Online Appendices
for
"A Coming of Age: Reviewing and Reinvigorating the Strategic Role of Firm Age in Boundary-Changing Activities"
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Appendix 1

Table A1.1: The roles and effects of firm age as viewed through a representative collection of theoretical lenses

Theoretical lens	Illustrative explanations of the roles & effects of firm age
Organizational Ecology Aldrich, 1999; Barron et al., 1994; Bruderl & Schussler, 1990; Hannan, 1998; Hannan & Freeman, 1977; Ranger-Moore, 1997; Stinchcombe, 1965	Firms face ongoing, but changing, threats to its survival throughout their life cycles; the organizational ecology view emphasizes three patterns of age dependence in explaining firm failure. First, young firms are susceptible to the "liability of newness," which stems from a young firm's lack of access to sufficient resources, stable external relationships, and effectively-defined organizational roles and structures. Second, running counter to the liability of newness, scholars have proposed that young maturing firms may be subject to the "liability of adolescence." This view suggests that very young firms in fact benefit from an initial endowment of resources that facilitates their survival during a brief honeymoon period. When the firm exhausts this resource stock, however, the honeymoon ends and the now-adolescent firm's risk of failure increases. Finally, older firms are vulnerable to the "liability of aging" (or the "liability of senescence"), which portends the perils of structural inertia, inefficiency, and dangers of obsolescence. Much of the liability of aging is driven by factors that inhibit firms' adaptation to change. As the firm ages, the very characteristics that enabled firms to survive adolescence and beyond – such as reliability, consistency, coordination, and control – create both internal conditions (e.g. vested interests, institutionalization of organizational processes and goals) and external conditions (e.g. inter-firm agreements, compromises made to influencing figures such as politicians and elites) that inhibit change.
Evolutionary View of the Firm Barnett & Burgelman, 1996; Baum & Singh, 1994; Levinthal, 1991; Levinthal, 2021; Nelson & Winter, 1982	Routines, the "genes" of the firm, are more likely to be present in greater variety and more deeply rooted in older firms than younger ones; routines offer firms valuable efficiency advantages. However, although maturing firms may increasingly benefit from these efficiencies, older firms' strong retention mechanisms can inculcate path dependencies and thus firm rigidities. These rigidities can pose severe consequences to firms. While firms' routines may suit a particular strategy, firms will need to adapt to environmental changes to survive and prosper. Firm rigidities impair adaptation, as firms resist changing their extant routines and exploring for new ones. Younger firms are not as susceptible to organizational rigidities – their routines are not as entrenched and thus these young firms are more flexible and open to variation – and therefore they are better positioned to respond to new opportunities than older firms. However, this flexibility often comes at the cost of reliability.

Resource-Based View of the Firm Barney, 1991; Dierickx & Cool, 1989; Lieberman & Montgomery, 1988; Penrose, 1959; Wernerfelt, 1984	Resources take time and investment to build and acquire. This puts young firms at a natural disadvantage relative to older ones. Furthermore, consequent with lagging behind older firms in resource accumulation, young firms also trail in realizing strategic advantage since they have had fewer resources and less time to invest in their chosen strategy. However, as firms expand their resource bases as they age, they increase their exposure to related vulnerabilities, such as "incumbent inertia." In this case, firms make investments in a set of resources that aligns with a particular strategy. Once the firm starts along a certain path of resource investment, with time and continued investment it becomes harder to switch to a new set of resources due to such factors as sunk costs and lock-in. It becomes increasingly onerous and expensive, organizationally and financially, to widen the firm's resource base into new areas. Another advantage for young firms stems from their tendency to make high productive use of their assets, which may push them to seek out new assets quickly. Older firms may have lower asset utilization. While older firms will still grow to make better use of those assets, this growth may be far slower when compared with younger firms.
Behavioral Theory of the Firm Argote & Greve, 2007; Cyert & March, 1963; Gavetti, Greve, Levinthal, & Ocasio, 2012; Greve, 2002	Firms set predefined aspiration levels for their performance; when outcomes fall below acceptable performance, firms search for satisfactory solutions to address the performance gap. As firms age, the ways in which they make sense of performance feedback and respond to it likewise change. Younger firms' aspiration levels are less stable than those of older firms; they also have fewer and more malleable routines. This enables young firms to more quickly adjust their aspiration levels and more widely search for possible solutions, but this flexibility comes with the tradeoff of unreliability. Older firms have established standard operating procedures and deeply-rooted routines, making them more consistent in their aspirations and actions, but with rigidities then can render their solution-searching and problem-solving processes narrower, slower, and less effective than those of younger firms.
Organizational Learning & Capability Development Huber, 1991; Leonard-Barton, 1992; Levinthal & March, 1993; Levitt & March, 1988; March, 1991;	Firm capabilities are a valuable outgrowth of organizational learning. In addition to the time, experience, and feedback requirements that are typically associated with learning, capability-building may also require deliberate efforts by the firm to articulate, codify, and retain the knowledge it gains during the learning process. As such, capabilities evolve over time. This means that older firms will have had the opportunity to build capabilities that younger firms have not – these could include higher-order coordinating capabilities and dynamic capabilities. Further, younger firms are likely to be disadvantaged relative to older ones in terms of the depth and extent of their capability portfolios. Yet, learning poses hazards, and firms will be more susceptible to some of these hazards as they age. Competency traps illustrate one such hazard. A firm's success – be it serving a certain type of market, producing a particular

Teece, Pisano & Shuen, 1997; Winter, 2003; Zollo & Winter, 2002	product, or using a specific process – will encourage the firm to continue with the activity. But this success can lead to complacency. Firms can get "stuck in a rut" and will not be prepared (or perhaps even aware of the need) to adapt as its conditions change.
Agency Theory Amihud & Lev, 1981; Fama, 1980; Jensen, 1986; Jensen & Meckling, 1976; Shleifer & Vishny, 1989	Agency issues create an overwhelming impetus for self-interested managers to grow the firm without restraint for private gain; they discourage managers from refocusing the firm or pursuing only those growth opportunities that benefit the shareholder. These agency problems are exacerbated as the firm ages, since management becomes increasingly entrenched and eager to control ever more resources to reap the compensation gains that come with them. One way in which these agency issues manifest is in managers' desire to reduce their unemployment risk, which induces them to diversify the firm. This incentive will continue unabated throughout the firm's lifecycle, and could increase in intensity as the executive team expands as the firm ages. To the extent that young firms are more likely to be run by founders and owners, young firms will avoid this self-interested driver of firm growth. Agency problems can also cause firm rigidities, which will be intensified as the firm ages. These rigidities stem from the likes of internal political frictions and perceived obligations to incumbent suppliers and customers.

References – Appendix 1

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Appendix 2: Literature Review Methodology – Supplemental Explanation

Data source (journal) identification details

We used the *Financial Times* "FT50" Research Rank list and the Academic Journal Guide from the Chartered Association of Business Schools (ABS) to discern appropriate journals from which to search for paper candidates for our review sample. The FT50 journals have broad audience appeal, whereas the larger ABS list also includes specialized journals with more focused mandates.

The FT50 list was most recently revised in 2016. For completeness, we include the publications that were dropped at that point, which leads to 54 FT-recognized journals. From the ABS list, we included journals ranked 4* and 4 from all relevant subject areas (ACCOUNT, ECON, ENT-SBM, ETHICS-CSR-MAN, FINANCE, IB&AREA, ORG STUD, SOC SCI, STRAT), as well as those ranked 3 in the two areas most closely related to this review (STRAT, or strategy, and ETHICS-CSR-MAN, which includes management-focused journals).

Search terms

The search terms that we used with Web of Science to identify potential paper candidates for the review sample are provided in **Table A2.1** below. During initial testing, we determined that specifying "firm age" was too restrictive, as it could cause us to overlook papers that instead referred to the likes of "company age", "organization's age", or the "age of the firm." We therefore use simply "age" and its main derivatives. In addition, we recognized that scholars may refer to firm age using lifecycle nomenclature; we included terms to capture this concept as well. Set 2 pertains to firms' inorganic boundary-changing activities (BCAs) from a tool-based perspective, and thus contains search terms for acquisitions, alliances, divestitures, and their commonly-used equivalents (such as M&A, joint venture (JV), or sell-off). We developed Set 3 since firm BCAs are often studied in the context of wider strategic activity phenomena, such as organizational turnaround, internationalization, and strategic renewal. For the search process itself, we designed the query to require a match in set 1 and a match in sets 2 or 3.

Table A2.1: Search term sets for Web of Science queries, organized by topic

Topic	Search Terms
Set 1: Firm age	age, ages, aging, ageing, lifecycle*, life-cycles, "life cycle", "life cycles"
Set 2: Firm boundary-changing activities – Tool orientation	acqui*, merg*, M&A*, divest*, disposal*, "asset sale", spinoff*, spin-off*, selloff*, sell-off*, "spin off", "sell off", "spin offs", "sell offs", partnership*, allianc*, JV, JVs, IJV*, "joint ventures", "joint venture", "joint venturing"
Set 3: Firm boundary-changing activities – Phenomenon orientation	restructur*, outsourc*, renew*, pivot*, bankrupt*, turnaround*, internationali*, "born global", "born-global", reconfigur*, redeploy*, boundary-chang*, "boundary changing", "boundary change", "boundary changes", "boundary-changing", scope-chang*, "scope-changing", "scope change", "scope changes"

The search terms that we used with Google Scholar had to be more limited and focused than those used with Web of Science, since Googe Scholar's full-text searching makes its results prone to mismatches and false positives. To minimize this issue, we ran three separate searches using Google Scholar's "advanced" function, one each for acquisitions, alliances, and divestitures. To illustrate, in the case of acquisitions, we required a match with both "acqui" and "age" along with a match with at least one of "firm", "organization", or "organisation". Sorting by Google's relevance rating, we examined the top 100 results. We followed the same process for alliances (substituting "alliance" for "acqui") and divestitures (using "divest"). Thus, in total, we collected the 300 topmost-relevant results returned by Google Scholar. We then subjected these papers to our screening and assessment procedures.

Additional screening process details

We adopted a flexible definition of firm age, such that papers pertaining to the age of the firm's components (business units, subsidiaries, acquired targets) or the firm's critical strategic resources (employees, competitively-important assets, technology) were eligible.

Numerous false positives were driven by age in the context of patients and clinical participants (there were an extensive number of irrelevant matches due to health-, disease-, medicine- and psychology-related studies), as well as to survey respondents. Other false positives were due to such issues as references to time periods ("digital age, "information age", "industrial age"), the residual "-age" from line-break words, age groups, perishable inventory, and the industry, IT, and product lifecycles. Further, there were many instances when the tool-related words were used in a non-strategy sense (acquisition of raw materials, disposal of hazardous products).

During the screening process, we noted two research streams that are closely related to our focus on firm age in the context of boundary-changing activities. These included: (1) studies pertaining to the ages (and firm-specific tenures) of leadership and governance team members (CEO, top management team members, directors) involved in firms' acquisitions, alliances, and divestitures, and (2) research examining alliance and JV duration and its effect on transaction performance. While these papers did not meet the evaluation criteria for inclusion in the final sample (as they do not strictly address firm age), these literatures are still salient and complementary to our review topic. Accordingly, we retained these papers for potential enrichment of our analysis and future research recommendations.

Appendix 3: Papers in the review sample

Note: The paper numbers provided here correspond to those used in the tables of **Appendix 4** below.

1. Aharonson, B. S., Tzabbar, D., & Amburgey, T. L. (2016). Do they know something we don't? Endorsements from foreign MNCs and domestic network advantages for start-ups. *Global Strategy Journal*, *6*(1), 31-49.
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4. Arte, P., & Larimo, J. (2019). Taking stock of foreign divestment: Insights and recommendations from three decades of contemporary literature. *International Business Review, 28*(6), 101599.
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18. Chang, K. (2008). The strategic alliance of the biotechnology firm. *Applied Economics*, *40*(23), 3089-3100.
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Appendix 4: Papers that underpin Figures 5, 6, and 7

Note: Paper numbers referenced in the tables below correspond to those provided in **Appendix 3** above.

Table A4.1: Papers that underpin Figure 5

	Acquisition	Alliance	Divestiture
Motivation, investigation, and initiation	3, 6, 21, 46, 48, 64, 85, 86, 88, 93, 95	7, 18, 20, 22, 35, 45, 47, 62, 64, 70, 71, 85, 93, 94, 95, 97	6, 19, 68, 70, 88
Target/partner/buyer search & selection	6, 36, 37, 52, 64, 75, 84, 86	36, 45, 47, 60, 64, 76, 91, 97	4, 6, 8, 9, 23, 32, 38, 40, 44, 59, 68, 83, 87
Deal design	37, 64, 66, 75, 84, 92, 93	47, 64, 82, 93	44, 92
Pre-completion implementation			23, 61
Deal completion	3, 6, 17, 33, 37, 46, 63, 66, 88	1, 18, 22, 35, 47, 65, 71, 79, 90	6, 16, 29, 32, 41, 43, 56, 57, 59, 78, 88
Post-completion implementation & evaluation	6, 11, 12, 15, 27, 34, 36, 39, 42, 49, 51, 55, 58, 64, 66, 73, 74, 75, 85, 95	1, 2, 5, 7, 10, 13, 14, 22, 24, 25, 26, 28, 30, 31, 36, 50, 53, 54, 60, 62, 64, 67, 71, 72, 74, 77, 80, 81, 85, 89, 90, 91, 94, 95, 96, 98	6, 23, 39, 61, 69

Table A4.2: Papers that underpin Figure 6

	Acquisition	Alliance	Divestiture
Legitimacy & Status	12, 36, 46, 84	1, 5, 22, 30, 31, 36, 50, 53, 62, 76, 89, 91	4, 57, 69, 83
Experience & Learning	11, 27, 34, 42, 49, 51, 55, 58, 74, 75, 86, 92, 95	2, 10, 25, 26, 28, 30, 31, 54, 65, 67, 70, 71, 72, 74, 80, 91, 95, 97, 98	8, 16, 43, 70, 78, 83, 92
Resource Access	3, 21, 27, 33, 37, 48, 63, 66, 86	7, 18, 20, 35, 62, 71, 77, 80, 90, 94	57, 68, 69, 83
Resource & Process Development	11, 34, 39, 55, 85	22, 31, 35, 77, 79, 80, 85, 90, 98	16, 19, 23, 39, 40, 61, 68, 69
Inertia & (In)flexibility	11, 34, 39, 46, 52, 64, 66, 75, 85	2, 13, 14, 22, 31, 54, 62, 64, 85	9, 23, 39, 87
Transparency & Information Availability	33, 75, 84	18, 77, 98	32, 41, 59
Cohesiveness & Compatibility	58	5, 7, 10, 28, 45, 50, 54, 60, 81, 82	41

Table A4.3: Papers that underpin Figure 7

	Motivation, investigation, and initiation	Target / partner / buyer search & selection	Deal design	Pre-completion implementation	Deal completion	Post-completion implementation & evaluation
Legitimacy & Status	22, 46, 62	4, 36, 76, 83, 84, 91	84		1, 22, 46, 57	1, 5, 12, 22, 30, 31, 36, 50, 53, 62, 69, 89, 91
Experience & Learning	70, 71, 86, 95, 97	8, 75, 83, 86, 91, 97	75, 92		16, 43, 65, 71, 78	2, 10, 11, 25, 26, 27, 28, 30, 31, 34, 42, 49, 51, 54, 55, 58, 67, 71, 72, 74, 75, 80, 91, 95, 98
Resource Access	3, 7, 18, 20, 21, 35, 48, 62, 68, 71, 86, 94	37, 68, 83, 86	37, 66		3, 18, 33, 35, 37, 57, 63, 66, 71, 90	7, 27, 62, 66, 69, 71, 77, 80, 90, 94
Resource & Process Development	19, 22, 35, 68, 85	23, 40, 68		23, 61	16, 22, 35, 79, 90	11, 22, 23, 31, 34, 39, 55, 61, 69, 77, 80, 85, 90, 98
Inertia & (In)flexibility	22, 46, 62, 64, 85	9, 23, 52, 64, 75, 87	64, 66, 75	23	22, 46, 66	2, 11, 13, 14, 22, 23, 31, 34, 39, 54, 62, 64, 66, 75, 85
Transparency & Information Availability	18	32, 59, 75, 84	75, 84		18, 32, 33, 41, 59	75, 77, 98
Cohesiveness & Compatibility	7, 45	45, 60	82		41	5, 7, 10, 28, 50, 54, 58, 60, 81