When is Less More? Boundary Conditions of Effective Entrepreneurial Bricolage

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ABSTRACT

While prior research suggests that entrepreneurial bricolage is often useful as a coping mechanism for resource-constrained new ventures, other accounts document detrimental effects of bricolage. As the conditions for effective bricolage have not been systematically examined in prior research, we develop and test theoretical explanations for some important boundary conditions. We propose that while bricolage has a positive influence through a *resource replacement* mechanism, it may be detrimental through the intertwined "second-best solutions" and "tinkering trap" which together lead to an *accumulation of compromises* that may result in a detrimental path dependence. We hypothesize that the intensity of these counteracting mechanisms differs depending on the venture's stage of development (nascent vs. operational) and its level of growth expectations. In essence, we argue that ventures expecting to achieve more derive greater benefit from resource replacement. In addition, they are more likely to resist an accumulation of compromises. We test our hypotheses using a longitudinal study of early-stage ventures. Although the results mostly support our theory, they also point to one interesting surprise for which we extend our theorizing to propose an explanation. Counter to the prevailing view in the literature, we find that bricolage is particularly effective for developing competitiveness for early-stage ventures striving to develop and grow. Complementing this, our results suggest the net effects of bricolage may actually be detrimental to the competitiveness of operational ventures that are not actively trying to grow.

Keywords: Bricolage; Competitiveness; Nascent Ventures; Growth Expectations.

WHEN IS LESS MORE? BOUNDARY CONDITIONS OF EFFECTIVE ENTREPRENEURIAL BRICOLAGE

Given that resource constraints characterize most newly created ventures (Aldrich & Ruef, 2006), theories of entrepreneurship must be able to explain both the patterns and significant outcomes of resourceful behavior. By conceptualizing entrepreneurial bricolage as "making do by applying combinations of the resources at hand to new problems and opportunities," Baker and Nelson (2005) provided an important starting point for understanding how some entrepreneurs create and nurture new ventures despite ostensibly inadequate resources. However, while subsequent work has largely portrayed the effects of bricolage as positive for the development of new ventures (Guo, Zhang, & Gao, 2018; Senyard, Baker, Steffens, & Davidsson, 2014; Stenholm & Renko, 2016), other studies have identified both negative performance outcomes such as through the creation of substandard solutions and also poor reliability that may require continued re-working (Ciborra, 1996; Desa & Basu, 2013; Lanzara, 1999; Sarkar, 2018; Stinchfield, Nelson, & Wood, 2013). We thus know that bricolage can be useful to early-stage firms trying to compete, and we also know that it can be harmful. However, we know little about what determines its net effects.

Given the popularity of the bricolage concept it is somewhat surprising that prior research has done little to examine the boundary conditions for *effective* bricolage. In this paper, we therefore ask the important question, "Under what conditions does bricolage enhance or attenuate the competitiveness of early-stage ventures?" We take significant steps toward answering it by drawing on existing bricolage research to identify new theoretical concepts that we argue are implicit in prior work. In a rare example of systematic empirical testing of claims about bricolage, we use these concepts to develop hypotheses which we then test using

longitudinal data from a purposive sample of 155 "high potential" early-stage ventures, supported by robustness tests on a random sample of 456 early-stage ventures.

The constructs we identify—resource replacement, second-best solutions, tinkering trap and accumulation of compromises—allow us to specify mechanisms and develop theory grounded in prior work on bricolage. Using these mechanisms to theorize the causes of positive and negative effects of bricolage, we find that the net effects of effective bricolage are shaped by two important boundary conditions: whether a firm remains nascent or has become operational, and by its growth expectations. The outcome on which we focus *competitiveness*— defined as the capacity to compete effectively against others in one's market—allows us to compare outcomes across nascent and operational ventures. We measure competitiveness by founder perceptions and provide additional support by comparison with objective performance.

We find that engaging in bricolage contributes to the competitiveness of nascent ventures regardless of growth expectations, but only contributes to the competitiveness of operational ventures when they expect to grow. Our most striking empirical findings challenges conventional understanding that bricolage is most useful as a coping mechanism for firms that are just trying to "get by" (Beunza & Stark, 2003; Fisher, 2012; Gras & Nason, 2015; Mair & Marti, 2009; Stinchfield et al., 2013; Welter, Mauer, & Wuebker, 2016). Instead we find that engaging in bricolage can be *detrimental* to competitiveness among the least ambitious category of our sample – operational ventures with low growth expectations. We deepen the theoretical foundations of entrepreneurial bricolage by providing a conceptual framework that goes well beyond the traditional and extreme bifurcation of parallel versus selective bricolage (Baker & Nelson, 2005), thus providing a basis for researchers to theorize and explore the causes of both positive and negative effects across the broad spectrum of firms engaged in bricolage.

Supporting this, we apply the concept of satisficing and acceptability thresholds to clarify what it means to do too much bricolage versus doing the wrong sorts of bricolage, allowing us to suggest how and why the latter is more likely to cause problems. We show that although bricolage carries a number of risks to competitiveness, that nascent ventures and ventures with growth intentions – and perhaps more generally, ventures that are endeavoring to develop – are often able to avoid the counter-productive patterns of behavior that feed the accumulation of compromises. As such, we also contribute to an emerging stream of papers seeking to understand how even high levels of bricolage can contribute to positive outcomes (Busch & Barkema, 2021; Reypens, Bacq, & Milanov, 2021; Senyard et al., 2014). Finally, by shifting from an emphasis on bricolage as a means of coping – which is extraordinarily robust and well-documented – to bricolage as an engine of competitiveness, we open large new territories for the development of bricolage theory and research. Our work shows that bricolage is commonly an engine not just of coping, but also of advantage-seeking.

THEORY AND HYPOTHESIS DEVELOPMENT

Our focus is on understanding the boundary conditions for when bricolage is likely to be useful to early-stage (nascent or young operational) ventures. Nascent ventures are not yet engaged in regular transactions with customers and most young but operational ventures are still focused on positioning themselves to compete effectively against a set of incumbent firms. Therefore, standard performance constructs used for established firms, such as revenues and profits, are less useful for understanding the performance of the new firms we are studying. Instead, the outcome on which we focus is a venture's *competitiveness:* the capacity of a venture to compete effectively against others in their market (Man, Lau, & Chan, 2002; Whipp, Rosenfeld, & Pettigrew, 1989). To build competitiveness, ventures assemble and reconfigure

their underlying resource base to develop organizational capabilities (Brush, Greene, & Hart, 2001). Hence, consistent with resource-based theorizing, we consider that what a firm does with its underlying resources strongly shapes its capacity to compete (Penrose, 1959; Wernerfelt, 1984). However, unlike most resource-based work, we are not concerned with explaining how firms generate sustainable competitive advantages (Barney, 1991). Instead, competitiveness refers to the more commonplace ability to compete despite the absence of initial resource-based advantages.

In focusing on competitiveness, we build on early work that understood the contribution of bricolage to venture success in terms of the range of firms against which it enabled a venture to compete. For example, in Baker and Nelson's (2005) portrayal, the extreme behavioral pattern they called "parallel bricolage" limited firms to serving only customers who were unwilling or unable to pay for standard quality products and services. This kept the firms from becoming competitive with incumbents providing standard or higher quality offerings. In contrast, firms engaging in the behavioral pattern labeled "selective bricolage" were able to expand the sets of customers they could serve, thus becoming competitive against a broader range of incumbents.

Primary Mechanisms

Figure 1 provides an overview of our theoretical model. The next section draws on prior work to identify and elaborate four mechanisms through which bricolage yields positive or negative effects. We then use these mechanisms to develop our hypotheses.

INSERT FIGURE 1 ABOUT HERE

Resource replacement. This mechanism is the primary source of positive effects described or alluded to in prior literature. It explains how firms deploy capabilities despite lacking the usual resources on which their competitors would normally rely.

Baker and Nelson (2005: 333) defined entrepreneurial bricolage as "making do by applying combinations of the resources at hand to new problems and opportunities." Those engaged in bricolage "make do" by treating much of what others typically regard as useless as potential resources (Halme, Lindeman, & Linna, 2012). They create flexible combinations from whatever is at hand (Baker & Nelson, 2005; Garud & Karnøe, 2003), testing and refusing to enact conventional limitations regarding what is an appropriate resource for a given task (Weick, 1979). In bricolage, combinations of non-standard inputs replace the standard resources that would be commonly deployed as an orthodox solution to address the same challenge (Ciborra & Lanzara, 1994; Desa & Basu, 2013; Stinchfield et al., 2013).

Illustrating this, Garud and Karnøe (2003) described how bricolage allowed under-resourced Danish wind turbine producers to compete effectively against highly resourced US firms that sought to dominate global markets[1]. Baker and Nelson (2005) examined resource-constrained entrepreneurs who accumulated troves of salvaged materials and creatively recombined them into workable replacements for standard resources. Banerjee and Campbell (2009) showed that "human capital bricolage" can serve as an effective means of resource replacement, allowing R&D-intensive firms to redeploy new combinations of existing technical talent, avoiding the need to acquire inventor capabilities. Bechky and Okhuysen (2011: 242) detailed how bricolage helped severely time-constrained SWAT teams substitute combinations of tools and materials at hand through team knowledge, learning and role shifting, as they responded to mission-critical surprises. In turn, Pollock, Baker and Sapienza (2013) interpreted the *Moneyball* (Lewis, 2004)

[1] As Levi-Strauss (1966: 17) and others have noted, bricolage *occasionally* produces "brilliant unforeseen results," which can be better than prior best practices or engineered designs.

narrative, wherein a baseball team becomes competitive against much wealthier rivals by assembling novel combinations of non-standard players, as an extended example of bricolage.

Resource replacement allows a firm to solve a problem or engage in a new challenge they would not otherwise have been able to take on. In so doing, it makes firms competitive through new or improved organizational capability (Chandler & Hanks, 1994). Much work on bricolage has stressed its role in permitting survival under arduous conditions, with the assumption that if a resource-constrained firm is competitive against even a small set of incumbents, this represents beneficial use of bricolage (Ernst, Kahle, Dubiel, Prabhu, & Subramaniam, 2015; Langevang & Namatovu, 2019; Sarkar, 2018). For many researchers who focus only on its positive aspects, resource replacement is the entirety of what they mean by bricolage.

Second-best solutions. The primary mechanisms driving the negative effects of bricolage derive from two gaps between what is achieved through resource replacement and what could have been achieved using more standard or engineering-specified resources[2]. The first such gap is between the *functional performance* of the capabilities rendered through bricolage and the functional performance of capabilities rendered using standard resources.

Baker and Nelson (2005: 334) explain the meaning of the "making do" aspect of bricolage as "a bias toward action and active engagement with problems or opportunities rather than lingering over questions of whether a workable outcome can be created from what is at hand." Based on their fieldwork, they elaborate this meaning to encompass a "refusal to enact limitations," including a tendency to "disregard the limitations of commonly accepted definitions of material inputs, practices, and definitions and standards, insisting instead on trying out

[2] Ventures not relying on bricolage might acquire standard resources used in an orthodox manner to support particular capabilities or they might engage in engineering efforts to specify appropriate resources. Throughout, we refer to these as *standard resources*.

solutions, observing and dealing with the results." In Lanzara's (1999: 347) evocative characterization of bricolage, which we adopt, these are labeled "second-best solutions." As he notes, these "do their job," but they "are usually associated with 'imperfection' and 'incompleteness'," and characterized by "hybrid, imperfect, transient artifacts, which perhaps do not look very elegant" and have lots of bugs and gaps, frictions and unusable components.

Other researchers have explored similar themes around solutions developed through bricolage that are, at best, barely good enough. Comparison is often made between such second-best solutions and the sorts of optimization or best practices that could have been accomplished using standard resources (Baker, Pollock, & Sapienza, 2013; Hatton, 1989; Molecke & Pinkse, 2017; Senyard, 2015). Some authors have described the generation of such solutions as a form of satisficing (Desa & Basu, 2013; Simon, 1947; Welter, Xheneti, & Smallbone, 2018), where "resource recombination stops as soon as the arrangement works" (Duymedjian & Rüling, 2010: 140).

Tinkering traps. The second gap is between the *reliability* of the capability rendered through bricolage and the *reliability* of a capability built on more standard resources. The capabilities rendered through resource replacement are often fragile, unreliable and prone to requiring that firms repeatedly engage in maintenance, adjustments and fixes (Di Domenico, Haugh, & Tracey, 2010; Levi-Strauss, 1966; Verjans, 2005). For example, Orr's (1996) ethnographic study of the work of field service technicians highlights a range of continued "fudges and shortcuts" (Graham & Thrift, 2007: 4) in attempts to fix malfunctions and errors from prior acts of bricolage. Ladstaetter, Plan and Hemetsberger (2018: 296) describe how bricolage solutions "contained the seed for new breakdowns," potentially limiting growth through "locking the organization into cycles of repetitive bug fixing." We label such challenges

"tinkering traps" to describe how ventures can be trapped into repeatedly investing time and attention into maintaining a capability rendered through bricolage.

Accumulation of compromises. Second-best solutions and tinkering traps both generate negative effects but are analytically separate mechanisms. Using this framework, it is possible to describe solutions rendered through resource replacement that meet most functional performance demands but are highly unreliable, thus creating the need for repeated tinkering. For example, Baker and Nelson (2005:351) describe how Jason Bond constructed an integration of two billing systems that met his employer's functional performance needs, but because he "continually had to tweak the billing system he created, his job as supervisor of the billing department changed over time to the much narrower position of billing system supervisor." In contrast, Baker and Nelson's (2005) example of replacing a catalytic converter with a piece of straight pipe led to a substantial second-best solutions functional performance gap, but little need for additional tinkering. These two mechanisms need not operate in lockstep. The negative effects of bricolage can thus build up over time through the separate accretion of second-best solutions and tinkering traps.

However, there are good reasons to expect second-best solutions and tinkering traps to be empirically intertwined. In one example, Baker and Nelson (2005: 351) describe software engineer Tim Reno, who built an "*almost* fault tolerant" IT system through bricolage, expressing his frustration at the demands of trying to keep it working: "I was tired of trying to make that half-a**ed system run and then trying to explain why it couldn't do everything the real [fault-tolerant] systems can do." Especially when solutions rendered through bricolage are accomplished on the fly and with little planning or design, the *functional performance gap,* and the *reliability gap* are likely to coincide and become self-reinforcing. For example, tinkering

traps can demand immediate action, which may take the form of repeated improvisations leading to temporary stop-gap solutions (Miner, Bassoff, & Moorman, 2001) that require the layering on of additional second-best solutions (Baker, Miner, & Eesley, 2003).

More generally, the unpredictability that can stem from using combinations of non-standard inputs to make do may demand a high degree of ongoing, deliberate attention (Valliere & Gegenhuber, 2013) where properly engineered processes would conserve resources, including entrepreneurs' limited time (Bechky & Okuysen, 2011; March & Simon, 1958). Moreover, such repeated distractions can engender an inward-facing orientation, which can reduce the ability to meet customer demands (Hendry & Harborne, 2011). Whereas the occasional emergence of second-best solutions or tinkering traps is unlikely to detract much from firm competitiveness, we conceptualize both the accretion and the intertwining of second-best solutions and tinkering traps as a harmful *accumulation of compromises.*

From accumulation to path dependencies. The accumulation of compromises can be hard to escape. Baker and Nelson (2005) describe how resource-constrained firms drew on the resources at hand to create substandard products and services for customers with low demands and limited ability or willingness to pay for standard goods. This encouraged firms to continue making do with whatever inputs were available to them cheaply or at no cost while often skirting institutional norms and regulations. As a result, these firms remained unable to compete for better customers. In several accounts of bricolage, these self-reinforcing cycles of accumulation of compromise veer towards rigidity and path dependence. Ciborra and Lanzara (1994: 63) capture this by describing how systems that are initially open and flexible evolve through bricolage "along paths that are often unexpected and irreversible" (cf. Nelson & Lima, 2020: 727).

The accumulation of compromises is sometimes further reinforced through embeddedness in the firm's network of relationships. Tasavori, Kwong and Pruthi (2018: 340) describe how interdependent, pre-existing relationships can result in firms "losing autonomy over their expansion path." Keating, Geiger and McLoughlin (2014: 18) describe an entrepreneur's reliance on existing contacts, "using the same ties for the same purposes time and again … limiting the company's development." Gras and Nason (2015: 549) further caution against being overly "enmeshed in the environment" and engaging in bricolage activities that create "reinforcing patterns of continuous improvisation" that stall firm growth. At the extreme, consistent with what Baker and Nelson (2005) labeled "parallel bricolage," the accumulation of compromises may result in path dependencies and lock-in to particular organizational trajectories through self-reinforcing cycles embedded in multiplex connections among stakeholders (Dobusch & Schüßler, 2013; Sydow, Schreyögg, & Koch, 2009).

Counteracting accumulation of compromises. Most prior insights into specific ways to avoid the accumulation of compromises have pointed toward *doing less bricolage* within the focal organization. For example, Baker and Nelson (2005: 349) explained that firms which grew using bricolage avoided "doing so consistently and repeatedly across multiple domains" but instead "appeared to use it selectively." Garud and Karnøe (2003) described what they called "embedded and distributed agency" in which the accomplishments of one group using bricolage to develop wind turbines were picked up by others and carried forward. This spread of the use of bricolage across multiple organizations seemingly breached the development of dependency relationships among a narrow set of undemanding stakeholders. Bechky and Okuysen (2011) demonstrated in various contexts the creation of resource-replacement without accumulation of compromises when bricolage is used only episodically. These examples illustrate specific ways

that accumulation of compromises can be held in check. However, they all focus on achieving positive net effects by limiting the amount of bricolage. Our interest is in understanding more general boundary conditions that shape the net effects of bricolage on the competitiveness of early-stage ventures that engage in various, *including high*, levels of bricolage.

Specifically, we explore how the venture's stage of development (nascent versus operational) and growth expectations shape the effectiveness of bricolage. Prior work has generally focused on the importance of bricolage for small, early-stage organizations that have the flexibility to engage in non-standard practices. We argue that an accumulation of compromises is more prone to develop and limit competitiveness in ventures that engage in bricolage once they become operational and become embedded in ongoing exchange relationships. Similarly, prior research has implied that bricolage is a coping strategy for firms that are just trying to survive and get by, rather than for those ventures that expect high growth (Gras & Nason, 2015; Mair & Marti, 2009; Pollock et al., 2013; Stinchfield et al., 2013). We argue instead that high expectations may be what prevents organizations from allowing the accumulation of compromises. We elaborate on these arguments below.

Nascent versus Operational Early-Stage Ventures

The distinction between nascent and operational ventures has become central in empirical entrepreneurship research (Davidsson & Gordon, 2012; Hindle & Klyver, 2011; Reynolds & Curtin, 2010; Reynolds et al., 2005). Scholars have demonstrated the importance of examining nascence as distinct from what happens after firms are operational and engaged in regular exchange transactions with customers. However, little work on bricolage has addressed this distinction. Because nascent and operational ventures face different performance demands and different access to resources, the contrast between them provides a useful context for using our

framework to theorize the boundary conditions under which bricolage enhances or attenuates the competitiveness of nascent versus operational ventures.

Nascent ventures are not yet engaged in regular transactions with customers, which reduces their risk of becoming embedded in a path dependent trajectory of providing substandard offerings to undemanding customers. More generally, nascent ventures have been demonstrated to engage in a wide variety of exploratory activities sequenced in largely unpredictable ways (Arenius, Engel, & Klyver, 2017; Liao, Welsch, & Tan, 2005). As a result, nascence can offer an opportunity for resource-constrained ventures to experiment and thereby explore the development of their competitiveness in a low-risk environment. In addition, since nascent firms do not face time pressure to meet the immediate demands of current customers, they have the flexibility to selectively reject temporary quick fixes and substandard solutions that are frequently observed as part of bricolage in operational firms (Lanzara, 1999).

In contrast, operational ventures face ongoing and immediate demands to serve customers and manage expectations regarding product and service quality, responsiveness and other elements of performance expectations (Griffin & Hauser, 1993). If bricolage leads to the accumulation of compromises, this can interfere with an operational venture's ability to satisfactorily meet the performance demands of current (and potential) customers and other important stakeholders, such as employees, regulators, suppliers and lenders. A reliance on tinkering and repeated improvisational fixes can undermine the development of routine approaches to meeting ongoing performance expectations, thereby generating repeated episodes of customer dissatisfaction (Baker et al., 2003; Miner et al., 2001) and the need for additional fixes. In such cases, the accumulation of compromises may render ventures competitive only at

the lower-end of the market, competing with firms that also serve extremely cost-sensitive customers who are forced to tolerate poorer performance.

Overall, our arguments suggest that second-best solutions and the tinkering trap will degrade the positive effects of resource replacement on competitiveness more strongly in operational than in nascent ventures.

> *Hypothesis 1: Venture stage moderates the relationship between bricolage and venture competitiveness, such that bricolage is more beneficial for the competitiveness of nascent ventures than for the competitiveness of operational ventures.*

Growth Expectations

A fundamental assumption of entrepreneurship research influenced by open-system theories is that growth requires the infusion of new resources. Early work on bricolage was largely motivated by the desire to understand how some firms were able to loosen the connection between new resource infusions and growth. Variation in the growth expectations that shape founder behaviors is, accordingly, a second key context for using our theoretical framework to explore the boundary conditions under which bricolage enhances or attenuates the competitiveness of early-stage ventures.

Founders differ greatly in their expectations for growth: many expect little or no growth, some expect to accomplish moderate growth, and a few expect that their efforts and circumstances will allow them to achieve high growth (Crawford, Aguinis, Lichtenstein, Davidsson, & McKelvey, 2015; Edelman, Brush, Manolova, & Greene, 2010; Wiklund, Davidsson, & Delmar, 2003). Prior research has demonstrated that growth expectations shape ensuing, actual growth (Delmar & Wiklund, 2008; Wiklund & Shepherd, 2003a). We argue that a venture's growth expectations will shape the relationship between bricolage and

competitiveness in two primary ways: by affecting the relative degree of gain from resource replacement and by shaping responses to the accumulation of compromises.

Greater gain from resource replacement. As argued by studies of resource slack (George, 2005; Lecuona & Reitzig, 2014), the degree of resource constraint a venture faces is a function of its level of expectations, which is derived from both its aspirations and its intentions to take action to fulfill them (Chen & Miller, 2007; Wiklund & Shepherd, 2003a). This has been insufficiently recognized in prior work on bricolage. For example, an entrepreneur who expects to accomplish very little can do so with very few resources, while the same level of resources will represent substantial constraints for one who expects to accomplish a great deal (George, 2005). Ventures with higher growth expectations thus face a greater gap between resource needs and resources available. This larger resource gap provides more potential avenues for bricolage to deliver benefits, and makes it more likely that engaging in bricolage behavior will identify some effective resource replacement solutions. As a result, we expect a venture with higher expectations and, therefore, higher resource demands to benefit more from resource replacement effects relative to a venture with lower expectations.

***Resisting the accumulation of compromises*.** As we described above, the accumulation of compromises reduces competitiveness. We argue here that path dependence toward such as trajectory—or escape from it—is shaped by the entrepreneur's growth expectations for the firm.

Generating substantial growth typically requires offering something better to become competitive (Davidsson, Steffens & Fitzsimmons, 2009; Ferrier, Smith, & Grimm, 1999) with firms that have established competitive capabilities (Fiol & Lyles, 1985; Huber, 1991; Zahra, Sapienza, & Davidsson, 2006). Ventures shaped by higher growth expectations tend to adopt an externally-oriented posture (Feeser & Willard, 1990; Gilbert, McDougall, & Audretsch, 2006;

Jarillo, 1989). They are typically forced to engage with more demanding customers and other stakeholders who provide pressure to resist second-best solutions. Growth expectations will therefore encourage entrepreneurs to resist the accumulation of compromises in the first place or attempt to break out of these self-reinforcing behaviors and path dependencies to create a new path toward improved competitiveness (Garud & Karnøe, 2001; Garud, Kumaraswamy, & Karnøe, 2010). In contrast, a resource-constrained entrepreneur who starts with low growth expectations is more likely to accept the accumulation of compromises and, therefore, to build a venture that is narrowly competitive, serving only a limited group of customers. This restricts growth.

Taken together, these arguments suggest that higher growth expectations both increase the value of resource replacement to early-stage ventures and help them to resist or overcome some of the accumulation of compromises. Hence, we propose:

> *Hypothesis 2: Growth expectations moderate the relationship between bricolage and competitiveness, such that bricolage becomes more beneficial for the competitiveness of early-stage ventures as growth expectations increase.*

METHODS

Sample and Procedures

We conducted a five-wave survey of early-stage ventures in Australia. In each wave, a founder of each venture was surveyed by phone interview. We use the first two waves, 12 months apart, to examine the influence of bricolage on the development of the venture's competitiveness. Later waves provide some additional information regarding subsequent venture performance but suffer from a decreasing number of cases.

Primary sample. To test our hypotheses, we needed a theoretically relevant sample of *early-stage ventures* including sufficient representation of ventures that *had not reached the operational stage* and had adequate variance in *growth expectations.* A random sample of early-stage ventures would be less useful for this purpose, as such samples are typically dominated by a "modest majority" with low growth expectations (Crawford et al., 2015; Davidsson & Gordon, 2012), providing limited variance in growth expectations. At the other end of the spectrum, a sample consisting of venture capital-backed start-ups would also be theoretically unsuitable to represent early-stage ventures because only a very small minority ever receive this type of financial backing and of those that do, extremely few are pre-operational (Kim, Aldrich, & Keister, 2006). In addition, such ventures would likely not represent the resource constraints that form the context of our arguments.

To address these challenges, we employed a two-stage approach to generate a purposive sample that fulfilled the above criteria, including approximately equal representation of nascent ventures and young but operational ventures. In the first stage, we contacted 429 source organizations that tend to have contact with early-stage ventures as identified to us by a diverse range of organizations across Australia (e.g., government agencies, chambers of commerce, university commercialization offices, and patent and trademark attorneys). We supplemented their suggestions with early-stage ventures that were directly identified through our web searches. The broad range of sources reduces the risk of sampling bias associated with any particular source and thereby mirrors one of the advantages of random sampling.

From over 3,000 suggestions, we were able to contact and screen 2,644 ventures that could potentially fit our criteria for inclusion. From this set of prospects, we identified 277 eligible early-stage ventures through a screening process, of which 155 (74 nascent and 81 operational

ventures) provided complete data for both waves of the survey. Table 1 (Panel A) describes how the final sample was obtained from the larger number of prospects. As recorded in the table, the main reason for the marked reduction in the number of participants was that the majority of the contacted ventures had been operational for more than 3.5 years. We applied this as our cutoff age for early-stage operational ventures based on an established combination of theoretical concerns of early firm survival and liability of newness and operational criteria to yield approximately even cohorts of nascent and operational early-stage ventures (Reynolds et al., 2005: 228).

INSERT TABLE 1 ABOUT HERE

No single criterion can be used to determine the future potential of an early-stage venture. Therefore, a 5-criteria index was used to determine whether a venture qualified as having the potential to develop beyond self-employment or a micro-business (cf. Henrekson & Johanson, 2010; Katz & Gartner, 1988). Table 1 (Panel B) provides references that support our choice of *human capital*, *growth orientation*, *technological sophistication*, *novelty* and *high growth industry* as criteria and specifies indicators of each measure. A formative index was produced and weighted to ensure that each of these five criteria contributed approximately equally. Ventures were included in the final sample if they met our cutoff of 120 out of 250 points. We excluded 44 ventures based on this criterion.

To examine for possible response bias, we compared the characteristics of the ventures that responded to those that did not. Specifically, we compared a) those that completed the Wave 1 survey (n=215) with the respondents who qualified after successfully passing the screener but did not complete the Wave 1 survey (n= 63), and b) our final sample (n=155) with those who dropped out between Waves 1 and 2 (n=59). The samples did not significantly differ on 16 of the

17 available demographic and screening variables (see Table 1). Men were somewhat more prone to respond (81%) than females (68%) ($p<0.05$). However, sex-related response bias is unlikely to compromise our theory-testing.

Secondary sample. While we were confident of the appropriateness of our primary sample, we conducted a robustness test using an alternative, random sample of early-stage ventures. The second sample allowed us to test our hypotheses using a sample designed to be statistically representative of the population of all early-stage ventures in Australia. The study design followed well-established practices for panel studies of entrepreneurial ventures (Davidsson & Gordon, 2012; Gartner, Gartner, Shaver, Carter, & Reynolds, 2004). Details are provided in Appendix A.

Measures

Competitiveness. The competitive position of established ventures is often inferred from objective performance measures, although finding objective measures that match broad conceptualizations of firm performance is a major challenge even for research on established firms (Miller, Washburn, & Glick, 2013). For early-stage ventures, objective performance measures are generally not suitable. Nascent ventures are defined as such because they do not yet have revenue that regularly exceeds running costs. Young, operational ventures may be in a build-up stage where they deliberately sacrifice profitability to build a market position and/or to scale up the venture. Researchers have therefore developed alternative approaches to assess a venture's standing relative to competitors (Julien & Ramangalahy, 2003; Wu, Wang Chen & Pan, 2008). Since our construct and theory development are about the ability of the firm to compete against incumbent firms, we followed Julien and Ramangalahy (2003) in basing our comprehensive measure of competitiveness on managerial perceptions of the venture's

advantages or disadvantages versus its current or future competitors. We enhance their approach by using multiple-item subscales rather than a single item for each dimension.

Drawing on existing scales where possible, we measure seven subscales that map onto Man et al.'s (2002) three conceptual dimensions of competitiveness. Specifically, two subscales capture "organizational capabilities," representing the internal dimension of competitiveness: knowledge-based resources of marketing/customer service expertise (3 items) and technical expertise (3 items), both adapted from Wiklund and Shepherd (2003b). Three subscales capture "entrepreneurial competencies," representing the process dimension of competitiveness: organizational flexibility (2 items; adapted from Chandler & Hanks, 1994), networking competence (3 items; adapted from Borch, Huse, & Senneseth, 1999), and a new scale for industry knowledge (3 items). The third dimension, "competitive scope," capturing the external dimension of competitiveness, was assessed by two subscales: cost-related (dis)advantages (4 items; adapted from Chandler & Hanks, 1994) and a new scale for product/service uniqueness (3 items). For each item on each subscale, respondents were asked to report the degree to which the item represented an advantage or disadvantage relative to their competitors, using a 5-point response scale: major disadvantage, slight disadvantage, no advantage or disadvantage, slight advantage and major advantage. See Table 2 for a complete list of items.

We calculate the overall measure of competitiveness as the summation of the seven first-order, reflective subscales. We assess the psychometric properties of the reflective subscales; however, traditional measures of reliability are not appropriate for the second-order, formative index (Coltman, Divinney, Midgley, & Venaik, 2008; Diamantopoulos & Winklhofer, 2001). First, we employed exploratory factor analysis (principal component with varimax rotation) to refine these subscales and then we confirmed reliability and discriminant validity using

confirmatory factor analysis (Amos). One item each was dropped from the marketing expertise and costs-based advantages scales as the items did not load sufficiently strongly on a single factor. Table 2 displays a list of items, including the final factor structure and reliability analysis for each subscale for both samples. The reliability of each subscale is acceptable; the Cronbach's alpha is greater than .70 for all scales, except the two-item scale of organizational flexibility, which is slightly lower (.68 primary sample, .66 secondary sample). The final factor structure reveals that each subscale of competitiveness is sufficiently distinct, and all factor loadings sufficiently strong (primary sample: > .520, secondary sample: > .577). The overall confirmatory measurement model indicated the seven-factor structure exhibited acceptable fit in both samples (primary sample: χ^2 [131] = 213.2, *TLI* = .914 *RMSEA* = .060; secondary sample: χ^2 [131] = 495.5, *TLI* = .934, *RMSEA* = .055) (Sharma, Mukherjee, Kumar, & Dillon, 2005).

INSERT TABLE 2 ABOUT HERE

Bricolage. We used the Senyard et al. (2014) bricolage scale which has been widely used (An, Zhao, Cao, Zhang, & Liu, 2018; Stenholm & Renko, 2016) and further validated (Davidsson, Baker, & Senyard, 2017). The scale has eight items designed to align with the elements of the Baker and Nelson (2005: 333) definition of bricolage, which is specified as "making do by applying combinations of the resources at hand to new problems and opportunities." Example items include: (a) "We use any existing resource that seems useful to responding to a new problem or opportunity," and (b) "We combine resources to accomplish new challenges that the resources weren't originally intended to accomplish." The items use a 5-point response scale from 1 "never" to 5 "always" to reflect the behavioral nature of the phenomenon. Cronbach's alpha in our sample is acceptable (0.77). The measure was collected in Wave 1.

Nascent and operational ventures. Early-stage ventures were categorized as *nascent ventures* if, in Wave 1, they fulfilled the criteria: concrete start-up activity, respondent is a (part) owner, and the venture is not yet operational (see Davidsson & Gordon, 2012; Reynolds, 2009). If in addition they already had revenue that regularly covered all costs, they were categorized as *operational ventures*, provided that they had started trading regularly in the current type of business activities no earlier than 3.5 calendar years before Wave 1 (Reynolds et al., 2005). Hence, all members of the operational venture category are early-stage ventures.

Growth expectations. In line with previous research (Castaño, Méndez, & Galindo, 2016; Yacus, Esposito, & Yang, 2019), growth expectations were measured as expected sales. Specifically, we used the natural logarithm of the expected sales in dollars after five years of operation. This variable was measured in Wave 1. A metric measure of expected sales is problematic for the secondary sample, as expected sales are extremely skewed, approximating a power-law distribution (Crawford et al., 2015). Hence, for our analyses of the secondary sample, we created a dummy variable, high expectations, representing those in the top 10th percentile of the sample for expected sales.

Control variables. Based on a comprehensive, methods-oriented review of the literature, Davidsson and Gordon (2012) advise that the most important factors to control for in this type of research are a) type of venture, b) human capital of founders, c) financial capital, and d) stage of development. While d) is accounted for with our nascent vs. operational moderator, we included the Wave 1 indicators of these other factors as control variables. To control for venture type, we used *industry* classified into five sectors (see Table 4) with "retail and consumer services" as the base category. A dummy variable is included to indicate whether the venture primarily sells *products* or *services*. Two dummy variables were used to indicate the sophistication of the

technology used by the venture: *technology exist 5 years* by asking the question, "Were the technologies or procedures required for your main product/service generally available more than five years ago?", and we use a self-reported dummy variable, *high technology*, to indicate whether the venture is considered high-tech.

We included three measures of the human capital of the founding team: *education* (dummy variable indicating at least one owner has a university degree), *managerial experience* (log number of years of the managerial experience of the owners), and *start-up experience* (log number of previous start-ups by owners). We controlled for financial capital as the overall amount of *money invested* in the venture (log). The research variable in our study, stage of development, is represented by *nascent venture* vs. *operational venture*, as described earlier.

Table 3 shows the means, standard deviations, and correlations for all variables. None of the correlations are critically high, indicating that none of the variables are highly collinear (all $r < 0.6$). Furthermore, we estimated the variance inflation factors (VIFs) for all variables and the colinear condition number. The VIFs have a maximum value of 1.7 and mean of 1.4, considerably less than the conventional threshold of 10 (Kutner, Nachtsheim, & Neter, 2004). In addition, the condition number is 10.5, well below the threshold of 30 (Belsey, Kuh, & Welsch, 1980).

INSERT TABLE 3 ABOUT HERE

Analytical Procedures

To identify potential model estimation issues, we estimated the models by adding key independent variables, one at a time, and checked for any instability in the coefficients or standard errors. No substantial changes in the estimates emerged, suggesting no material multicollinearity problems. We centered all variables involved in the interaction terms to

minimize multicollinearity between these terms and their individual components (Aiken, West, & Reno, 1991). We report one-tailed statistical significance for hypothesized relationships and otherwise two-tailed. This is consistent with $p<.05$ (.01), meaning there is less than 5% (1%) risk of a false positive if the null hypothesis of no effect is true.

Remedies for common method bias. Since both our independent and dependent variable rely on a single rater, the study is potentially subject to common-rater method bias (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). Our most important strategy to mitigate this in the analysis is to control for the measure of our dependent variable in Wave 1. This will eliminate all sources of common rater effects that are consistent over time. There is no reason to think that any common rater effects, such as acquiescence, or social desirability, should vary systematically over time. This said, it is likely that there are individual differences in the cognitive bias of their perception of the firm's objective competitiveness, and this bias may be correlated with our independent variable in unknown ways. Controlling for our dependent variable in Wave 1 corrected for such individual rater bias. We also assessed whether common-method bias is likely to be problematic by conducting a Harman single-factor test. A single factor accounted for 25.1% and 21.4 % of the variance of model variables in the primary and secondary samples respectively, well under the 50% cut-off considered problematic (Podsakoff et al., 2003).

Further, we substantially time separate the dependent variable by measuring it in Wave 2, one year later. This mitigates consistency motif and implicit theories effects as respondents are unlikely to recall their responses to items in Wave 1, as well as transient mood effects. Importantly, we also conduct robustness tests using objective indicators of firm performance as a dependent variable. This mitigates the impact of common item characteristics.

Remedies for selection bias. Since we only observe competitiveness for those ventures that persist until Wave 2, and venture persistence is likely to be endogenous, we correct for selection. We use a maximum likelihood extension of the Heckman (1979) two-stage approach (e.g. Greene, 2018). Details are provided in Online Appendix B, including Tables B1 and B2.

RESULTS

Before examining our hypotheses, we test whether bricolage has a direct effect on the competitiveness of early-stage ventures. We entered all of the control variables in Model 1 before adding the linear term for bricolage in Model 2 (Tables 4 and 5). We find evidence that, overall, bricolage has a positive impact on competitiveness in the primary sample (b = .191, p = .006) and marginally significant positive effect in the secondary sample (b = .068, p = .052), just over the conventional, 5% level of significance. Substantively, this represents an effect of moderate size with an increase of competitiveness from low bricolage (10th percentile of the sample) to high bricolage (90th percentile) of approximately 0.25 for the primary sample on the 5-point measurement scale (approximately 0.5 of a standard deviation in our sample).

INSERT TABLES 4 & 5 ABOUT HERE

Hypothesis 1 proposes that a venture's stage of development moderates the influence of bricolage on competitiveness such that the influence is more positive for nascent than for operational ventures. In Model 3, the interaction term for bricolage and nascent stage is positive and significant for the primary sample (b = .337; p = .006) and marginally significant in the secondary sample (b = .105; p = .056). The effect size for the primary sample (f-squared) for this categorical moderating term is .042 or 20 times the median effect size of .002 for categorical variable moderating effects in published studies in management and applied psychology (Aguinis, Beaty, Boik, & Pierce, 2005). In a substantive sense, we find that bricolage has no

meaningful *overall* effect on the competitiveness of operational ventures. However, for nascent ventures, there is an increase in competitiveness between low bricolage (10th percentile of the sample) and high bricolage (90th percentile) of approximately 0.45 on the 5-point measurement scale (approximately one standard deviation in our sample). These results for the primary sample support Hypothesis 1 and suggest that the effect is of a meaningful magnitude. Our evidence for the secondary sample was not conclusive, although the coefficients were in the expected direction and very close to conventional levels of significance.

Hypothesis 2 argues that growth expectations positively moderate the influence of bricolage on competitiveness. In Model 4, we added an interaction term of the venture's growth expectations with bricolage. The interaction term is not significant for the primary sample (b = .017; p = .312) or the secondary sample (b = .106; p = .165). Thus, overall, we do not find any evidence that growth expectations moderate the positive influence of bricolage behavior on competitiveness. However, and importantly for our understanding of bricolage, as we show in the post-hoc analysis below, this hypothesis is supported for sub-samples of operational ventures.

Post-Hoc Analysis: Growth Expectations for Nascent vs. Operational Ventures

Empirical analyses. Failing to find support for Hypothesis 2, we engaged in further empirical exploration. Specifically, since we argue that bricolage operates differently between nascent and operational ventures, we were curious whether growth expectations moderate the influence of bricolage behavior on the competitiveness of nascent ventures differently than operational ventures. As such, we test Hypothesis 2 for the sample of nascent ventures separately from operational ventures, examining both the primary and secondary samples.

Table 6 displays the test of Hypothesis 2 for each of the four sub-samples. In each case, Model 7 includes the control variables and main effect of bricolage, and Model 8 introduces the

interaction of bricolage and high growth expectations. To aid interpretation of these findings, they are displayed in Figure 2 for the primary sample. Quadrants A and B display the point estimate for bricolage for high growth expectations (one standard deviation above mean) for nascent and operational ventures, respectively. Similarly, Quadrants C and D display low expectations estimates. Figure 3 displays results for the secondary sample: in this case, high vs. low expectations are a dichotomous variable (See METHOD>Variables>Growth expectations). The range of values for bricolage (2.5 – 5.0) represents the observed range of values.

We see a consistent pattern across both samples. First, Model 7 reveals that the main effects of bricolage are positive and significant for both nascent venture samples (primary sample b = 0.327, p = 0.0013; secondary sample b = 0.167, p = 0.0011). However, for the operational venture samples, the estimate for bricolage is not significant and the point estimate is slightly negative (primary sample b = -0.004, p = 0.976; secondary sample b = -0.007, p = 0.881). These results reconfirm the support for Hypothesis 1 by suggesting that, in general, bricolage is positive for nascent ventures but not for operational ventures. Second, Model 8 indicates that the interaction effect of expectations on bricolage is positive and significant for operational ventures (primary sample b = 0.100, p = 0.040; secondary sample b = 0.350, p = 0.013) but we find no significant effect for the nascent ventures, and the point estimates are slightly negative (primary sample b = -0.051, p = 0.286; secondary sample b = -0.086, p = 0.540). In other words, we find that Hypothesis 2, proposing that growth expectations positively moderate the effect of bricolage on competitiveness, is supported for operational ventures but not for nascent ventures.

These findings are summarized in Figures 2 and 3. For nascent ventures, we find that bricolage increases venture competitiveness, regardless of growth expectations (Quadrants A and C positive). However, for operational ventures, the effect of bricolage on competitiveness is

dependent on growth expectations, with bricolage more effective for high-expectations ventures (Quadrant B vs. D). Indeed, for the primary sample, the results indicate that *bricolage has a negative effect on the competitiveness of low-expectations operational ventures* (Quadrant D).

INSERT FIGURE 2 and 3 ABOUT HERE

We conducted a robustness test to confirm that the moderating effect of expectations on bricolage is, in fact, different between nascent and operational ventures. This effect implies a three-way interaction. To confirm such an interaction, the addition of the three-way interaction term should explain a significant amount of variance, above and beyond the total amount of variance explained by the three main effects and the three two-way interactions (Cohen, Cohen, West, & Aiken, 1983). The three-way interaction term (Model 6, Tables 4 and 5) is negative and marginally significant for the primary sample ($b = -.121$; $p = .067$) and significant for the secondary sample ($b = -.447$; $p = .042$).

Revising our theory. While our conceptual framework led us to argue that growth expectations increase *resource replacement* effects and also help ventures to resist or overcome the *accumulation of compromises*, we failed to anticipate that these mechanisms would apply only to operational ventures. Consequently, we engaged in pragmatic empirical theorizing (Shepherd & Suddaby, 2017) to interpret these findings. We had earlier theorized (leading to Hypothesis 1) that nascent ventures can better resist the accumulation of compromises because they do not have the strong engagement with customers and external actors that can reinforce path dependence. It seems plausible that because the nascent firms have fewer feedback loops from (more demanding) customers, higher growth expectations might have little effect on resisting the accumulation of compromise. This distinction between nascence and operational status for the boundaries of effective bricolage calls for additional research and for a specific

focus on what happens during the liminal period between nascence and operational status. We continue to suspect that the higher resource constraints faced by higher expectations nascent ventures should lead to higher gains from resource replacement. Still, this effect does not appear strong enough to produce the expected positive moderation overall for nascent ventures.

These post hoc results, while they surprised us, nonetheless reinforce our basic arguments about the importance of growth expectations in shaping the boundary conditions of effective bricolage for operational ventures (albeit not for nascent ventures).

Robustness Tests: Objective Measures of Firm Performance

Since our measurement strategy for competitiveness follows prior research in relying on founder perceptions, we assessed the robustness of our results by using two objective measures of firm performance: future profits and sales. We perform robustness tests for Hypothesis 2, that growth expectations moderate the effects of bricolage. We are unable to perform such a robustness test for Hypothesis 1, that the effect of bricolage is different for nascent versus operational ventures, because objective (future) performance measures are not comparable between nascent and operational ventures. Some nascent ventures never become operational, and those that did during our observation period had less time than those what were operational at our first observation to develop sales and profitability. This lack of measurement equivalence is not a critical concern for testing Hypothesis 2, because we are able to compare objective performance measures for high-expectations nascent ventures with low-expectations nascent ventures, and high-expectations operational ventures with low-expectations operational ventures.

Since the trajectory of development over time is very heterogeneous for both nascent and operational ventures (Coad, Frankish, Roberts, & Storey, 2013; Davidsson & Gordon, 2012), assessing profits and sales at a single time point would be a poor measure of performance

because some ventures will develop quickly while others take considerable time to reach their potential. Hence, we measure sales and profits across multiple years. Specifically, we measure *Highest Profit* as the highest reported annual profits in Waves 2 to 5 of the study (log thousands of dollars). The second measure is *Highest Sales*, measured as the highest reported sales revenue in Waves 2 to 5 of the study (log thousands of dollars).

These robustness tests are presented in Online Appendix C. Overall, we continue to find some support for Hypothesis 2, suggesting that growth expectations moderate the effect of bricolage on objective venture performance. For highest sales as the dependent variable, we found support for Hypothesis 2 in the primary sample and marginal support in the secondary sample. For highest profits as the dependent variable, we found marginal support for Hypothesis 2 for the primary sample but no support for the secondary sample. Overall, these findings should help reduce any concerns about our hypothesis tests relying on perceptual measures.

DISCUSSION

Regardless of when or where they are formed, most early-stage ventures are created under conditions of substantial resource constraints (Aldrich & Ruef, 2006; Holtz-Eakin, Joulfaian, & Rosen, 1994). Therefore, the ability of entrepreneurs to behave resourcefully is a matter of considerable importance, and a solid understanding of resourcefulness is foundational to developing interesting and useful entrepreneurship theory. While research on bricolage has contributed to this understanding, it has been limited by its selective focus on ventures that experience some overall level of success using bricolage (e.g., Banerjee & Campbell, 2009; Beunza & Stark, 2003; Busch & Barkema, 2021; Pollock et al., 2013; Reypens et al., 2021; Senyard et al., 2014; Stenholm & Renko, 2016). It seems obvious, however, that effectively addressing resource constraints is sometimes quite difficult. Consistent with this, some early

studies described instances where bricolage acts as a double-edged sword with both positive and negative impacts (Baker & Nelson, 2005; Ciborra, 1996; Lanzara, 1999). Nonetheless, existing research provides little information regarding the boundary conditions of effective bricolage. In this paper, we take several steps forward.

Conceptual Framework for Theorizing Positive and Negative Effects of Bricolage

We provide a conceptual framework (see Figure 1) for distinguishing the mechanisms behind the positive effects of bricolage, which we label *resource replacement*, from what causes its negative effects, *second-best solutions* and *the tinkering trap*. We also conceptualize the intertwining and potentially mutually reinforcing connections between second-best solutions and tinkering trap through *accumulation of compromises*. While our framework is consistent with prior research on bricolage, it allows us to develop and test theory that goes substantially beyond prior work and also allows us to make theoretical sense of our unanticipated findings.

Baker and Nelson's original work illustrated negative outcomes by identifying cases of what they labeled "parallel bricolage." By relying on bricolage across multiple "domains," such as physical inputs, labor, customers and the regulatory environment, firms became embedded in "a permissive community of practice" that locked them into serving only customers who would not or could not pay for higher grade products and services (Baker & Nelson, 2005: 349). These represent extreme cases of seemingly indiscriminate reliance on bricolage; it was not so much that they did a lot of bricolage but that they did it in ways that blocked pathways to growth. Indeed, as Baker and Nelson (2005: 348) point out, "Parallel bricolage is associated with a very distinctive and robust organizational form." Applying our framework to Baker and Nelson's cases, firms engaged in parallel bricolage paid the price for resource replacement through an

extreme accumulation of compromises that left them unable to reach competitiveness with most other firms serving their markets, and therefore unable to grow.

Alternatively, Baker and Nelson (2005: 344) conceptualize "selective bricolage," a judicious and sometimes temporary use of bricolage, "as a deviation from parallel bricolage." The firms engaged in selective bricolage reaped its benefits, seemingly without any of its negative effects. This focus on extreme cases is a useful strategy for the process of discovery in grounded theory development (Eisenhardt, 1989). But their results represent a bifurcation in both process and outcome. None of the firms engaged in parallel bricolage were able to compete and grow, while the firms engaged in selective bricolage avoided these negative effects and most did grow. The bifurcation between parallel and selective bricolage is evocative and has proven useful. At the same time, it restricts understanding of the negative effects of bricolage to the extremes of parallel bricolage and tells us little about the likely interplay of positive and negative effects in less extreme cases.

In contrast, our framework provides a basis from which to theorize about the interplay of the causes of positive and negative effects across a broad spectrum of firms engaged in bricolage. It suggests that the negative effects of the accumulation of compromises are likely to shape firm outcomes, even when they do not reach the sorts of path-dependent extremes labeled parallel bricolage by Baker and Nelson (2005). This framework also allows us to clarify the commonplace, but unsubstantiated interpretation that simply doing "too much" bricolage is what generates negative effects (Bojica, Jiménez, Nava, & Fuentes-Fuentes, 2018; Onwuegbuzie & Mafimisebi, 2021; Theodora, Kakouris, Apostolopoulos, & Dermatis, 2020).

For example, and strikingly, in their systematic empirical tests, Senyard et al. (2014) did not find the inverted U-shaped effect of bricolage they had hypothesized; even at the highest levels

of bricolage, it still drove increased innovativeness. Firms engaged in parallel bricolage are indeed engaged in "too much" bricolage to improve their competitiveness, but understanding "too much" requires some nuance. As noted above, Baker and Nelson (2005) suggested that the limitations they described as parallel bricolage were not directly caused by excessive *overall levels* of bricolage, but instead by firms "making do" and relying too consistently on bricolage across too many domains. They observed that firms and stakeholders developed embedded ties and a permissive community of practice that became taken-for-granted. This constrained the parallel bricolage firms from seeking to serve more demanding customers. Other research that has observed negative outcomes of bricolage has also described such patterns of embedded behaviors (Keating, Geiger, & McLoughlin 2014; Nelson & Lima 2020; Tasavori et al., 2018). To clarify differences between firms that engage in patterns of bricolage that generate high levels of competitiveness, and those that don't, we propose it may be useful to invoke Simon's (1947) notion of "satisficing."

Satisficing is typically used to mean stopping the search for better alternatives once an "acceptability threshold" – one that is "good enough" – is met. In bricolage, such a threshold may not be predefined or clear. Rather, "making do" implies that the entrepreneur treats whatever they can accomplish with what is at hand *as defining the acceptability threshold*; the best they can achieve with what is at hand defines "good enough." All firms that engage in bricolage make do and refuse to enact some limitations. However, our theory suggests that firms with higher expectations adopt acceptability thresholds that incorporate the requirements of more discriminating customers. They *enact some limitations* in their use of bricolage, imposing higher acceptability thresholds that reduce the prevalence of second-best solutions and tinkering traps, and thus the self-reinforcing accumulation of compromises. Engaging in bricolage against higher

acceptability thresholds does not mean that firms necessarily do less bricolage, which would imply experiencing fewer benefits from resource replacement. It is rather that they do it in a way that allows them to avoid the accumulation of compromises and hence increase competitiveness. We believe this important distinction between doing too much bricolage and doing the wrong kinds of bricolage is important to future theory development. It also provides the potential to elaborate the way by which bricoleurs are "selective" in selective bricolage and a basis for theoretically examining how ventures may move from parallel toward selective bricolage.

Testing and Countering Assumptions about Which Firms Benefit Most

Prior work that has addressed the potential pitfalls of bricolage has typically relied on observations from a small number of case studies (Baker & Nelson, 2005; Halme et al., 2012; Lanzara, 1999; Nelson & Lima, 2020; Stinchfield et al., 2013). Building on this prior work, our study develops hypotheses regarding important boundary conditions shaping when bricolage is more-or-less beneficial. It tests these ideas across two broad samples of early-stage ventures. As such, we make an important step towards understanding the generalizability of the benefits derived from employing bricolage.

The pattern of our results – including both those our framework allowed us to hypothesize and those we observed and used our theory to make sense of post hoc – challenges commonplace assumptions about which firms benefit more or less from engaging in bricolage. On average, our results show that bricolage was effective in increasing competitiveness across a broad selection of early-stage ventures. While bricolage is typically viewed in the literature as a coping mechanism for early-stage operational ventures that are mainly trying to get by (Beunza & Stark, 2003; Fisher, 2012; Gras & Nason, 2015; Mair & Marti, 2009; Stinchfield et al., 2013; Welter et al., 2016), that is, for those without much by way of growth expectations, these are the very

ventures for which we found that bricolage was *at best unhelpful but more likely actually detrimental* to competitiveness.

The contrast between low-expectations nascent ventures and low-expectations operational ventures (see Figures 2 and 3: Quadrants C versus D) extends this insight. Our theory suggests the interpretation that during nascence, when the *accumulation of compromises* is less extreme, the positive resource replacement effects of bricolage dominate and competitiveness is improved. However, for low-expectations operational ventures regularly serving customers and engaging with other stakeholders, the negative effects of the *accumulation of compromises* appear to dominate, thereby reducing competitiveness. Our theory suggests that these negative effects may be amplified in low-expectations ventures that tend to engage with non-demanding customers and other stakeholders and therefore treat whatever they can accomplish with what is at hand *as defining the acceptability threshold*.

In contrast, apart from very early work and a couple of important recent examples pertaining to highly specific contexts (Busch & Barkema, 2021; Garud & Karnøe, 2003; Reypens et al., 2021), research on bricolage seldom suggests that it might be an effective approach for ventures that are aiming for substantial growth. Indeed, if we consider bricolage primarily as a coping mechanism for addressing resource constraints, it would be easy to conclude that it is best avoided by ventures with high growth expectations. Our theory and results allow us to see that the effects of bricolage in early-stage ventures with high growth expectations are more complex and interesting than prior work might suggest.

Strikingly, what we found is that bricolage is beneficial to the competitiveness of high-expectations operational ventures, the very sort of organization that the entrepreneurship literature characterizes as mostly likely to call for external infusions of new resources (Clough,

Fang, Vissa, & Wu, 2019; Eckhardt, Shane, & Delmar, 2006). In terms of the theory we have developed, these ventures benefit strongly from *resource replacement* and resist the *accumulation of compromises*. Rather than treating whatever they can accomplish with what's at hand as the acceptability threshold, they *enact some limitations* that reflect the requirements of more demanding customers and thereby improve their competitiveness.

Recent work has suggested that high levels of bricolage may be effective at driving growth through either a strategy of simple rules that replicate local operations in new locations (Busch & Barkema, 2021) or through patterned ways of engaging in both bricolage and resource-seeking activities (Reypens et al., 2021). Our theory and quantitative results complement these papers' observations based on very specific settings by identifying a broader understanding of the boundary conditions of effective bricolage that can be applied across a wide range of contexts.

We believe that our efforts open an important pathway for the development of a much richer theory of entrepreneurial bricolage. At the most general level, our work suggests that the underlying assumptions conflating *resourcefulness* and *coping* should be reexamined. If we understand coping to involve dealing with and attempting to overcome disadvantage, our notions of resourcefulness and theorizing about bricolage should extend to circumstances where that battle has, at least temporarily, been won. Resourcefulness in general, and bricolage in particular, may be engines of not just coping, but of advantage-seeking as well.

Limitations and Future Research

This paper has made progress toward addressing the question, "Under what conditions does bricolage enhance or attenuate the competitiveness of early-stage ventures?" by identifying some boundary conditions for effective bricolage. Our empirical investigation of the performance implications of bricolage across two longitudinal samples of new ventures represents a

substantive advance on prior empirical studies of bricolage. Nonetheless, our study has several important limitations.

Our research implicitly suggests an important related research question, "What does it mean to be good at bricolage?" An easy but not very useful answer is that it means knowing how to be "selective" about engaging in bricolage or when to enact limitations that are in line with more demanding customers. But being good at bricolage must also involve being skilled at the most basic task of generating resource replacement effects through combining things that carry little value for most organizations (Pollock et al., 2013). Without being good at this, being "selective" about when you "make do by applying combinations of the resources at hand to new problems and opportunities" might make little difference. But being good at bricolage may also require skills and capabilities regarding when to engage in some other form of resourcefulness, for example, careful cash management practices (Wiklund, Baker, & Shepherd, 2010); when to seek new resources (Reypens et al., 2021); and when to just avoid or refuse new challenges (Baker & Nelson, 2005). The current understanding of what constitutes bricolage skills requires substantial new research efforts to provide the basis for improved theorizing about what bricolage can accomplish in various contexts. It remains likely that bricolage works better when the entrepreneur is good at it and worse when the entrepreneur is not, but we can't yet say a lot about what this means.

It is important to note that our results do not speak directly to the issue of firm survival. A large body of research suggests that bricolage can be essential to the survival of small ventures, including those with limited growth expectations, across a vast array of contexts (Langevang & Namatovu, 2019; Stinchfied et al., 2013; Stenholm & Renko, 2016). Commonsense, however, suggests that competitiveness enhances firm survival. Additional theory development and testing

are required to tease out the circumstances in which bricolage contributes to firm survival and those in which it perhaps may not.

Our dependent variable, venture competitiveness, was measured based on the perceptions of founders. Although we have partial confirmation of our findings using objective measures, we cannot exclude the possibility that our results may have been confounded by systematic biases in the subjective perceptions of (objective) venture competitiveness. We note that since our models control for Wave 1 perceptions, and hence eliminate time-invariant systematic bias, it is only non-random changes in bias between Waves 1 and 2 that would affect our findings. It is plausible that during the nascent phase, perceptions of competitiveness might be less accurate compared with operational ventures due to less extensive marketplace interactions and knowledge. Indeed, perceptions are likely to be positively biased (Koellinger, Minniti & Schade, 2007). With respect to founders with higher growth expectations, there is little reason to think that any perceptual biases would develop differently between Wave 1 and 2. In sum, it is unlikely that our findings are driven by perceptual biases. This is not to deny that founder perceptions are imprecise indicators of objective competitiveness. However, we argue that the systematic component of this imprecision is controlled for with our Wave 1 measure and the random component would dilute rather than exaggerate the statistical significance of our findings.

Our study theorizes several mechanisms through which bricolage shapes a venture's competitiveness: *resource replacement* and the *accumulation of compromises*, which represents the sometimes intertwined and path dependent *tinkering trap* and *second-best solutions.* Although the theory we develop about these underlying mechanisms is supported in our study,

we do not directly observe or measure them. Future bricolage research will benefit from empirical exploration and measurement of these mechanisms.

One way to conceptualize the overall pattern of our results would be to posit that bricolage appears to help ventures that are – in a very general sense – developing. For example, we might argue that all nascent ventures are *developing* in the sense that they are attempting to become operational and that high expectations ventures are *developing* by seeking growth. Bricolage has positive effects on the competitiveness of these ventures. Similarly, Senyard et al. (2014) found positive effects of bricolage on innovativeness, which is another aspect of being oriented toward development rather than the status quo. Conversely, we might posit that when operational ventures are not developing but are instead focused only on *sustaining*, reliance on bricolage may prove to be a hindrance to competitiveness. This conceptualization of firm development is much broader than the "growth expectations" we theorized and measured in this study and suggests the value of theorizing on and testing other aspects of developing versus sustaining.

Furthermore, similar to most previous bricolage research, our study was confined to small, early-stage ventures. However, our findings are consistent with recent research by An et al. (2018), which hints that the benefits of bricolage behavior might also extend to larger and more mature organizations. It was the most advanced firms in our sample, operational, high growth expectations ventures, that seemed to gain the most from bricolage. This gives reason to suggest that future research should explore whether the benefits of bricolage might also accrue for more mature and larger organizations if they, too, face resource constraints while attempting to develop and grow.

CONCLUSION

Prior research suggests that bricolage behavior contributes to the performance of early-stage ventures. We demonstrate that bricolage represents an important pattern of behavior for many early-stage ventures but that it is not the magic bullet of resourcefulness. Underlying much of the prior research is the notion that bricolage is an important coping behavior for ventures that are just trying to get by. Our study goes beyond this presumption and instead suggests that bricolage can help build competitiveness among ventures endeavoring to develop and grow. The theory and framework we provide are an important foundation for future research.

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Table 1

Sampling Procedures

Panel A: Sample Size	Primary Sample			Secondary Sample	
Identified and contact attempt	**3,377**	*Less*			*Less*
No successful contact		*338*			
Refused		*375*			
Interviewed (initial screener)	**2,664**	**(79%)**		**30,105**	
Ineligible		*2,387*			*28,296*
- too old			*2,052*		
- international			*229*		
- terminated			*46*		
- Sold or merged			*14*		
- Under qualified on 5-criteria index			*44*		
Identified as fully eligible	**277**	*Less*		**1,809**	*Less*
Refused/dropped out Wave 1	214	*63*		927	*882*
Refused/dropped out Wave 2	177	*37*		719	*208*
Discontinued Wave 2	168	*9*		544	*175*
Excluded due to item nonresponse	155	*13*		456	*88*
Final sample (percent of eligible)	**155**	**(56%)**		**456**	**(28%)**

Panel B: Five Criteria Eligibility Index

Dimension (*Indicators)*	**Relevant References**	**Measure based on**
Human Capital - *education* - *management experience* - *starup experience*	Cooper et al., 1994; Unger et al., 2011	Cooper, and Gimeno-Gascon, 1992; Stuart and Abetti, 1990; Vesper, 1990
Growth orientation - *future revenue expectation* - *future employee expectation*	Cassar, 2006; Delmar and Wiklund, 2008; Wiklund and Shepherd, 2003b	Davidsson and Delmar, 2006; Stewart and Roth, 2001
Technological sophistication - *use of existing/new technology* - *R and D investment* - *patent or trademark application*	Acs and Audretsch 1989; Acs et al., 2009; Gnyawali and Fogel, 1994	Poutziouris et al., 2000
Novelty - *product/service* - *production/ channel* -*promotion/sales* - *customers*	Allen and Sterns, 1994; Dahlqvist and Wiklund, 2012	Dahlqvist and Wiklund 2012
'High growth' industry	Cooper et al., 1994;	McDougall et al., 1994

Table 2

Confirmatory Factor Analysis for Competitiveness Scale

		Factor Loading		**Cronbach's Alpha**	
Construct	**Survey Item***	Primary Sample	Secondary Sample	Primary Sample	Secondary Sample
Marketing Expertise	Expertise in marketing	.864	.835	.810	.835
	Innovative marketers	.788	.829		
	Ability to provide excellent customer service (dropped)				
Technical Expertise	Technical expertise	.703	.695	.702	.704
	Expertise regarding development of products (services)	.801	.728		
	Competence which is difficult to copy	.520	.577		
Cost Advantage	Purchase Prices (dropped)			.765	.829
	Labour costs	.535	.629		
	Operating costs	1.010	.933		
	Overhead costs	.692	.835		
Organizational Flexibility	Freedom for managers to make and implement fast decisions	.776	.676	.682	.664
	Flexibility to react fast to new trends	.677	.770		
Industry Knowledge	Knowledge of the latest industry trends	.656	.843	.732	.809
	Knowledge of the latest technological trends	.654	.787		
	Knowledge of what the leading customers are asking for	.723	.684		
Networking competence	Ability to use the firm's networks to influence the firm's environment	.839	.771	.827	.799
	Ability to use the firm's networks to access useful knowledge	.873	.856		
	Ability to use personal networks for business purposes	.671	.657		
Product Uniqueness	Product / Service uniqueness	.692	.771	.725	.789
	Superior product (service)	.677	.641		
	Distinctive product (service) features	.788	.813		

* Question asked: Could you now compare your business to other businesses in your industry. I will read a list of business capabilities and resources. For each one, please state if it represents an advantage, disadvantage or no real advantage or disadvantage for your business. [After affirming advantage/disadvantage:] Would that be a slight or major (dis)advantage? Responses were coded on a 5-point scale from 1=strong disadvantage, 3=neither advantage nor disadvantage, to 5=strongly advantage.

Table 3

Descriptive Statistics and Correlations – Primary and Secondary Sample

		Primary Sample		Secondary Sample		Correlations - Primary sample below diagonal. Secondary Sample above diagonal				
		Mean	S.D.	Mean	S.D.	(1)	(2)	(3)	(4)	(5)
(1)	Wave 2 Competitiveness	4.04	.51	3.88	.52	1.0	.03	.03	-.02	.09
(2)	Manufact. Mining & Agri.	.41	.49	.22	.42	-.01	1.0	-.21	-.20	-.19
(3)	Wholesale Trans. Comms.	.15	.36	.14	.35	.02	-.35	1.0	-.15	-.14
(4)	Bus. Consult. Fin. & Insur.	.17	.38	.13	.34	-.06	-.38	-.20	1.0	-.13
(5)	Other	.17	.37	.11	.31	-.04	-.37	-.19	-.21	1.0
(6)	Product (vs Service)	.57	.50	.30	.46	-.12	.40	-.13	-.32	-.10
(7)	Education	.60	.49	.41	.49	-.07	-.21	-.09	.24	.19
(8)	Managerial Experience	2.86	1.59	2.03	1.80	-.08	.17	-.01	-.07	-.08
(9)	Start-up Experience	.56	1.70	-.66	1.68	-.14	.18	.04	-.18	.01
(10)	Technology Exist 5yrs	.63	.49	.23	.42	-.04	.02	.04	-.10	.06
(11)	High Technology	.63	.49	.30	.46	-.10	-.01	.04	-.10	.10
(12)	Investment (log)	11.73	2.80	8.96	3.98	-.01	.25	.03	-.16	-.15
(13)	Wave 1 Competitiveness	4.12	.53	3.94	.58	.49	.00	.07	-.08	.01
(14)	Bricolage	4.11	.53	4.00	.64	.27	.03	.04	.08	-.12
(15)	Nascent	.48	.50	.48	.50	-.07	.18	-.05	-.13	-.01
(16)	Growth Expectations	15.12	2.75	11.37	4.39	-.12	.08	.13	-.15	.03

		Correlations - Primary sample below diagonal. Secondary Sample above diagonal										
		(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
(1)	Wave 2 Competitiveness	.02	-.03	.16	.17	.07	.16	.04	.49	.26	.09	.12
(2)	Manufact. Mining & Agri.	.14	-.12	.03	.04	-.04	-.03	.14	-.06	.03	-.02	-.02
(3)	Wholesale Trans. Comms.	-.05	.01	.00	.01	.05	.05	.02	.01	.04	-.07	.05
(4)	Bus. Consult. Fin. & Insur.	-.23	.20	.05	.01	.04	.08	-.13	-.01	-.04	-.08	-.01
(5)	Other	-.02	-.01	-.02	-.02	.08	.02	-.02	.12	.02	-.06	.03
(6)	Product (vs Service)	1.0	-.03	.13	.16	.05	-.04	.13	.04	.00	.14	.01
(7)	Education	-.18	1.0	.07	.02	.10	.06	.04	-.01	-.07	-.05	.04
(8)	Managerial Experience	.16	.06	1.0	.37	.04	-.01	.18	.17	.12	.10	.07
(9)	Start-up Experience	.34	-.02	.52	1.0	.07	.05	.16	.20	.18	.19	.17
(10)	Technology Exist 5yrs	.16	.08	.18	.14	1.0	.27	.06	.02	.10	.09	.03
(11)	High Technology	.00	.21	.10	.22	.39	1.0	.10	.13	.10	.05	.11
(12)	Investment (log)	.20	-.14	.27	.36	.16	.10	1.0	.09	-.02	.00	.32
(13)	Wave 1 Competitiveness	-.08	.01	.11	.13	-.04	.10	.04	1.0	.29	.16	.14
(14)	Bricolage	.09	-.01	.04	-.04	-.02	-.01	.07	.27	1.0	.08	.07
(15)	Nascent	.31	-.06	.03	.17	.13	.10	.11	-.04	-.07	1.0	.08
(16)	Growth Expectations	.18	-.02	.24	.30	.05	.17	.40	.08	.12	.15	1.0

Primary sample n = 155; all correlations larger than .15 in magnitude are significant at $p<.05$;

Secondary sample n = 456. All correlations larger than .09 in magnitude are significant at $p<.05$.

Table 4

Regression for Competitiveness of Primary Sample[a] (Selection Corrected)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Manufact., Mining & Agri.	-0.070	-0.071	-0.064	-0.070	-0.062	-0.079
	(0.135)	(0.131)	(0.128)	(0.131)	(0.128)	(0.127)
Wholesale, Trans., Comms.	-0.086	-0.103	-0.076	-0.104	-0.076	-0.115
	(0.154)	(0.151)	(0.147)	(0.151)	(0.147)	(0.147)
Bus. Consult., Fin. & Insur.	-0.181	-0.226	-0.218	-0.226	-0.218	-0.245
	(0.152)	(0.149)	(0.146)	(0.149)	(0.145)	(0.144)
Other	-0.102	-0.090	-0.066	-0.091	-0.066	-0.102
	(0.151)	(0.147)	(0.144)	(0.147)	(0.144)	(0.143)
Product (vs Service)	-0.044	-0.092	-0.065	-0.095	-0.069	-0.074
	(0.089)	(0.089)	(0.087)	(0.089)	(0.088)	(0.087)
Education	-0.035	-0.033	-0.038	-0.030	-0.034	-0.038
	(0.078)	(0.077)	(0.075)	(0.077)	(0.075)	(0.074)
Managerial Experience	-0.011	-0.014	-0.011	-0.014	-0.011	-0.012
	(0.027)	(0.026)	(0.026)	(0.026)	(0.026)	(0.025)
Start-up Experience	-0.055	-0.044	-0.042	-0.044	-0.042	-0.045
	(0.028)	(0.028)	(0.027)	(0.028)	(0.027)	(0.027)
Technology Exist 5yrs	0.087	0.095	0.055	0.092	0.052	0.033
	(0.082)	(0.080)	(0.080)	(0.080)	(0.080)	(0.080)
High Technology	-0.124	-0.121	-0.095	-0.128	-0.103	-0.098
	(0.084)	(0.082)	(0.080)	(0.083)	(0.081)	(0.080)
Investment (log)	0.013	0.011	0.017	0.011	0.016	0.018
	(0.015)	(0.015)	(0.014)	(0.015)	(0.014)	(0.014)
Wave 1 Competitiveness	0.504****	0.446****	0.449****	0.443****	0.446****	0.448****
	(0.068)	(0.069)	(0.068)	(0.070)	(0.068)	(0.067)
Nascent	-0.016	-0.004	-0.017	-0.004	-0.016	0.007
	(0.074)	(0.073)	(0.071)	(0.073)	(0.071)	(0.071)
Growth Expectations	-0.025	-0.027	-0.029*	-0.024	-0.025	-0.015
	(0.017)	(0.017)	(0.016)	(0.017)	(0.017)	(0.018)
Nascent x Growth Expectations	-0.006	-0.014	-0.024	-0.018	-0.030	-0.031
	(0.032)	(0.032)	(0.031)	(0.033)	(0.032)	(0.032)
Bricolage		0.191***	0.012	0.186***	0.004	-0.031

		(0.070)	(0.098)	(0.070)	(0.098)	(0.099)
Bricolage x Nascent			0.337***		0.341***	0.385***
			(0.132)		(0.132)	(0.133)
Bricolage x Growth Expectations				0.017	0.020	0.085*
				(0.034)	(0.033)	(0.048)
Bricolage x Nascent x Grwth. Expect.						-0.121*
						(0.066)
Log liklihood	-166.7	-163.0	-159.8	-162.9	-159.6	-158.0
Model χ^{2b}	71.3****	82.1****	92.6****	82.6****	93.4****	98.9****
Change from previous step: χ^{2c}		7.34***	6.37**	0.24	6.75**	3.32*

[a] Competitiveness is measured in Wave 2. Unstandardized coefficients are reported, with standard errors in parentheses. Moderation variables are mean centered. N = 189; N selected = 155.

[b] Chi-square for each model and its significance compared to the null model.

[c] Likelihood ratio Chi-square test: Model 2 c.f. Model 1. Models 3-5 c.f. Model 2. Model 6 c.f. Model 5.

* p < 0.1; ** p<.05; *** p<.01; **** p<.001. Exact p-values are reported in the text.

Table 5

Regression for Competitiveness of Secondary Sample[a] (Selection Corrected)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Manufact., Mining & Agri.	0.093	0.087	0.081	0.086	0.081	0.079
	(0.056)	(0.057)	(0.057)	(0.057)	(0.057)	(0.061)
Wholesale, Trans., Comms.	0.048	0.044	0.044	0.050	0.049	0.036
	(0.063)	(0.063)	(0.063)	(0.063)	(0.063)	(0.064)
Bus. Consult., Fin. & Insur.	-0.007	-0.005	-0.009	-0.003	-0.007	-0.012
	(0.071)	(0.072)	(0.071)	(0.072)	(0.072)	(0.074)
Other	0.143*	0.144*	0.142*	0.144*	0.142*	0.132
	(0.071)	(0.071)	(0.070)	(0.071)	(0.071)	(0.071)
Product (vs Service)	-0.001	0.000	0.002	0.002	0.004	-0.002
	(0.047)	(0.047)	(0.047)	(0.048)	(0.048)	(0.050)
Education	-0.009	-0.003	-0.003	-0.002	-0.002	-0.005
	(0.043)	(0.043)	(0.042)	(0.043)	(0.043)	(0.043)
Managerial Experience	0.009	0.007	0.007	0.006	0.006	0.004
	(0.015)	(0.016)	(0.016)	(0.016)	(0.016)	(0.020)
Start-up Experience	0.012	0.010	0.010	0.010	0.010	0.009
	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)
Technology Exist 5yrs	0.069	0.064	0.063	0.065	0.065	0.075
	(0.051)	(0.052)	(0.052)	(0.052)	(0.052)	(0.058)
High Technology	0.082	0.077	0.073	0.077	0.073	0.069
	(0.047)	(0.048)	(0.048)	(0.048)	(0.048)	(0.051)
Investment (log)	-0.009	-0.008	-0.008	-0.009	-0.009	-0.010
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.009)
Wave 1 Competitiveness	0.413****	0.394****	0.390****	0.395****	0.391****	0.393****
	(0.038)	(0.039)	(0.039)	(0.040)	(0.040)	(0.042)
Nascent	0.015	0.023	0.033	0.027	0.036	0.052
	(0.067)	(0.074)	(0.075)	(0.077)	(0.078)	(0.109)
Growth Expectations	0.054	0.058	0.063	0.062	0.067	0.080
	(0.092)	(0.091)	(0.091)	(0.091)	(0.091)	(0.091)

Nascent x Growth Expectations	0.012	-0.001	-0.018	-0.023	-0.037	-0.018
	(0.124)	(0.123)	(0.124)	(0.125)	(0.125)	(0.127)
Bricolage		0.068**	0.017	0.057	0.009	-0.013
		(0.035)	(0.048)	(0.037)	(0.048)	(0.049)
Bricolage x Nascent			0.105*		0.101	0.147**
			(0.066)		(0.066)	(0.070)
Bricolage x Growth Expectations				0.106	0.095	0.355**
				(0.108)	(0.108)	(0.168)
Bricolage x Nascent x Grwth. Expect.						-0.447**
						(0.220)
Log liklihood	-728.2	-726.4	-725.1	-725.9	-724.7	-722.7
Model χ^{2b}	181.0	185.3	189.0	185.8	189.2	190.8
Change from previous step: χ^{2c}		3.74*	2.52	0.95	3.28	4.12**

[a] Competitiveness is measured in Wave 2. Unstandardized coefficients are reported, with standard errors in parentheses. Moderation variables are mean centered. N = 189; N selected = 155.

[b] Chi-square for each model and its significance compared to the null model.

[c] Likelihood ratio Chi-square test: Model 2 c.f. Model 1. Models 3-5 c.f. Model 2. Model 6 c.f. Model 5.

* p < 0.1; ** p<.05; *** p<.01; **** p<.001. Exact p-values are reported in the text.

Table 6

Regression for Competitiveness of Nascent-Operational Sub-Sample[a]

	Primary Sample Operational		Primary Sample Nascent		Secondary Sample Operational		Secondary Sample Nascent	
	Model 7	Model 8	Model 7	Model 8	Model 7	Model 8	Model 7	Model 8
Controls supressed								
Bricolage	-0.004	-0.044	0.327**	0.340***	-0.007	-0.036	0.167**	0.180**
	(0.117)	(0.118)	(0.097)	(0.097)	(0.046)	(0.048)	(0.051)	(0.055)
Bricolage x Growth Expectations		0.100**		-0.051		0.350**		-0.086
		(0.056)		(0.048)		(0.159)		(0.141)
Log liklihood					-305.5	-303.1	-402.8	-402.6
Change from previous step: χ^2 test					0.02	4.79**	10.16***	0.38
R square	0.397	0.425	0.431	0.442				
Change from previous step: F test	0.001	3.18*	11.41**	1.16				

[a] Competitiveness is measured in Wave 2. Unstandardized coefficients are reported, with standard errors in parentheses. Moderation variables are mean centered. Secondary sample corrected for sample selection (Heckman). Primary sample OLS regression.

[b] Likelihood ratio Chi-square test: Model 7 c.f. control variables only. Models 8 c.f. Model 7.

* p < 0.1; ** p<.05; *** p<.01; **** p<.001. Precise p-values are specified in the text.

Figure 1

Theoretical Model

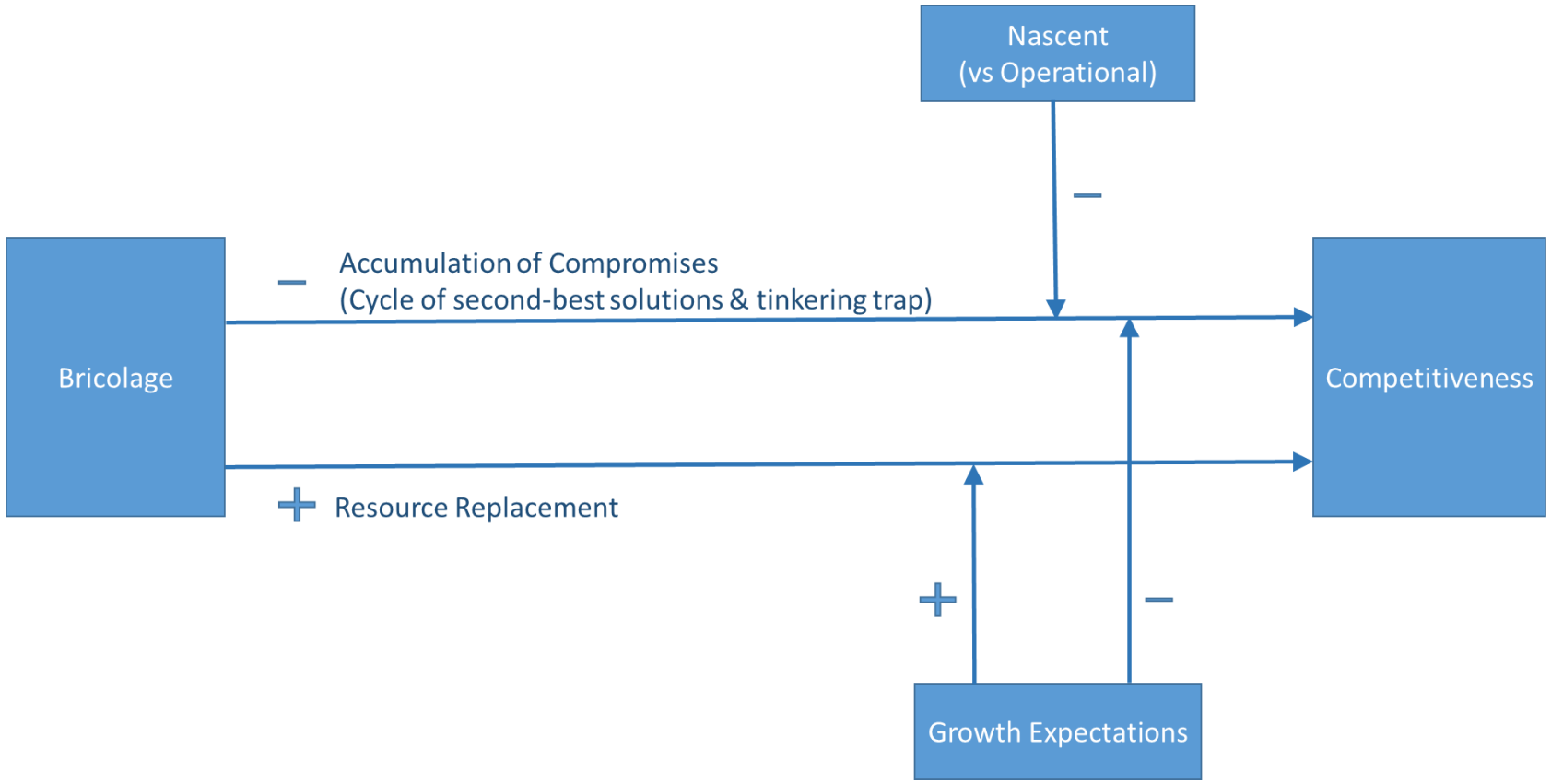


Figure 2

Influence of Bricolage on Early-stage Venture Competitiveness Moderated by Growth Expectations Nascent vs. Operational Firms: Primary Sample

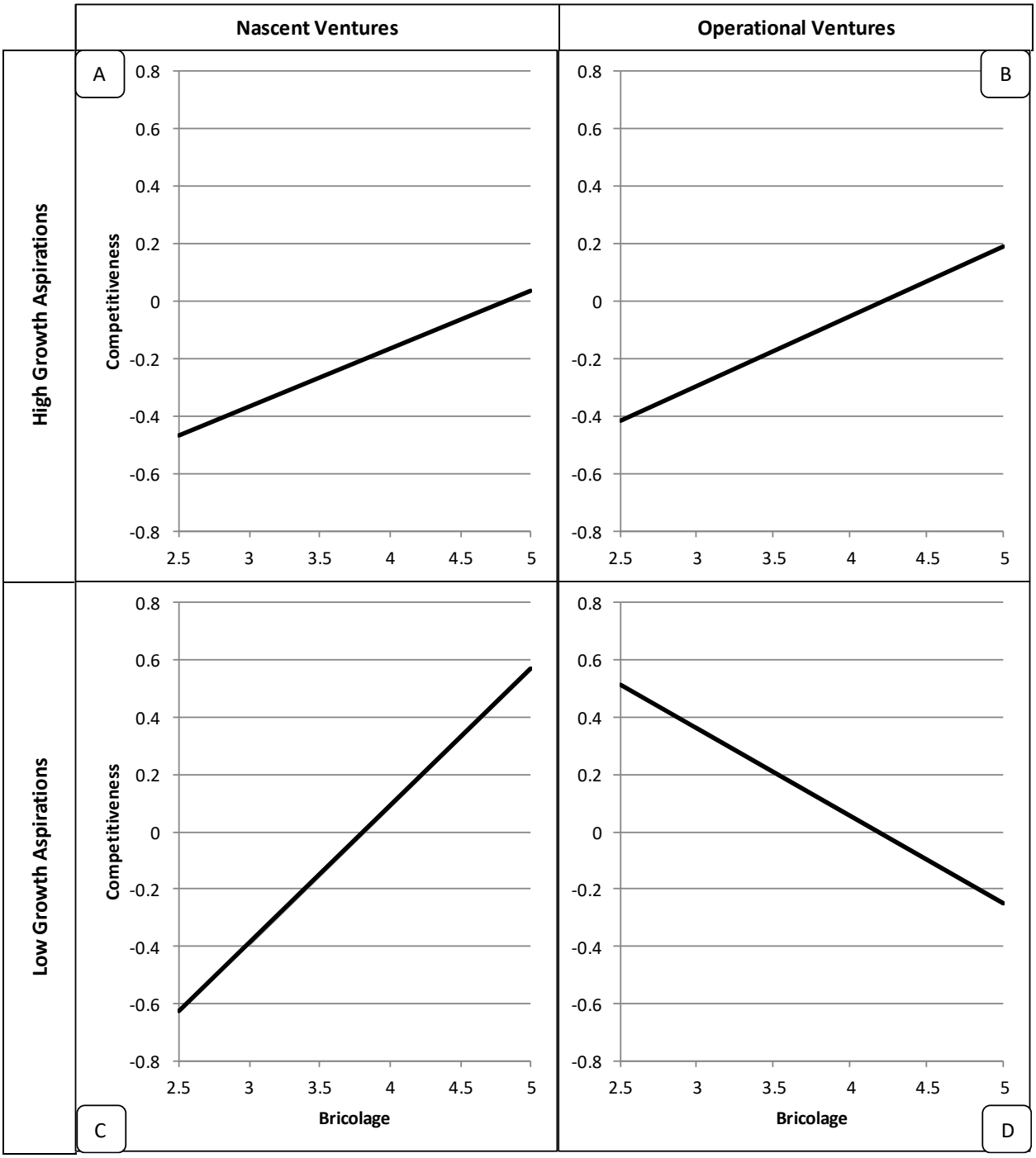
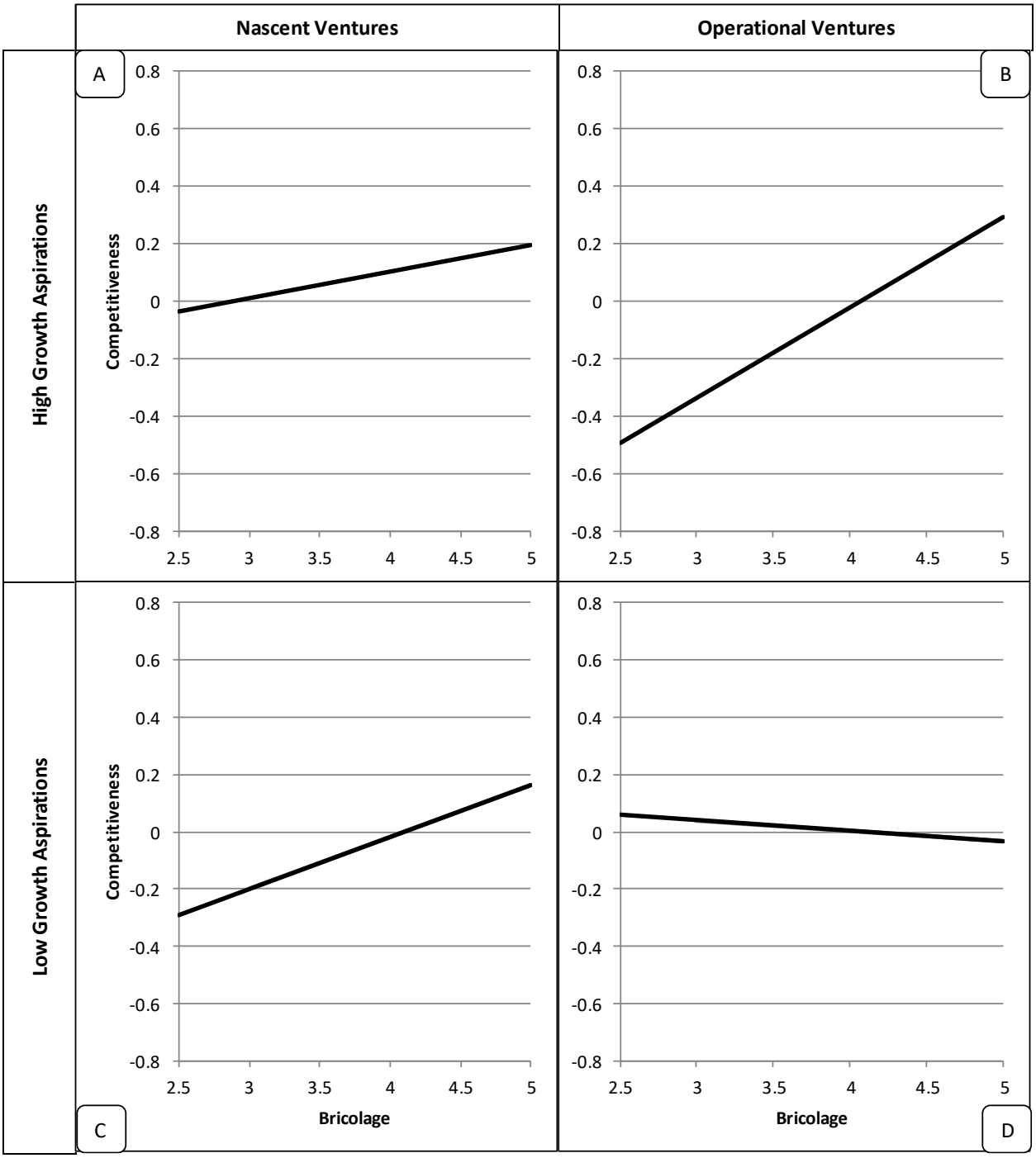


Figure 3

Influence of Bricolage on Early-stage Venture Competitiveness Moderated by Growth Expectations Nascent vs. Operational Firms: Secondary Sample



SUPPLEMENTARY ONLINE MATERIALS

ONLINE APPENDIX A: DESCRIPTION OF SECONDARY SAMPLE

The second sample allowed us to test our hypotheses using a sample designed to be statistically representative of the population of all early-stage ventures in Australia.

We applied an established approach used by researchers studying nascent entrepreneurship that, in essence, screens a random sample of the national adult population to determine which ventures are currently in the nascent stage (Davidsson & Gordon, 2012; Gartner et al., 2004) or have recently been so (Reynolds, 2009). Random digit dialing phone interviews were conducted with adults in 30,105 Australian households by a professional market research organization. These screening interviews were used to identify anyone currently engaged as an owner or part owner-manager of either a "nascent" or an "operational" venture.

To qualify for selection as a participant in the research, all respondents had first to answer affirmatively to at least one of the following questions: i) Are you, alone or with others, currently trying to start a new business, including any self-employment or selling any goods or services to others? (potential nascent venture); ii) Are you, alone or with others, currently trying to start a new business or a new venture for your employer, an effort that is part of your normal work? (potential nascent venture if respondent is part owner); or iii) Are you, alone or with others, currently the owner of a business you help manage, including self-employment or selling any goods or services to others? (potential operational venture). To qualify as founders of a nascent or operational venture, respondents also had to meet several other criteria described below. We excluded respondents who were self-employed and did not plan to have employees.

This process yielded 1,809 early-stage ventures eligible for our study, each represented by a (co-)founder respondent. Of these, 927 completed the full Wave 1 interview identical to that conducted with the primary sample, representing a response rate of 51%. Respondents and non-respondents could be compared on ten socio-demographic variables obtained in the short screener interview. No differences were found for employment status, home or investment property ownership, and ethnic and country origin of the respondents or their parents. Respondents tended to be somewhat older than non-respondents (average age 42.9 vs. 41.3 years), less likely to only have high school education (32.1% vs. 39.9%), and more likely to have at least one parent with self-employment experience (57.1% vs. 52.3%). Twelve months after the first interview, we were able to re-interview 719 respondents (78% response rate), of which 544 were still continuing their operations or start-up attempt. Our final sample consisted of 456 early-stage ventures due to item non-response.

Survey administration. The survey instrument was pre-tested on a convenience sample of 71 founders of operational ventures and then on a random sample of 78 nascent ventures. The Wave 1 main study data collection was undertaken through a computer assisted telephone interview (CATI). Study participants who could not be contacted or were unable to complete the survey at the time of contact were rescheduled up to 10 times to complete the interview. When possible, interrupted interviews were completed at a later date through callbacks. Respondents who agreed to continued participation were re-contacted 12 months after the first interview for the Wave 2 data collection. The subsequent waves were also administered via CATI.

ONLINE APPENDIX B: REMEDIES FOR SELECTION BIAS

Since we only observe competitiveness for those ventures that persist until Wave 2, and venture persistence is likely to be endogenous, we correct for selection. We use a maximum likelihood extension of the Heckman (1979) two-stage approach (Greene, 2018). To correct for selection bias, at least one instrumental variable must be identified that influences sample selection (Venture survival) but is not used to predict the focal dependent variable (competitiveness) (Greene, 2018; Heckman, 1979). We include the number of hours worked (log) in the sample selection model, as this indicates a level of commitment of the founder to persist with the venture, while not related to the quality of the venture itself. The selection models are presented in Tables A1 and A2 for the primary and secondary samples respectively. The control variables other than investment are suppressed. None are significant, which is unsurprising since we also control for the dependent variable, competitiveness, measured in Wave 1. For the primary sample, the instrumental variable (hours invested) is not significant in predicting selection. Nor is the χ^2 test of independent equation significant (χ^2 ranging between .397 and .770), indicating that selection does not substantially bias the final model. This is not surprising because dropout is modest (36 of 189 ventures). For the secondary sample, the instrumental variable (hours invested) is significant in predicting selection ($p<.001$) for all models. However, the χ^2 test of independent equations is significant (χ^2 ranging between .082 and .191), indicating that selection does not substantially bias the final model.

INSERT TABLES A1 & A2 ABOUT HERE

ONLINE APPENDIX C: ROBUSTNESS TESTS – OBJECTIVE MEASURES OF FIRM PERFORMANCE

We assess the robustness of Hypothesis 2 using two objective measures of future firm performance: profits and sales. Since the trajectory of development over time is heterogeneous for nascent and operational early-stage ventures (Coad et al., 2013; Davidsson & Gordon, 2012), we measure sales and profits across multiple years. Specifically, we measure *Highest Profit* as the highest reported annual profits in Waves 2 to 5 of the study (log thousands of dollars). Waves 1 – 4 were annual waves of data collection, while Wave 5 occurred six years after the first wave and focused on firm outcomes – including collecting data from respondents that had dropped out of some earlier waves of data collection. The second measure is *Highest Sales*, measured as the highest reported sales revenue in Waves 2 to 5 of the study (log thousands of dollars).

Again, we conducted regressions corrected for sample selection (Heckman), controlling for the dependent variable measured in Wave 1 (natural log of Profits or Sales respectively). The results are presented in Table B1 (suppressing controls identical to the previous regressions).

For highest sales as dependent variable, we found support that expectations moderate the effect of bricolage on future sales for the primary sample (b = 0.579, p = 0.019) and marginal support for the secondary sample (b = 0.041, p = 0.100). For highest profits as dependent variable, we found marginal support that expectations moderate the effect of bricolage on future profits for the primary sample (p = 0.556, p = 0.071) but not for the secondary sample (b = -0.016, p = 0.403). These findings provide further support of our theorizing for Hypothesis 2, that growth expectations moderate the effect of bricolage on venture competitiveness.

INSERT TABLE B1 ABOUT HERE

Table B1

Selection Model for Primary Sample

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Hours Invested (log)	-0.581	-0.574	-0.579	-0.583	-0.589	-0.594
	(0.406)	(0.406)	(0.412)	(0.409)	(0.416)	(0.421)
Manufact., Mining & Agri.	0.146	0.133	0.132	0.133	0.133	0.140
	(0.416)	(0.415)	(0.416)	(0.416)	(0.416)	(0.417)
Wholesale, Trans., Comms.	0.452	0.437	0.446	0.440	0.448	0.456
	(0.477)	(0.477)	(0.478)	(0.477)	(0.478)	(0.479)
Bus. Consult., Fin. & Insur.	0.048	0.042	0.037	0.045	0.039	0.043
	(0.472)	(0.473)	(0.472)	(0.474)	(0.473)	(0.474)
Other	0.484	0.480	0.476	0.479	0.475	0.479
	(0.479)	(0.481)	(0.480)	(0.481)	(0.481)	(0.481)
Product (vs Service)	0.455	0.458	0.449	0.458	0.449	0.446
	(0.279)	(0.279)	(0.279)	(0.280)	(0.279)	(0.279)
Education	-0.091	-0.094	-0.093	-0.094	-0.094	-0.090
	(0.260)	(0.260)	(0.260)	(0.260)	(0.260)	(0.259)
Managerial Experience	0.114	0.114	0.114	0.113	0.114	0.112
	(0.094)	(0.094)	(0.094)	(0.094)	(0.094)	(0.094)
Start-up Experience	-0.128	-0.128	-0.131	-0.128	-0.130	-0.131
	(0.090)	(0.090)	(0.090)	(0.090)	(0.090)	(0.090)
Technology Exist 5yrs	0.207	0.205	0.201	0.204	0.201	0.201
	(0.255)	(0.254)	(0.253)	(0.254)	(0.253)	(0.253)
High Technology	0.247	0.250	0.253	0.249	0.251	0.250
	(0.270)	(0.270)	(0.270)	(0.270)	(0.269)	(0.269)
Investment (log)	-0.015	-0.014	-0.015	-0.014	-0.015	-0.015
	(0.058)	(0.058)	(0.058)	(0.058)	(0.058)	(0.058)
Wave 1 Competitiveness	0.117	0.118	0.113	0.118	0.113	0.112
	(0.221)	(0.221)	(0.220)	(0.221)	(0.220)	(0.219)
Growth Expectations	-0.155**	-0.155**	-0.151**	-0.153**	-0.149**	-0.147**

	(0.074)	(0.074)	(0.074)	(0.074)	(0.074)	(0.075)
Nascent	-0.079	-0.084	-0.082	-0.085	-0.084	-0.083
	(0.257)	(0.259)	(0.259)	(0.259)	(0.259)	(0.259)
Atanh ρ	0.402	0.404	0.353	0.395	0.344	0.331
	(0.355)	(0.392)	(0.396)	(0.396)	(0.402)	(0.411)
Ln σ	-0.839****	-0.864****	-0.891****	-0.866****	-0.893****	-0.906****
	(0.074)	(0.076)	(0.074)	(0.076)	(0.073)	(0.073)
Selection Model χ^2	0.770	0.673	0.522	0.627	0.478	0.397

Table B2

Selection Model for Secondary Sample

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Hours Invested (log)	0.393****	0.394****	0.393****	0.395****	0.394****	0.397****
	(0.115)	(0.115)	(0.115)	(0.114)	(0.115)	(0.113)
Manufact., Mining & Agri.	-0.177	-0.177	-0.177	-0.177	-0.177	-0.178
	(0.126)	(0.126)	(0.126)	(0.126)	(0.126)	(0.127)
Wholesale, Trans., Comms.	-0.030	-0.030	-0.030	-0.030	-0.030	-0.030
	(0.150)	(0.150)	(0.150)	(0.150)	(0.150)	(0.150)
Bus. Consult., Fin. & Insur.	0.060	0.059	0.059	0.059	0.059	0.056
	(0.176)	(0.176)	(0.176)	(0.176)	(0.176)	(0.177)
Other	-0.007	-0.007	-0.007	-0.008	-0.008	-0.012
	(0.166)	(0.166)	(0.166)	(0.166)	(0.166)	(0.168)
Product (vs Service)	-0.061	-0.061	-0.061	-0.061	-0.061	-0.059
	(0.106)	(0.106)	(0.106)	(0.106)	(0.106)	(0.106)
Education	-0.015	-0.016	-0.016	-0.017	-0.017	-0.022
	(0.102)	(0.102)	(0.102)	(0.103)	(0.103)	(0.110)
Managerial Experience	0.058	0.058	0.058	0.058	0.058	0.058
	(0.030)	(0.030)	(0.030)	(0.030)	(0.030)	(0.030)
Start-up Experience	-0.005	-0.006	-0.006	-0.006	-0.006	-0.008
	(0.033)	(0.033)	(0.033)	(0.034)	(0.034)	(0.036)
Technology Exist 5yrs	-0.140	-0.140	-0.140	-0.139	-0.139	-0.137
	(0.112)	(0.112)	(0.112)	(0.112)	(0.112)	(0.113)
High Technology	0.103	0.103	0.103	0.103	0.103	0.102
	(0.109)	(0.108)	(0.108)	(0.108)	(0.108)	(0.108)
Investment (log)	0.029*	0.029*	0.029*	0.029*	0.029*	0.028**
	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)
Wave 1 Competitiveness	-0.087	-0.087	-0.087	-0.086	-0.087	-0.085
	(0.087)	(0.087)	(0.087)	(0.087)	(0.087)	(0.088)
Growth Expectations	-0.017	-0.017	-0.017	-0.017	-0.017	-0.016

	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)
Nascent	-0.286***	-0.285***	-0.285***	-0.284***	-0.285***	-0.281**
	(0.109)	(0.109)	(0.109)	(0.109)	(0.109)	(0.110)
Atanh ρ	-0.134	-0.168	-0.166	-0.206	-0.203	-0.333
	(0.495)	(0.593)	(0.600)	(0.626)	(0.640)	(1.008)
Ln σ	-0.841****	-0.842****	-0.845****	-0.839****	-0.842****	-0.829****
	(0.048)	(0.062)	(0.062)	(0.074)	(0.075)	(0.168)
Selection Model χ^2	0.084	0.103	0.099	0.149	0.141	0.253

Table B1

Robustness Tests for Highest Sales and Highest Profits[a]

	Highest Sales (ln)		Highest Profits (ln)	
	Primary	Secondary	Primary	Secondary
Controls supressed				
Wave 1 Sales (ln)	0.337****	0.132****		
	(0.053)	(0.021)		
Wave 1 Profits (ln)			0.129**	0.320****
			(0.061)	(0.038)
Growth Expectations	-0.035	0.098****	-0.174	0.055
	(0.117)	(0.024)	(0.201)	(0.042)
Nascent	0.246	0.247	-1.404	1.244
	(0.711)	(0.247)	(1.449)	(1.660)
Bricolage	0.193	-0.163	-0.340	-0.113
	(0.551)	(0.138)	(0.713)	(0.266)
Bricolage x Growth Expectations	0.579**	0.041*	0.556*	-0.016
	(0.279)	(0.032)	(0.377)	(0.065)
Constant	7.790****	10.622****	2.733	8.189****
	(1.730)	(0.411)	(2.225)	(1.676)
Log liklihood	-418.49	-1469.74		
Chi-Square	76.0****	107.6****	42.9****	92.5****

[a] Highest Sales / Profits is measured over Waves 2-5. Unstandardized coefficients are reported, with standard errors in parentheses. Moderation variables are mean centered. Corrected for sample selection (Heckman). Selection models not displayed.

* p < 0.1; ** p<.05; *** p<.01; **** p<.001. Precise p-values are specified in the text.