than the population from which they were selected.

We have also considered several aspects concerning the notion of expertise. First, because we cannot make precise estimates regarding the rate at which experience translates into expertise (i.e., a learning function), we considered thresholds other than our three-year period for director experience to convert into expertise. Specifically, we used 1, 2, 4, 5, 6, and 7 years as the window, and found that the goodness-of-fit was best (smallest AIC) using a value of 3 years. We also considered a multiplicative measure of depth/breadth. While measuring the blend of expertise depth/breadth this way tends to downplay the role of depth in the formation of expertise, our results remained unchanged, lending further support to our operationalization of expertise depth/breadth. Finally, we recalculate our expertise depth/breadth predictor using Farjoun (1994) industry reclassification (i.e., RIGs). RIGs account for similarity in knowledge required to work across SIC3 industry categories. When two industries fall under the same RIG, expertise would be the same making depth deeper and breadth smaller. Our results were robust to this alternative specification.

Finally, our fine-grained measure of strategic change is based on 7-point Likert scores and reflects the extent to which a strategy is emphasized in the 10-K report of a firm. We can also address the substantive significance of our results by adding an illustration of how our dependent variable can translate into more familiar and practical indicators. We use the example of Innovative Differentiation, which as a generic strategy can also be proxied using the familiar R&D Intensity ratio (measured as R&D expenses / Sales). We linked our finding on Innovation Differentiation (i.e., in which we show that adding a deep/broad director influences directional strategic change of greater Innovative Differentiation) to the measure of R&D intensity by employing a two-step process. First, we use our regression predicting the directional strategic change described above. We then calculate the linear prediction from that fitted model and use it to run a new regression -- this time with R&D Intensity as the dependent variable at $t+1$ and $t+2$. Here, we find that one unit increase in the predicted value of our strategic change measure results in a sizable 30% increase in R&D intensity in the following year (and a similarly large 26% increase in R&D Intensity at $t+2$ years).

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