Abstract

We contend that exploring the construct of bootstrapping could be much more nuanced and interesting than the extant literature has revealed. Unfortunately, the extant literature is stymied by conflicting theoretical as well as empirical landscapes. We address the critical lacunas in the literature by (a) situating the construct of bootstrapping in its historical, chronological context; (b) providing clarity to a construct that is currently lacking; (c) summarizing the theoretical bases which currently apply to bootstrapping; and (d) proposing signaling theory as an appropriate and complementary perspective to use when examining bootstrapping. Additionally, our work identifies multiple lines of compelling and novel research that emerge from our approach to the construct of bootstrapping via signaling theory.

Key words: bootstrapping; signaling; resources; entrepreneurs; stakeholders
Bootstrapping: A New Way Forward

Bootstrapping: Reviewing the Literature, Clarifying the Construct, And Charting a New Path Forward

Noted to be an “essential entrepreneurial phenomenon,” (Grichnik & Singh, 2010, p. 1) bootstrapping is a concept that is increasingly examined in the academic entrepreneurship literature. Understood as a method to secure startup resources without reliance on external financing (Freear, Sohl, & Wetzel, 1995; Winborg, 2009), the construct has existed in the academic literature for roughly three decades (e.g., Van Auken & Carter, 1989). However, although bootstrapping is an essential phenomenon occurring within entrepreneurship, it is disconcerting how little entrepreneurship scholars know about it. Despite a growing volume of research focused on bootstrapping in recent years, the state of the literature—both empirical and theoretical—remains underdeveloped.

As attention to the topic is increasing, some areas have received a large amount of attention (e.g., bootstrapping over the life cycle), while others have been virtually dormant (e.g., bootstrapping’s relation with associated constructs). As a result, the literature is fragmented and only slowly emerging from its descriptive roots that characterized early work on the topic. The uneven development of the domain should be a substantial concern for scholars, entrepreneurs, as well as policy makers. Bootstrapping garners a great deal of anecdotal attention in the popular press (e.g., Kawasaki, 2009) and it is a well-regarded fact that most entrepreneurs bootstrap their new firms (Shane, 2008). However, without academics providing robust empirical findings based on sound theoretical rationale, interested stakeholders are left to merely rely on anecdotes, educated guesses, and conjecture.
Accordingly, we contend that it is an ideal time to accumulate the literature, organize it, and suggest new paths forward. We confront the critical gaps present in the literature, explore the relative limitations of theory bases in the bootstrapping literature, and then offer an appropriate base from which to accumulate and extend work on the construct. We submit that this is an important contribution because, in some ways, bootstrapping is a construct in search of a theory to better explain its important role for new ventures. In a necessary and needed movement towards proper epistemology, we seek to provide more robust theoretical grounding. Since entrepreneurship research tends to be necessarily phenomenological, this condition occurs periodically. However, it is crucial that scholars work to embed these constructs in bona fide theory, so that we can properly build a base of knowledge and draw appropriate conclusions allowing one to understand, explain, and predict such behavior.

In this review we make three, somewhat contentious, assertions: 1) bootstrapping is a construct—not a theory, 2) as a construct, it is a distinctive form of capital structure, and 3) as a capital structure construct, it is ideally, and logically, explored via signaling theory. To the first point, the logic of bootstrapping has not been developed to the level where, in absentia of other theoretical bases, researchers can predict and understand important relationships. While this may be the least contentious of the three claims, it is nonetheless important to clarify.

To the second point, our stance is that bootstrapping is about startup financing—no more, no less. In the current work, we put forth and support the following definition: ‘starting a business with only financial capital possessed by the owners of the business or family members of the owners.’ While our definition limits the construct to consider only financing, we suggest that the subject of financing de novo firms is sufficiently complex that it can, and should, be considered as a standalone subject. While we understand and respect historical typologies and
taxonomies within this literature, such as the highly regarded one by Winborg and Landström (2001), we suggest that the activities that follow the decision to start a business with no outside financing are actually separate constructs. Clearly, activities such as late payments and sharing resources are not purely financial considerations. Instead, they are actions that must be undertaken because one decided to start with no external money. We determine that conflating financial and subsequent strategic decisions makes the construct of bootstrapping challenging to understand, explain, study, and therefore apply. By restricting the construct to only capital structure concerns, it allows scholars to more clearly and effectively hone in on the construct and its boundary conditions. By extension, it allows for the construct to operate more harmoniously with related yet distinct constructs and theories, such as bricolage and effectuation.

Finally, and to the third point, the relation between capital structure and signaling has been well-established in the literature (e.g., Connelly, Certo, Ireland, & Reutzel, 2011; Ross, 1977). At its heart, signaling is about overcoming information asymmetry. It is exactly the presence of this asymmetrical information that describes the position in which new firms find themselves. That is, a hallmark of most new ventures is that they are informationally opaque—more specifically, extreme information asymmetry exists between sender and receiver (Brewer, 2007; Gulati & Higgins, 2003). But, as firms age, they become more able to produce and transmit information to stakeholders and information becomes more symmetrical—this is known as the financial growth cycle (Berger & Udell, 1998). In fact, scholars have suggested that the importance of capital structure may reside more in the types of signals that can be sent from a given capital structure than from the actual strength or weakness of that capital structure (Stiglitz, 2000). We suggest that this notion is even more salient in de novo ventures, where information asymmetry is extreme. This relation between capital structure and signaling
encourages us to look more carefully at signaling theory as being appropriate when studying the construct of bootstrapping (Rutherford et al., 2017).

We proceed as follows. First, we trace the evolution of the bootstrapping literature. Then, we conduct a construct clarification process (Suddaby, 2010) in an effort to provide a more integrated understanding. Following this, we review the commonly used theory bases in bootstrapping for the purpose of setting up our theoretical remedy—signaling theory. We conclude by offering a number of directions for future research, based on signaling theory, that have the potential to substantially advance the literature.

**Background and Context: A Brief History of the Bootstrapping Literature**

In this section, we organize and explain the literature by demarcating “eras” of development. Based upon the identified relevant studies, we group the literature into three separate stages of development. We employed the following approach to identify the relevant literature. First, our literature search process used multiple relevant key words queried via computerized databases including Google Scholar, ABI/INFORM, EBSCO Host (e.g., Academic Search Complete and Business Source Complete), ProQuest Dissertations and Theses, ScienceDirect, and Social Science Citation Index. We additionally searched all major journals in entrepreneurship, management, and strategy. Still further, we snowballed—tracked the references and citations—of two seminal articles (i.e., Bhide, 1992; Winborg & Landström, 2001). Our search, initially, revealed over 18,000 possibilities as of our search conclusion in December 2016.

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1 It should be noted that this is a non-empirical grouping—a typology—but does incorporate the characteristic of time. However the eras, while distinctive, are not orthogonal. The demarcations between eras were decided upon based on the authors’ knowledge of the collected literature.

2 "bootstrap(ping)," "financial/venture / firm / startup / business / small/finance / financing / strategy / strategic / entrepreneurial / entrepreneur / SME(s) / family" with "bootstrap(ping)," "owner resources," and "self-)finance"
We only had two inclusion criteria that narrowed our field of studies. The study had to: 1) be published in a peer-reviewed outlet, and 2) deal with bootstrapping in the context of entrepreneurs and/or small business owners. Works that did not directly study the bootstrapping construct or focused on bootstrapping as a statistical technique were eliminated. In the end, we identified 60 articles addressing bootstrapping in an entrepreneurial context (see Figure 1).

Table 1 offers a summary of the results from our literature analysis. As indicated, research on bootstrapping began as far back as 1989 (e.g., Van Auken & Carter, 1989). Since then, bootstrapping has become an increasingly researched phenomenon in the field of entrepreneurship. By 2016, the majority of all scholarly works on bootstrapping were published in peer-reviewed journals. However, despite this growth in peer-reviewed work on bootstrapping, there is still much to be desired regarding the rigor provided in articles published. Rigor involves theoretical sophistication and empirical robustness (Sharma, Chrisman, & Gersik, 2012). Indeed, “small paths are pushed out through the unknown, with simple and primitive instruments, measurements are made, much is left to assumption and to lucky intuition” (Lewin, 1940/1951, p. 3). Together, for the scientific legitimacy of bootstrapping literature, the last three decades have progressed slowly on both dimensions. Thus, much work needs to be done—and, to know where a literature needs to go, it is helpful to know the past. Accordingly, in the following section, we trace the evolution of the bootstrapping literature.
Figure 2 contains visual results of our citation base analysis (e.g., Busenitz et al., 2003). Our results show that there has clearly been an increasing use—and now dominance—of seminal articles within the bootstrapping literature. We report descriptive statistics about the frequency of citations that bootstrapping articles received within the period of 1989 – 2016. The number of citations received provides a rough measure of how important an article is in entrepreneurship literature. For instance, Freear et al. (1995) received the most citations in the first era of 1989 – 1999; Winborg and Landström (2000), Carter et al. (2003), Ebben and Johnson (2006), Kim et al. (2006) received the greatest number of citations in the era of 2000 – 2010; and Lam (2010) received the most citations in the third era of 2010 – 2016.

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Although many early studies addressed the notion of bootstrapping when discussing new and small ventures, initial discussion of the concept is often attributed to Thorne (1989). As noted by Smith (2009), the ‘alternative financing’ techniques Thorne refers to—such as borrowing from suppliers, late/deferred payments to suppliers, early payment by customers, free/low-cost labor, deal-making for deferred and low rent, exploitation of non-equity funding sources (such as grants, federal programs and government contracts), advances and use of equipment from vendors, partnerships with universities in order to acquire technology, and providing consulting services while developing a product—are now considered to be bootstrapping approaches. More specific investigation of the bootstrapping construct is traceable to Freear et al. (1995), who examine a sample of young technology firms with the goal of uncovering preferred financing sources. Their results indicate that a large percentage of
entrepreneurs do bootstrap, but an even larger amount receives angel investment—a finding unique to the technology sector.

While the findings of Freear et al. (1995) are certainly thought-provoking, the key value of their work is the interest that it generates concerning the construct of bootstrapping and its link to firm performance. Since the appearance of this seminal article, attention to the relationship between bootstrapping and performance has grown, and this base of literature continues to develop.


Early studies (e.g., Van Auken & Carter, 1989; Van Auken & Neeley, 1996) focused on the prevalence of bootstrapping among small—not new—firms. These works provide a foundation and rationale for investigating the practice, as the preponderance of data show that small firms consistently rely on at least some bootstrapping techniques; many, in fact, never receive any external debt or equity. After establishing that the vast majority of small firms employ bootstrapping, scholars then turned to understanding the use of bootstrapping over the venture’s life cycle (e.g., Brush, Carter, Gatewood, Greene, & Hart, 2006; Ebben & Johnson, 2006). These works, in the aggregate, suggest that firms of all ages employ some form of bootstrapping. However, newer and smaller firms employ far more of it and, as firms mature, they appear to engage in fewer bootstrapping techniques and take on more external capital as resources – including financial assets, social networks, and brand equity – become more plentiful.

From this foundation, scholarly interest evolved to developing and refining typologies and taxonomies of bootstrapping techniques. Much of the groundwork of this literature arguably
begins with the Winborg and Landström’s (2001) five factor typology, developed via cluster analysis, in which they classify small businesses based upon the financial bootstrapping methods they employ. Jones and Jayawarna (2010) subsequently refined the Winborg and Landström typology by empirically deriving a more parsimonious model consisting of only three factors. In general, subsequent typologies utilized by researchers tend to be some variant of these two (e.g., Ebben, 2009; Van Auken, 2005). These will be discussed in more detail below.

**The Third Era: Bootstrapping and Performance (circa 2010-present)**

In this third era, scholars have redirected the focus from typological considerations and turned to examining the relationship between bootstrapping and firm performance. A review of the literature indicates an increased focus on firm performance (as a dependent variable) in bootstrapping studies; however, additional work is still needed here. Grichnik and Singh (2010) and Vanacker, Manigart, Meuleman, and Sels (2011), for example, note the relative absence of research examining the impact of bootstrapping, not only on venture growth, but also survival. Similarly, Ebben (2009) observes a lack of analysis focusing on the connection between bootstrapping and performance, as well as the longitudinal nature of this relationship. While these issues are beginning to gain attention in the field of entrepreneurship, empirical studies remain limited—and empirical work that does exist tends to be underpowered and/or lacks external validity.

Consequently, assessment of this relationship is where this particular area of the field currently resides, but findings remain equivocal. Some authors find largely negative performance implications, some find positive relationships, and still others report mixed findings. To this point, Miao, Rutherford, and Pollack (2018) conducted a meta-analysis on the relationship and found that, while bootstrapping did not enhance performance, neither did it constrain it. Echoing
Vanacker et al. (2011) and others, the authors note that there may currently be too few studies to uncover a relation if one exists. It is one goal of this review to add clarity to the bootstrapping-performance relationship by building upon this extant literature.

**Moving Forward: Construct Clarity**

Constructs are the base of theory (Bacharach, 1989). Accordingly, as part of this review, it is pertinent to conduct a clarification exercise on the construct of bootstrapping. To do this, we use Suddaby’s (2010) framework as a guide. His framework contains four components: definitional robustness, scope conditions, relationships between constructs, and coherence. This work will cover the first three, as coherence largely derives from the preceding three components.

**Definitional Robustness**

As Suddaby (2010, p. 348) notes, “The challenge is to create constructs that are sufficiently narrow enough to strip away unintended connotations and surplus meaning but are conceptually broad enough to capture the underlying essence of the phenomenon.” Clearly, crafting a unique and meaningful definition is no small task, at least in the social sciences where there is likely no perfect definition (Bhattacherjee, 2012). To submit ours, we begin with a review of existing definitions.

This examination reveals that there are numerous studies on the construct, but the definitions used have converged around five. As noted, initial exploration of bootstrapping is attributable to Thorne (1989), but the first definition to appear in the literature was Bhide’s (1992), who states that bootstrapping is “launching ventures with modest personal funds” (p. 110). Our review reveals that the most commonly used definition is Freear, Sohl, and Wetzel’s (1995): “highly creative ways of acquiring the use of resources without borrowing money or
raising equity financing from traditional sources” (p. 102). Another commonly cited definition is one put forth by Van Auken and Neeley (1996): “capital acquired from sources other than traditional providers of capital” (p. 236). Winborg and Landström’s (2001) seminal work holds another: “financial bootstrapping refers to the use of methods for meeting the need for resources without relying on long-term external finance from debt holders and/or new owners” (p. 238). Finally, Harrison, Mason, and Girling (2004) define it as follows: “bootstrapping involves imaginative and parsimonious strategies for marshaling and gaining control of resources” (p. 308).

Although somewhat similar, substantial distinctiveness is also noticeable among these definitions. For example, Van Auken and Neeley (1996) are more focused on the purely financial aspects of bootstrapping, while most others incorporate some notion of creative tactics, behaviors, or strategies undertaken in response to a lack of outside assistance. In defense of the Van Auken and Neeley definition, we note that it strips away surplus meaning—thus, it is the most concise. However, the others are broader and, arguably, more interesting.

To further inform our definition, we consider the context in which the bootstrapping metaphor itself materialized and gained popularity among academics and practitioners alike—the context of a cowboy rising from a seated position to a standing one using nothing but what is on the cowboy’s person. The Oxford English Dictionary defines bootstrapping as to “pull oneself up by one’s bootstraps; improve one’s position by one’s own efforts.” Bootstrapping is taken to convey self-reliance, and a specific kind of self-reliance (that is, autonomy in accomplishing the task at hand). Ostensibly, the metaphor’s only concern for how one chooses to arise is that it must to be done by grasping one’s own bootstraps. Therefore, arising without any help from others, but still gaining leverage by using a resource already existing on the person. More than
representing some resource, the boots actually represent the lack of something—assistance from others.

Our intent here is certainly not to disparage extant definitions and prior usage. As noted, there is likely no perfect definition. Instead, with the benefit of hindsight, it is our intent to consider the definition, the construct, and intertwined theory to suggest a recalibration. This is necessary so that the field may continue to develop in concert with other existing theories. In doing so, we also hope to revive interest in this domain. As such, we submit that bootstrapping be defined as ‘starting a business with only financial capital possessed by the owners of the business or family members of the owners.’ Intrinsically, this definition offers clarity to the construct, situating it at a specific point in time in the organizational life cycle. Moreover, it creates boundaries for the construct, offering distinct demarcations from preceding and subsequent entrepreneurial behaviors and outcomes. Making the definition more succinct, we think, would compromise its generalizability and importance to the point that it would render bootstrapping uninteresting. Making it broader, to include the activities resultant from a lack of funding, is simply not distinctive—other literatures have claimed this space.

In relation to the extant definitions, the one presented here is similar to the first two (i.e., Bhide (1992), Freear et al. (1995)), holds noticeable commonalities with those offered in the manuscripts by Van Auken and Neeley (1996) and Winborg and Landström (2001), and is most distinct from the one proffered by Harrison et al. (2004). More specifically, our submission is probably most akin to Bhide’s in that we consider the launching event to be important; however, in our view “modest” is too vague a term, and “personal” is overly specific. Regarding Van Auken and Neeley, we believe that the application to firms other than new ventures is an issue.
Drawing again from our metaphor, the richness of the construct lies in the struggle to stand, and the struggle for new entrants is a unique form of struggle (e.g., Stinchcombe, 1965).

With regard to Freear et al., our definition is similar in that we both restrict from where funds may come (i.e., traditional sources). However, we remove the notion of creativity from the financing event of bootstrapping. As noted, we hold that these tactics are separate constructs. Similarly, looking at Winborg and Landström’s conceptualization, we restrict funding sources, but strip away the surplus meaning around strategies or tactics. Finally, our definition probably differs the most from the Harrison et al. conceptualization. We would submit that no part of that definition is actually bootstrapping, but rather are antecedents and/or outcomes.

We understand that our proposed definition is not infallible. For example, the word *starting* could have multiple meanings, and certainly *family* is not without various interpretations. However, a small degree of ambiguity is a quality of a good definition (Astley & Zammuto, 1992). A definition that is too narrow fails to capture the essence of the construct, and is therefore uninteresting (Suddaby, 2010).

Our overriding issue with definitions that incorporate subsequent activities (e.g., *creativity*) is that these create confusion because the first portion of the definition is dependent upon the second portion. That is, it introduces the antecedent of “insider financing” to the outcome of “creative behavior.” We suggest that these are two orthogonal constructs. Stated differently, the “creative behavior” portion of the definition is problematic because it involves a condition and a causally related behavior based upon the existence of “insider financing.” A second noted concern is that “creative behavior” has been capably handled by other bases of theory—even theories dealing with new ventures, specifically effectuation (Sarasvathy, 2001) and bricolage (Baker & Nelson, 2005). The use of “creativity” makes it difficult to discern
bootstrapping from such theories, which—in our view—is a detriment to the bootstrapping construct.

As such, creativity techniques can and should exist in the nomological net of bootstrapping, but it is a distinct construct from bootstrapping. Consideration based solely upon the financial aspect, while potentially less interesting, clearly delineates its boundaries. Once it has been established that an entrepreneur is bootstrapping, then outcomes related to bootstrapping (e.g., creativity) can be more clearly and concisely explored.

**Scope conditions**

Under which conditions will bootstrapping not apply? While creating a new venture is a process, we conceptualize bootstrapping as a singular event within that process. For the sake of argument, “starting” takes on a legal connotation here. A firm “starts” when it is legally recognized by the institutions of that firm’s context. That is, at launch, a bootstrapped firm is one in which the capital structure of that firm is such that no outside funds have been injected into the business. While this may seem overly inclusive, the evidence is fairly clear that at least 25% of startups take on at least some form external finance (Robb & Farhat, 2013; Rutherford, 2015), and therefore would not be considered bootstrapped.

It should be noted that the definition allows for team-level bootstrapping, which is to say, a collective form of the individual event described by the metaphor (i.e., a collective cowboy). By extension, a firm can start with many founders and their possessed capital can be amassed in the bootstrapped firm. Also to this point, the definition makes no mention of other types of capital (e.g., social and human), so those may be obtained externally.

Also of import, bootstrapping applies to *de novo* firms. Bootstrapping will not apply to other types of firms, because the issues surrounding startup are unique (Caplow, 1957;
Venkataraman, 1997). Stinchcombe (1965) has coined the term “liability of newness” for the comparatively higher death rates of new organizations relative to old ones (p. 148). A large number of empirical studies (e.g., Bruderl & Schussler, 1990; Freeman, Carroll, & Hannan, 1983) confirm that organizational death risks decline with age. Large and old firms may choose to forego external finance, but this is not technically bootstrapping, as age and size meaningfully change the context. Just by virtue of being older and larger, firms will have access to more resources (e.g., Aldrich & Auster, 1986; Stinchcombe, 1965), thus, they are assumed to more effectively endure challenging times.

Another notable conclusion is that our purported definition puts no restriction on amount of capital that can be possessed by the founder(s). Strictly speaking, we maintain that bootstrapping is dichotomous—a firm either takes external financing, or it does not. That is, in the current context, a firm can be in one of two configurations at startup—bootstrapped or not bootstrapped. While it could certainly be debated that starting with only internal financing does not necessarily equate to less financial capital, we would submit strongly that, on average, this is the case (Shane, 2007); and, it is true that firms accepting outside funding typically start with more financial capital than firms which do not (Ebben, 2009). However, it is also the case that some firms in a bootstrapped configuration are more heavily endowed (e.g. a startup launched by Warren Buffet) than others and this variance should prove interesting to study.

Finally, our definition allays the concern of whether entrepreneurs bootstrap because they “want to” or they “have to.” Since bootstrapping only occurs at the startup event, an important assertion of our work is that it represents a decision made by the founder or founding team. For even if the firm attempted to (but could not) raise money, the entrepreneur still has a choice to not start the business. Returning to our cowboy metaphor, when faced with a dearth of resources
from which to draw upon, it is still a choice on whether to make the attempt to arise or not; the cowboy may save resources for a later effort, just as the entrepreneur can abort an attempt to start the business and conserve resources for another initiative or investment. This contention allows for a shifting of this important issue (i.e., antecedents) into the nomological net, which is discussed in greater detail below.

**Relationships between Constructs**

The literature to date has outlined several antecedent, outcomes, and covariates with regard to bootstrapping. From our article search as well as the extant empirical and theory-focused literature, we provide Figure 3, which briefly lists the antecedents, moderators, and possible outcomes.

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**Extant Theory Bases Underpinning the Nomological Net of Bootstrapping**

Based on the most commonly used logic in this milieu, financing in the *de novo* firm and its relation to antecedents and outcomes should be a relatively benign issue. Assuming the existence of perfectly efficient markets, value-adding startups should request the funding needed to adequately pursue identified opportunities (Schwarz & Arronson, 1967). In turn, they should receive all the financing necessary to exploit properly identified opportunities, whether it be through debt or equity (e.g., Modigliani & Miller, 1958). Based on these assumptions, if entrepreneurs cannot attain adequate funding, then they have not identified a robust enough opportunity. In this way, firms that adequately identify opportunities—and subsequently secure the appropriate funding—should then outperform peers who do not identify adequate
opportunities or who are unable to adequately finance the identified opportunity. Bootstrapping, in this scenario, should be unpopular and negatively related to firm performance outcomes.

However, in reality, we know that entrepreneurs with viable opportunities often do not request funds, and we know that there is reluctance on the part of financiers to grant money to startups—even if those startups have identified bona fide opportunities (Ebben & Johnson, 2006). The latter issue occurs primarily due to information asymmetry (Leland & Pyle, 1977), while the former is largely based on the average entrepreneur’s preference for autonomy (Shane, 2007). Information asymmetry is more of a supply-side issue and is discussed below, but the issue of autonomy preference on the part of entrepreneurs is central to the ontology of the bootstrapping construct. Though a number of scholars hold that accepting external financing leads to enhanced wealth and performance (e.g., Wasserman, 2008), it is simply the case that many entrepreneurs prefer (i.e., demand-side) autonomy over profits; they would rather miss out on an identified opportunity than accept any external funding which might compromise the entrepreneur’s control over the organization (Bird, 1988; Kets de Vries, 1985).

The fact that many entrepreneurs do not ask for funding when they “should” and that financiers do not grant funding when they “should” causes problems for theory development, because the presence of these issues calls into question some fundamentals of transaction cost economics. This theoretical void makes it challenging to accumulate a cohesive body of knowledge around critical relationships. Therefore, entrepreneurship scholars are left searching for an appropriate theoretical lens through which to view the bootstrapping construct.

For example, Ebben and Johnson (2006) specifically note that, “to date, organizational theory has not been applied to bootstrapping…” (p. 855), and this lack of theory is a major weakness of the bootstrapping literature. Indeed, our review of the literature would largely
support this stance. Of the extant studies that employ a base of theory, many employ some subset or variant of transaction cost economics (e.g., agency theory) that, as suggested above, may not be ideal when examining the context of new enterprise. But even this is not consistent, as there are numerous other theoretical bases employed to study bootstrapping. Given this muddled state of theory development, it is useful to examine these bases more carefully.

To better grasp the theorization on this topic, and using the literature review criteria mentioned previously, members of our authorship team independently coded the theoretical framework(s) referenced in each of the 60 peer-reviewed articles that focus on bootstrapping. Transaction cost economics (TCE), resource dependence theory (RDT), and the resource-based view (RBV) proved to be the most utilized theory bases. Accordingly, we review the application of these three theories in the bootstrapping literature and summarize the inherent limitations in such extant theorizing before discoursing our chosen theory base.

**Transaction Cost Economics**

We apply the broad classification of transaction cost economics (TCE) to include agency, capital structure, pecking order, and other theoretical perspectives derived from or closely aligned with the work of Williamson (1975). As noted above, in efficient markets with no transaction costs or taxes, capital structure decisions should not be an issue of concern (Modigliani & Meyer, 1958). Under these circumstances, high quality firms should be connected with willing financiers and resources should be exchanged. Moreover, whether those resources are in the form of debt or equity is unimportant. Once the firms have the needed financing, they are able to exploit opportunities for the purpose of generating revenue. They then repay their

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3 Two of the authors went through the list of 60 studies independently and coded each (although many did not overtly employ a base of theory). Any disagreements were discussed and resolved. A table summarizing the findings of the literature review is available online or through correspondence with the lead author.
debt or share profits with shareholders. Firms that do not receive financing are of lower quality and will underperform.

However, for new firms, the story is different. Markets are often not efficient and transaction costs are substantial (Bates & Robb, 2013). In practice, it is difficult for entrepreneurs to find willing financiers and, even when financiers are willing to grant debt or equity, it usually comes at a higher price—in the form of higher interest rates or a greater share of equity—than that paid by more established firms. These less-than-ideal conditions exist for de novo firms because of a “Bermuda Triangle” of constructs (Rutherford, 2015), namely information asymmetry, moral hazard, and adverse selection. These constructs are highly related, self-reinforcing, and ultimately problematic for the startup firm (Ackerlof, 1970).

Often discussed in agency theory literature, information asymmetry captures the notion that it is difficult for external parties (e.g., financiers and customers) to gauge the quality of a given venture because complete information on the viability of that venture is simply not available. Such asymmetries often result in dishonesty under circumstances where cooperation is expected (Eisenhardt, 1989; Rutherford, Buller, & Stebbins, 2009). Since an entrepreneur can potentially “fleece” stakeholders (i.e., moral hazard), these stakeholders are reluctant to select these potential “lemons” (i.e., adverse selection). When they do select the informationally opaque new venture, a premium is generally charged for said resources, making the acceptance of such resources prohibitively expensive for the new venture. This fact often encourages entrepreneurs to eschew external funding in favor of a capital structure that is solely comprised of internal equity (Korkeamaki & Rutherford, 2006); in other words, the entrepreneur turns to bootstrapping.
As an illustration, an empirical study by Vanacker et al. (2011) investigates the relationship between new venture growth and the use of bootstrapping, drawing largely upon TCE to couch their research question. Noting that much of the bootstrapping literature provides cogent arguments as to why both positive and negative relationships might be expected, their research shows no evidence of bootstrapping having a negative role on performance (measured as ‘value added’). Similarly grounding their research in TCE, Neeley and Van Auken (2010) examine the implications of bootstrapping for female entrepreneurs, as previous research suggests the existence of differences in both access to (and preferences for) capital of female and male entrepreneurs (e.g., Greene, Hart, Gatewood, Brush, & Carter, 2003; Orser, Riding, & Manley, 2006). This is especially important as “risk aversion and the lack of financial expertise may also influence women’s capital acquisition decision” (Neeley & Van Auken, 2010, p. 22). While much of their research focuses on entrepreneur (male and female) characteristics and the use of bootstrapping, they also find that, in the case of female entrepreneurs, a negative relationship exists between the use of bootstrap financing and revenue growth.

Constructing the nomological net of bootstrapping solely around TCE, however, seems less than ideal. With regard to performance outcomes, the extant literature seems to be suggestive of a negative relation (e.g., Neeley & Van Auken, 2010), under the logic that new firms unable to generate information symmetry and receive financing are substandard. However, it is reasonable to surmise that drawing upon TCE could also lead to hypotheses of positive relations (e.g., George, 2005). Considering antecedents to the decision to bootstrap, some variants of TCE suggest that the prudent entrepreneur finances his firm with only the resources at hand so as not to waste valuable time and money attempting to make information symmetrical and because external financing is so expensive. However, others suggest that nascent
entrepreneurs should engage substantial planning to, for example, target an optimal debt/equity ratio and exercise any means possible to attain it (e.g., Myers, 1984). As such, TCE, at least standing alone, does not offer scholars ideal guidance in this context.

**Resource Dependency Theory**

The basis of resource dependency theory (RDT) is straightforward: organizations need resources from their environment to survive and thrive (Pfeffer & Salancik, 1978). If these resources cannot be obtained, the organization should not launch and will not survive. Under ideal circumstances, new ventures can readily obtain all necessary resources, and the availability of these resources reduces both uncertainty as well as the overall dependency of the venture on the external environment (Pfeffer & Salancik, 1978). However, in reality, access to critical resources by many of these ventures falls woefully short. For instance, due to liabilities of newness, a new firm will experience low levels of external legitimacy and reputation, resulting in less access to resources and thereby threatening its chances of survival (Stinchcombe, 1965). Additionally, bootstrapped firms relinquish potential opportunities for valuable information, social ties, and financial resources by eschewing relationships with external investors (Hillman, Withers, & Collins, 2009). As such, RDT is a rational lens from which to draw insight regarding bootstrapping, as the theory assumes that startup organizations do not automatically have control over necessary resources (Daily, McDougall, Covin, & Dalton, 2002).

Employing RDT logic would seem to incontrovertibly suggest that bootstrapped firms will underperform, but entrepreneurship scholars have suggested that the lack of financial resources in the bootstrapped firm actually enhances performance because it forces the new venture to attract other—arguably more valuable—resources. In what has become a seminal contribution (even if a phenomenological one), Bhide (1992) submitted that in most firms,
Bootstrapping would result in enhanced performance for two key reasons. First, it would force the firm to be frugal, thereby lowering its cost structure. Second, it would afford the firm additional flexibility, because it would not be hamstrung by the demands of powerful and short-sighted financiers. In this way, new firms would be allowed to develop and fully use their human and social capital to pivot effectively, relying on increased levels of creativity, hustle, and/or frugality on the part of the entrepreneur.

This leads us to another key tenet of RDT: when firms acquire resources from outsiders, dependence on those suppliers naturally increases. As such, the decision to forego some of these relationships may also be due to the belief that “by changing these dependent relationships, firms can improve their chances of survival and success by limiting relationships where they have little leverage” (Ebben & Johnson, 2006, p. 855). This situation of dependence may also be contrary to some entrepreneurs’ preferences for autonomy. As a result, the entrepreneur may naturally attempt to prevent certain dependencies from occurring in the first place by avoiding external support and relationships. This might also be rooted in the reliance and confidence of the founders’ own human and social capital, as founder experience and social network have been associated with less bootstrapping behavior (Carter et al., 2003). In essence, bootstrapping might be a necessary approach to overcome capital constraints (e.g., Van Auken & Neeley, 1996) resulting from liabilities of newness (Stinchcombe, 1965), or it could also be a deliberate tactic used by the entrepreneur to maintain control over their venture (Smilor, 1997).

In the end, survival of the venture depends on legitimacy, conveyed by possessing various resources (such as a board of directors) that help it to overcome various liabilities (such as liabilities of newness) (e.g., Singh, Tucker, & House, 1986), along with actions that help the firm to inexpensively overcome resource constraints (Ebben & Johnson, 2006). Accordingly,
some methods of bootstrapping may provide unconventional options for entrepreneurs to gather resources otherwise unavailable, thereby increasing likelihood of survival.

In sum, Ebben and Johnson (2006) suggest that “the traditional view of bootstrapping coincides with resource dependence theory” (p. 855). However, as noted by Jones and Jayawarna (2010), the use of RDT—with its primary focus on using bootstrapping as a way to maximize profits—does not adequately capture the complexity of bootstrapping. Further, RDT offers limited insights into the contextual factors that figure into founders’ decisions on bootstrapping, and fails to address the information asymmetry evident in TCE argumentation.

**Resource-Based View (RBV)**

As opposed to utilizing the dependency approach, some extant bootstrapping research applies RBV (Wernerfelt, 1984) to help explain the utility and need for bootstrapping techniques. As discussed by Barney (1986), whereas strategic factors (such as efforts to reduce resource dependencies) are important for the entrepreneur, they will not necessarily lead to entrepreneurial rents (generation of value). Instead, if resources are combined into bundles—those that are valuable, rare, inimitable, and organizationally exploitable—value can be created (Barney, 1991; 1995). Uniqueness of these bundles affects the potential competitive advantage of the firm and its consequent performance. Those firms that can most quickly assemble unique resources bundles are also more likely to outperform their peers in the ability to produce above-average value and rents (Lee, Lee, & Pennings, 2001).

In addition, rather than merely focusing on the types of resources, acting to gain complementary resources allows an organization to understand and develop capabilities that help it to outperform competitors (Harrison, Hitt, Hoskisson, & Ireland, 1991). Especially important for the entrepreneur a fundamental condition of the RBV is resource heterogeneity, where there
exists some level of diversity in resource bundles and capabilities across firms (Alvarez & Busenitz, 2001; Penrose, 1959). These assorted resource configurations can differentiate a firm from their competitors (Barney, 1991; Penrose, 1959), further reinforcing potential rarity and inimitability of those resource bundles and positively impacting the firm’s competitive advantage.

If we go beyond examining the firm and continue to consider the entrepreneur as a resource of the firm—one that not only meets fundamental RBV assumptions of heterogeneity and immobility, but also exhibits attributes of value, rarity, and inimitability—we begin to appreciate the complexity of the new venture and the role that bootstrapping can play in the venture’s pursuit of necessary resources and survival. In examining the first criteria of RBV—resource value—it is difficult to imagine a lack of outside funds as a valuable condition (almost by definition, it is not). However, it just may be that this lack of funds triggers some level of creativity in the entrepreneur or team that would otherwise not emerge. It is true that without outside funding, entrepreneurs must actively find imaginative ways to overcome various resource constraints by seeking resources and bundling them to produce unique outputs (Alvarez & Busenitz, 2001), and that these actions may consequently result in value for the firm. Similarly, due to an entrepreneur’s innate knowledge about their venture, particular skill sets and capabilities might emerge that confer competitive advantages (Alvarez & Busenitz, 2001; Arthurs & Busenitz, 2003). Thus, the capacity to employ bootstrapping techniques may or may not meet the first criterion required to generate sustainable competitive advantage.

Continuing with the RBV conditions, bootstrapping techniques, overall, are not rare; in fact, most new ventures bootstrap to compensate for inadequate resources (Bhide, 1992; Shane, 2008). For many new ventures these are necessary and expected approaches (due to a variety of
situational limitations, such as liabilities of newness and smallness) that do not provide any particular uniqueness for the firm and therefore provide no competitive advantage. For instance, since new ventures generally face the difficulty of raising external financing from banks and investors, it is necessary for them to bootstrap in response to these capital constraints (Ebben & Johnson, 2006). Still, it may be possible for a given entrepreneur to develop some rare technique to overcome a lack of finance (e.g., bricolage). Similarly, bootstrapping and its related practices are not inimitable because most new firms bootstrap in similar ways.

Based on RBV criteria of value, rarity, and inimitability, bootstrapping in general should be negatively related to small firm performance. However, if considering the nuances of how different forms of capital (e.g., human and social) impact performance, interesting outcomes arise. Jones and Jayawarna (2010) examine the impact that network effects (i.e., strong and weak ties) have on entrepreneurs’ abilities to achieve firm performance via bootstrapping, and suggest that those who are bootstrapped and are better able to develop their social capital will outperform those who do not. So, again, depending upon which form of capital a given scholar deems most valuable (i.e., which resource is under scrutiny), RBV could very reasonably lead to competing hypotheses.

Also, noticeably absent from RBV is an appreciation for idiosyncrasies. Since it was developed in the strategy literature, RBV is not equipped to handle, for example, autonomy preferences of entrepreneurs. Additionally, in the RBV rubric, entrepreneurs seek to efficiently and effectively combine resources to create sustainable competitive advantages and maximize profitability. However, we know that entrepreneurs often have multiple and even conflicting reasons for starting a business, and many entrepreneurs do not measure success solely by their organization’s financial performance (Hmeileski & Corbett, 2008).
Summary—Limitations of Extant Theory Bases in Bootstrapping—Performance Research

TCE, RDT, and RBV perspectives have certainly allowed exploration of the bootstrapping construct and the construct’s nomological net to begin in earnest. Occasional support from other theories—e.g., institutional theory (Politis, Winborg, & Dahlstrand, 2011; Winborg, 2007), human and social capital theory (Carter et al., 2003; Jones & Jayawarna, 2010; Grichnik et al., 2014), and real options theory (Bosse & Arnold, 2010)—have prompted additional perspective as well. However, many unanswered questions about bootstrapping’s relation to other constructs remain and scholars now seem to be stymied. If it is true that bootstrapping is synonymous with the entrepreneurial experience (Grichnik & Singh, 2010)—indeed, it is true that the majority of new firms partake in some form of bootstrapping (Harrison & Mason, 1997)—then far more effort should be exerted in understanding the nature of bootstrapping, and these efforts should begin with proper theory.

The three theories discussed briefly above all share a common problem when applied to bootstrapping—all three can reasonably lead an enlightened scholar to strongly assert either a positive relation or a negative one between bootstrapping on the same antecedent or outcome. Not surprisingly, a review of the literature reveals exactly that: a muddled mix of findings, without consistent or generalizable outcomes (Miao et al., 2017). We maintain that the origin of this problem is the surprisingly common ontological and epistemological fallacy that new firms are simply scaled-down versions of large and old firms. Rather, in contrast, new firms are their own “species” and therefore need their own theoretical treatments (Penrose, 1959).

While TCE outlines the problems around information asymmetry, it does not go far enough in telling us whether or not an entrepreneur’s reaction to the information problem should be to bootstrap, or if (bootstrapping) should lead to enhanced or degraded performance. TCE
theories are more likely to assume information asymmetry away. On the other hand, the resource-focused theories (RDT and RBV) do not seem to fully consider the unique nature of the new firm with regard to entrepreneurial preferences; these theories were clearly developed with large, mature firms in mind. Such gaps encourage some scholars to consider the notion of other types of capital—human and social. However, using any of these theoretical bases, it is unclear what the link between bootstrapping, antecedents, and outcomes should be. Further, a reliance on these theories fails to account for bootstrapping as a choice (e.g., to maintain autonomy) or a forced reality (an inability to secure desired outside debt or equity) and may overestimate or simplify the relation with firm performance.

Certainly, some of the problem lies in differences in measurement and other methodological concerns, but the fact remains that these three theoretical approaches do not lead to the most well-designed studies examining bootstrapping. What is clear, however, is that information asymmetry plays a prominent role in making it challenging for new firms to receive positive judgments and subsequent resources from all stakeholders. Building upon this, we now move to theoretically address what this means for bootstrappers through the suggestion of a new and complementary theoretical direction: signaling theory.

A Path Forward: Making the Case for Signaling Theory

Signaling theory applied in an organizational setting is largely based upon the original work of Michael Spence (1973; 1974), but it should be noted that signaling theory has been applied more literally in evolutionary biology (c.f., Dowling, 1968). In either setting, at its core, signaling theory is concerned with reducing information asymmetry between two primary actors—a signaler and a receiver (though situations may include multiple signalers or multiple receivers)—through an observable action taken to typically and intentionally communicate some
positive, imperceptible qualities of the signaler (Spence, 2002). The signaling environment also includes some form of feedback from the receiver to the signaler regarding the effectiveness of the signals (Gupta, Govindarajan, & Malhotra, 1999). In all, signaling theory is applied in efforts to understand how signals can be used to reduce the uncertainty associated with making a selection among a choice set in situations that have incomplete and asymmetrically distributed information (Bergh, Connelly, Ketchen, & Shannon, 2014). For our purposes, we adopt Busenitz et al.’s (2005) definition of a signal as, “new information that may change our current understanding of a future state” (p. 3).

Due to its importance in resolving information asymmetries in a wide range of economic and social phenomena, a greater understanding of signaling theory lies in imputing costs to the information acquisition processes, such that the costs of signaling should be negatively correlated to quality (Spence, 1973). These costs help receivers distinguish the value and validity of a given signal; if everyone could invest in a signal in exactly the same way, the merits would be indistinguishable. Therefore, high-quality signals must be observable and costly to imitate (Certo, Covin, Daily, & Dalton, 2001). To be judged as appropriate, and in light of the new venture context, a signal must possess at least five properties: it must be honest, costly, observable, frequent, and consistent.

The use of a metaphor from the animal kingdom helps illustrate the dynamics of the signaling process. A deer on an open plain will engage in a series of acrobatic and exhausting jumping maneuvers (“pronging”) to communicate to a lurking predator that it is agile, healthy, and not worth the effort of pursuing. Pronging signals an otherwise unobservable strength—speed and agility. Even after the signal, the predator may remain unsure if the deer actually possesses the implied strength and ability, as the signals displayed could have been dishonest (in
that the deer only possesses the ability to engage in that behavior for a short period of time).

However, the predator also understands that the signal is likely to be an authentic one (Bergstrom & Lachmann, 2001). It is an effective indicator, because it is both costly and honest. The deer is wasting valuable energy that it may need to escape the predator if it chooses to attack—if it cannot afford to expend this energy, it will be caught and killed. Moreover, the deer will likely need energy to display to additional predators, which it cannot do if it expends all of its signaling efforts on one predator. Since the deer is essentially betting his life on the signal, it is likely an honest one. To the degree that deer can make this same (consistent) display several times (frequency), it can convince the predator that it, indeed, possesses the underlying quality.

Transferring this metaphor to the context of entrepreneurship, founders need to send proper signals to stakeholders to reduce uncertainty with their new ventures. If done effectively, signaling can “affect the value of the firm when asymmetric information prevails” (Levy & Lazarovich-Porat, 1995, p. 40). The entrepreneur (signaler) possesses private information about his or her firm and the stakeholder possesses public information about the firm, and it is difficult for outsiders to discern underlying qualities in new ventures. In fact, it is exactly this asymmetry that signaling theory speaks to. The value of signaling, then, is in its ability to reduce existing information asymmetries (Levy & Lazarovich-Porat, 1995) and provide a means for outsiders to make conclusions and predictions about actions and outcomes (Busenitz et al., 2005).

As such, signaling theory provides a substantial, if subtle, component that is not addressed by the other theory bases (TCE, RDT, RBV) with regard to bootstrapping. Specifically, our approach (along with the definition we proffer) allows us to address the notion of underlying qualities that affect judgments of appropriateness. This is important because in the new venture accumulating these judgments is more difficult than in the established firm because
of the existence of extreme information asymmetry (Penrose, 1959). Essentially, seen through the lens of signaling theory, antecedents and outcomes of bootstrapping can be viewed via the dyadic relation between entrepreneur and stakeholder (sender and receiver). That is, the entrepreneur can consider her preferences for the business (e.g., autonomy, wealth, control) and then consider the specific stakeholders who need to be signaled to satisfy those preferences. When conceptualized via a signaling approach, a more fine-grained and enlightened understanding of the bootstrapping phenomenon can occur.

Signaling theory, when used in conjunction with our proposed definition of bootstrapping, provides further support in dealing with debate over whether entrepreneurs bootstrap because they want to or because they have to. Although we have demonstrated the limitations of the bootstrapping construct with regard to RBV (specifically, through the VRIN framework), signaling theory can be used to reveal intentionality in the financing choice at startup, including with the incurring of costs (financial, opportunity, or otherwise) as a tradeoff for other valuable benefits (e.g., autonomy, reduced financial burdens, legitimacy). Therefore, when combined with valuable human and/or social capital elements, bootstrapping complements theories focused on resources (RBV, RDT) in that it hypothetically signals confidence in founders, their personal asset inventory, and in the value and growth potential of the business proposition. Signaling theory inherently mollifies the concern of whether or not the founder(s) chose autonomy or was unable to secure external funding. The decision to bootstrap—regardless of prior circumstance—represents a choice by the founder(s) and could be interpreted as a signal of the perceived merits and quality of the business.

However, contrary to these potential (positive) signals which may be construed by a limited number of organizational stakeholders, we contend that signaling theory pronounces a
distinctly negative impact on immediate and distal outcomes of bootstrapping. In substance, bootstrapping is literally and symbolically damaging: a firm has less resources at its disposal and indicates a failure to achieve early external legitimacy from financiers. As such, a firm that bootstraps likely does not have the resources necessary to compete and scale, and will therefore insufficiently meet the needs of the most prominent of organizational stakeholders, namely customers and employees.

Ultimately, signaling theory augments a resource-based argument. While RBV examines the latent quality of the venture, bootstrapping is an imperfect indicator of quality and signaling theory provides a more intricate view into this signaling process. And whereas RDT might suggest financial success due to the enhanced flexibility and inherent frugality in a choice to bootstrap, signaling theory would indicate—regardless of founder circumstances and decisions—an inability to entice financiers and secure additional resources. The choice to bootstrap then constrains and reduces the quality, supply, and accessibility of product or services for consumers, and a lack of resources limits a firm’s ability to fairly compensate personnel. The venture is unable to openly and completely signal vibrancy—e.g., well-appointed facilities, high-quality products or services, competitive salaries, and/or extensive advertising campaigns (Zott & Huy, 2007). The entrepreneur may be able to “fake” signals of quality in the near-term, but eventually a signal that does not possess the requisite qualities (e.g., an inability to meet product demand or payroll, an inability to capitalize on growth opportunities) will be exposed as a signal of weakness. Commonly, new ventures that lack the underlying quality they attempt to signal will fail because these firms are not “honest” with their signals, will be inconsistent with signals over time, and cannot absorb the costs associated with signal sending—the underlying weakness of bootstrapping will eventually be discovered (Kirmani & Rao, 2000). In returning briefly to the

\footnote{We thank one anonymous reviewer for this insight.}
metaphor of the deer, we can further rationalize. If a particular deer chose not to prong in order to conserve energy, or had insufficient resources to do so to the full extent of others in the herd (due to injury, malnourishment, etc.), that deer would decrease its likelihood of survival, as it would be much more likely to become the target for the hungry and stalking lioness.

Even if certain strengths exist in a new venture, they are often unnoticeable because of the extreme information asymmetry between sender and receiver (Gulati & Higgins, 2003; Berger & Udell, 2002). In accordance with TCE, it is difficult for outside stakeholders to discern underlying qualities in new ventures. That is, it is unlikely that the audience (e.g., customers)—through a bootstrapping signal—will be specifically aware of the new firm’s capital structure, or even whether or not the firm accepted any outside funding. However, the audience will likely perceive manifestations of capital structure choices, as it is likely that signals of high quality are far more easily sent if the firm possesses external financial capital. The simple fact is that most stakeholders (customer and employees in particular) do not engage in extensive due diligence when making decisions, often simply relying on others to legitimize (Bitektine, 2011). Hence, without external validation and the unlocking of additional resources, bootstrapping—on the whole—will lead to substandard firm performance over time.

In sum, we extend existing theories in the bootstrapping literature by including signaling theory as an appropriate and complementary base of theory. Signaling theory offers a more fundamentally transparent view of new venture financing decisions by suggesting that securing external funding sends signals of legitimacy and grants access to additional external resources that may, in turn, be recognized as attractive to stakeholders and lead to better firm performance; firms without such funding are unable send these specific signals and reap these subsequent
rewards. To further develop the merits of this advancement, we now offer suggestions for future research using signaling theory to better distinguish the nature of the bootstrapping construct.

**Discussion: The Promise of Signaling Theory as a Base for Bootstrapping Research**

Venture creation is a boundary spanning exercise (Dollinger, 1984). That is, the entrepreneur must reach outside the boundaries of the venture to develop critical relationships with key stakeholders. Therefore, the mechanizations of this relationship development are worthy of serious study—and an appropriate base of theory.

Above, we lamented that the extant theory bases used to frame academic inquiry into the construct of bootstrapping do not fully embrace the challenges of this relationship development under conditions of extreme asymmetry, and may actually serve to constrain and confound our understanding. We suggest, as a path forward, that signaling theory can provide the nuanced perspective necessary to advance the literature. Multiple compelling lines of research emerge from this approach. We outline these below and summarize them in Table 2.

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Insert Table 2 about here
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**Signaling and Key Stakeholders**

In the earliest stages of venture inception emergence, the most critical stakeholders are customers and financiers (Rutherford & Buller, 2007). Here, not surprisingly, cash flow is the critical issue that entrepreneurs face when struggling for survival. Applying a signaling theory lens to illuminate the relationships between entrepreneurs and their specific stakeholders may prove a fruitful line of inquiry. For example, harkening back to the deer and predator predicament, what are the signals that entrepreneurs can send to their most critical, earliest stakeholders that are both costly and honest? And, through what means are these signals best
sent? Put differently—what are the signals (and to which stakeholders) entrepreneurs need to send to optimize their chances of effective bootstrapping (i.e., signaling as an antecedent to bootstrapping effectiveness and more distal outcomes such as firm performance)?

Table 2 details multiple representative research questions for both antecedents and outcomes of bootstrapping. Studies here that focus on the dyadic (e.g., entrepreneur-customer, entrepreneur-financier, entrepreneur-employee) relationships over time (i.e., longitudinally) would greatly advance the literature related to entrepreneurs and bootstrapping.

**Signal Properties: Quality and Intent**

Embedded within their relationships with key stakeholders is the notion that nascent ventures will almost always have more information than will external stakeholders. This presents an issue that hinders entrepreneurs’ ability to build trust and gain the support of stakeholders (e.g., Pollack, Barr, & Hanson, 2017). Here, what would be exceptional to examine are the two broad types of information noted by Stiglitz (2000) to be the particularly important for entrepreneurs in building new relationships with key stakeholders: information about quality and information about intent.

Avenues for future research might focus on the parameters of the context (i.e., potentially different antecedents) that lead to bootstrapping as well as positive outcomes of bootstrapping for the entrepreneurs and stakeholders, beyond popular variables such as survival and performance. Scholars have the intriguing opportunity to contextualize scenarios and establish differences between high- and low-quality signalers. For instance, it would seem important to identify the mechanism by which a separating equilibrium may be established—that is, separating high quality and low-quality firms—and how the signal is differentially costly for high and low-quality signalers (i.e., describe why it is optimal for high quality firms to signal and
why low-quality firms would not). Further depth might distinguish between strong and weak signals, perhaps based upon the conditions surrounding or leading up to start-up (e.g., whether the entrepreneur chose autonomy or simply was unable to secure external financing). The quality of signals might be tied to not only financial performance measures, but also variables measuring human and/or social capital, creativity, and innovation. Related, considering the extent to which a third party with unique or private information could contribute to the presence of a separating equilibrium would be an appealing line of inquiry for scholars interested in the bootstrapping phenomenon (Plummer et al., 2016).

Focusing more specifically on the intent of entrepreneurs, one critical emphasis might be on an entrepreneur’s motivation for signaling. On behalf of the stakeholders, an associated area of interest would have to be the mode and attributes of the signal in order to better determine ‘how’ a signal was interpreted and the action (or lack thereof) the stakeholder took. Including confirmation mechanisms and post-signal performance outcomes that enable determinations of whether beliefs of signal (regarding quality and intent) are indeed realized for both signal sender and receiver would be especially useful.

**Signal Properties: Efficacy**

Along this line of thought, how might the creditability of signaler affect the interpretation of new venture signals (e.g., Certo et al., 2001)? We know that good signals would be observable and costly to imitate, but we know very little about the signaler and the characteristics of the signaler that might affect signal perception by the receiver. Here, with regards to how receivers perceive signals, research has the chance to explore receiver attention and how different signal strengths (sent via multiple channels) affects stakeholder actions (e.g., mitigation or enhancement of uncertainty; Gulati & Higgins 2003; Sanders & Boivie, 2004).
It is clear that entrepreneurs must enroll key stakeholders to be effective in bootstrapping. However, beyond that, far more research is needed and a signaling theory perspective can assist. For example, should entrepreneurs align themselves with third parties to signal quality as a means to overcome the lack of legitimacy and resources inherent in bootstrapping (e.g., Gulati & Higgins, 2003; Plummer, Allison, & Connelly, 2016; Pollock, Chen, Jackson, & Hambrick, 2010)? Would third party affiliation(s) help under conditions of severe information asymmetry (as with de novo firms) as well as when the facts are well-known by both the signaler and the receiver (Jain, Jayaraman, & Kini, 2008; Pollock & Gulati, 2007; Sanders & Boivie, 2004; Stuart, Hoang, & Hybels, 1999)?

Related, can uncertainty reducing signals of venture attributes and actions be cumulative and/or reinforce each other (signaling interactions)? Put another way, if new ventures can send simultaneous signals, or very frequent ones, would this be an optimal choice to enhance the bootstrapping signal (Li & McConomy, 2004)? Could simultaneous or very frequent signals help both high quality and low quality startup ventures equally (Janney & Folta, 2003), and offset or augment signals of bootstrapping? Or, and related, could such signals confuse receivers about the opportunity (e.g., disguise weaknesses, Certo, 2003) in a way that inhibits good decisions? Would such signals improve or decrease the likelihood of accurate signal interpretation and subsequent uncertainty reduction for startup firms (e.g., Filatochev & Bishop, 2002)?

**Signal Properties: Ambiguity**

Within much of the extant literature on signaling, there is an underlying assumption that signaling is good. Future research attention is needed here as well. So far, within the discussion about how the application of signaling and signaling theory can advance the literature related to bootstrapping, we have addressed the premise that some signals may, in fact, be negative (or
have conflicting judgments). One signal can send multiple messages and those multiple contextual cues can lead to different interpretations of a signal by a receiver (Busenitz, et al. 2005). We surmise that greater signal cost and honesty are desirable attributes, yet we also know that signals can be positive or negative and different receivers process signals differently (Fischer & Reuber, 2007). What impacts does this have on de novo firms seeking legitimacy and access to resources?

For example, an entrepreneur may choose to send a costly signal thinking that it would be received positively. However, to a particular stakeholder (receiver) a costly signal might be interpreted as a move to increase the cost of engaging with the entrepreneur (e.g., ‘this entrepreneur is not careful with money and thus engaging with them might be too risky’). Similarly, imagine that an entrepreneur sends an honest signal, perhaps about the struggles she has encountered, thinking that the stakeholder (receiver) will gain trust in the benevolence of the entrepreneur. A stakeholder could interpret this as a weakness and decline to engage, thinking that the entrepreneur is too honest and will not make difficult decisions when needed. Overall, we need a great deal more research focused on our understanding of signals and receivers surrounding new ventures. As examples, research that applies a strategic sensemaking perspective (e.g., how receivers process and act upon that information) (Gioia & Chittipeddi, 1991; Weick, 1995) aligned with information processing theory (Galbraith, 1973) would be very welcome as additions in the literature.

Here, it might be that once the concept of signaling becomes more mainstream, certain signals and the interpretations of intent and quality would become more consistent. More specifically, receivers might become more attuned to signals and their interpretation would be more predictable (Higgins & Gulati, 2006). Perhaps even typologies of signals would emerge. As
suggested by Connelly et al. (2011), one possible signal typology for further refinement includes five classifications: *pointing* (e.g., indicate characteristics that separates signaler from competitors), *activating* (e.g., signals that trigger perceptions of quality in the signaler by the receiver), *intent* (e.g., indicating future action, possibly conditional on receiver’s response), *camouflage* (signals designed to disguise a potential liability or weakness), *need* (e.g., communicating requirements to receiver regarding a need for resources). Testing to see if these are active in the new venture context would prove particularly insightful.

**Conclusion**

Our review explores the tactics that organizations use to appear legitimate (and desirable) to their target audiences. Extant work has focused on the signaling of organizations (to their target audiences) that they are enacting appropriate strategies and behaviors—for example, in large organizations, Wellbourne et al. (2007) examined the signaling of firms pursuing an IPO and how gender diversity affected the perceptions of investors. In a similar fashion, Roberson and Park (2007) examined racial diversity. This (i.e., signaling) can happen internally within organizations as well—here, Olsen et al. (2016) looked at the internal signals of an organization regarding gender diversity and whether advancement was acceptable.

However, as can be seen from the examples above, the extant literature is unprepared to accommodate the phenomenon of new ventures’ signaling. Thus, we integrate the signaling literature, and advance the conversation surrounding the bootstrapping construct. In particular, exemplifying (signaling) the characteristics that are desired by an audience is of critical interest to all groups and organizations, but in particular to new and emerging ventures. As much as positive signals aim to engage an audience, failure to send the proper message that resonates with an audience can also have detrimental impacts to organizational success. Through this work, we
pivot the conversation that focuses on the topic of bootstrapping in new and unique ways, and enable the literature to rethink how organizations emerge.
REFERENCES

* Articles reviewed in this study


Table 1. A Review of the Bootstrapping Literature

<table>
<thead>
<tr>
<th># Cites</th>
<th>Author(s)</th>
<th>Year</th>
<th>Title</th>
<th>Journal</th>
<th>Lens</th>
<th>Methods</th>
<th>Bootstrapping Definition</th>
<th>Major Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>98</td>
<td>Van Auken &amp; Carter</td>
<td>1989</td>
<td>Acquisition of capital by small business</td>
<td>Journal of Small Business Management</td>
<td>N/A</td>
<td>Univariate statistics (frequencies)</td>
<td>N/A</td>
<td>The average financing mix was 45 percent equity and 55 percent debt.</td>
</tr>
<tr>
<td>50</td>
<td>Thorne</td>
<td>1989</td>
<td>Alternative financing for entrepreneurial ventures</td>
<td>Entrepreneurship Theory and Practice</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>Bootstrapping is part of the entrepreneur’s efforts to manage risks.</td>
</tr>
<tr>
<td>184</td>
<td>Freear, Sohl, &amp; Wetzel</td>
<td>1995</td>
<td>Angels: Personal investors in the venture capital market</td>
<td>Entrepreneurship and Regional Development</td>
<td>N/A</td>
<td>N/A</td>
<td>Highly creative ways of acquiring the use of resources without borrowing money or raising equity financing from traditional sources.</td>
<td>Past studies are not acceptable solutions to the obstacles encountered by entrepreneurs in their efforts to raise angel financing.</td>
</tr>
<tr>
<td>142</td>
<td>Van Auken &amp; Neeley</td>
<td>1996</td>
<td>Evidence of bootstrap financing among small startup firms</td>
<td>Journal of Entrepreneurial and Small Business Finance</td>
<td>TCE</td>
<td>Univariate statistics (frequencies, means, SD)</td>
<td>Capital acquired from sources other than traditional providers of capital</td>
<td>Bootstrap is significantly affected by the characteristics of the firm.</td>
</tr>
<tr>
<td>17</td>
<td>Van Auken</td>
<td>2000</td>
<td>The familiarity of small technology-based business owners with sources of capital: Impact of location and capitalization</td>
<td>Journal of Small Business Strategy</td>
<td>TCE</td>
<td>Univariate statistics (frequencies, means, SD)</td>
<td>Freear et al. (1995)</td>
<td>Alternative sources of capital are affected by the location of the business and amount of capital raised</td>
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<td>Page</td>
<td>Author(s)</td>
<td>Year</td>
<td>Title</td>
<td>Journal</td>
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<td>486</td>
<td>Winborg &amp; Landström</td>
<td>2000</td>
<td>Financial bootstrapping in small businesses: examining small business managers' resource acquisition behaviors</td>
<td>Journal of Business Venturing</td>
<td>TCE</td>
<td>Explorative factor analysis and cluster analysis</td>
<td>The use of methods for meeting the need for resources without relying on long-term external finance from debt holders and/or new owners.</td>
<td>Buy used or borrow equipment; withhold manager's salary; delay payments; and speeding-up invoicing</td>
</tr>
<tr>
<td>14</td>
<td>Freear &amp; Sohl</td>
<td>2001</td>
<td>The characteristics and value-added contributions of private investors to entrepreneurial software ventures</td>
<td>Journal of Entrepreneurial Finance</td>
<td>TCE</td>
<td>Univariate statistics (frequencies, means, SD)</td>
<td>N/A</td>
<td>It appears that non-investor backed ventures tended to rely on bootstrapping and, to a lesser extent, on business alliances.</td>
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<tr>
<td>295</td>
<td>Carter, Brush, Greene, Gatewood, &amp; Hart</td>
<td>2003</td>
<td>Women entrepreneurs who break through to equity financing: the influence of human, social and financial capital.</td>
<td>Venture Capital: An International Journal of Entrepreneurial Finance</td>
<td>Human Capital &amp; Social Capital</td>
<td>Regressions and logistic regressions</td>
<td>The use of personal and internally generated funds for business investment, the control of costs and the delay of capital expenditure until such funds are available.</td>
<td>Experience is related with less bootstrapping. Social capital is largely associated with less bootstrapping.</td>
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<tr>
<td>35</td>
<td>Baeyens &amp; Manigart</td>
<td>2003</td>
<td>Dynamic financing strategies: The role of venture capital</td>
<td>Journal of Private Equity</td>
<td>N/A</td>
<td>Univariate statistics (frequencies, means, SD)</td>
<td>N/A</td>
<td>VC backed companies are required to give more collateral when issuing additional debt.</td>
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<td>Page</td>
<td>Reference</td>
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<td>152</td>
<td>Harrison, Mason, &amp; Girling</td>
<td>2004</td>
<td>Financial bootstrapping and venture development in the software industry</td>
<td>Entrepreneurship &amp; Regional Development</td>
<td>RBV</td>
<td>Univariate statistics (frequencies, means, SD)</td>
<td>Freear et al. (1995)</td>
<td>Bootstrapping strategies are different in geographical regions.</td>
</tr>
<tr>
<td>47</td>
<td>Van Auken</td>
<td>2004</td>
<td>The use of bootstrap financing among small technology-based firms</td>
<td>Journal of Developmental Entrepreneurship</td>
<td>TCE</td>
<td>Multinomial logistic regressions</td>
<td>Freear et al. (1995)</td>
<td>Owners did not see bootstrapping to be an important source of capital.</td>
</tr>
<tr>
<td>115</td>
<td>Carter &amp; Van Auken</td>
<td>2005</td>
<td>Bootstrap financing and owners’ perceptions of their business constraints and opportunities</td>
<td>Entrepreneurship &amp; Regional Development</td>
<td>Self-Perception Theory</td>
<td>Cluster analysis</td>
<td>Winborg &amp; Landström (2001)</td>
<td>Risk is highly associated with owners’ perceptions of the importance of bootstrapping.</td>
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<tr>
<td>18</td>
<td>Lahm &amp; Little</td>
<td>2005</td>
<td>Bootstrapping business start-ups: entrepreneurship literature, textbooks, and teaching practices versus current business practices?</td>
<td>Journal of Entrepreneurship Education</td>
<td>N/A</td>
<td>Two-way discriminate analysis</td>
<td></td>
<td>Entrepreneurs with little capital should focus on compensation prior to the delivery of a product or service.</td>
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<tr>
<td>Page</td>
<td>Author(s)</td>
<td>Year</td>
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<td>149</td>
<td>Smallbone &amp; Welter</td>
<td>2006</td>
<td>Conceptualizing entrepreneurship in a transition context</td>
<td>International Journal of Entrepreneurship and Small Business</td>
<td>Institutio nal Theory</td>
<td>N/A</td>
<td>Bootstrapping is used as one way for SMEs to accumulate the financial resources necessary to start a business, in a context where the financial system is inadequate (Smallbone and Welter, 2001).</td>
<td>Fostering entrepreneurship where institutional change is needed, requires entrepreneurial (re-) learning.</td>
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<tr>
<td>36</td>
<td>O’Gorman &amp; Terjesen</td>
<td>2006</td>
<td>Financing the Celtic Tigress: Venture financing and informal investment in Ireland</td>
<td>Venture Capital</td>
<td>N/A</td>
<td>t-tests</td>
<td>Winborg &amp; Landström (2001)</td>
<td>Female nascent entrepreneurs invest less personal resources in their new business.</td>
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<td>Page</td>
<td>Author(s)</td>
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<td>482</td>
<td>Kim, Aldrich, &amp; Keister</td>
<td>2006</td>
<td>Access (not) denied: The impact of financial, human, and cultural capital on entrepreneurial entry in the United States</td>
<td>Small Business Economics</td>
<td>TCE</td>
<td>Logistic regression</td>
<td>Neither financial nor cultural resources are necessary conditions for entrepreneurial entry.</td>
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<td>58</td>
<td>Yilmazer &amp; Schrank</td>
<td>2006</td>
<td>Financial intermingling in small family businesses</td>
<td>Journal of Business Venturing</td>
<td>N/A</td>
<td>Univariate statistics (frequencies)</td>
<td>Households are more likely to co-sign for business loans as the firm net worth increases.</td>
<td></td>
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<tr>
<td>56</td>
<td>Brush</td>
<td>2008</td>
<td>Pioneering strategies for entrepreneurial success</td>
<td>Business Horizons</td>
<td>N/A</td>
<td>N/A</td>
<td>The means of conserving financial resources and managing cash in a resourceful manner to start and grow a venture. Bootstrapping is a means for pioneering entrepreneurs to survive and overcome challenges.</td>
<td></td>
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<tr>
<td>101</td>
<td>Gatewood, Brush, Carter, Greene, &amp; Hart</td>
<td>2009</td>
<td>Diana: a symbol of women entrepreneurs’ hunt for knowledge, money, and the rewards of entrepreneurship</td>
<td>Small Business Economics</td>
<td>RBV &amp; TCE</td>
<td>Univariate statistics (frequencies)</td>
<td>The lack of investment in women-led ventures diminishes the opportunity for women to create and grow their own wealth.</td>
<td></td>
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<tr>
<td>Page</td>
<td>Author(s)</td>
<td>Year</td>
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<td>Highly levered, illiquid, and underperforming firms are more likely to use certain bootstrapping methods than other firms, and that the methods they used may have been detrimental to future firm performance.</td>
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<tr>
<td>23</td>
<td>Smith</td>
<td>2009</td>
<td>Financial bootstrapping and social capital: How technology-based start-ups fund innovation</td>
<td>International Journal of Entrepreneurship and Innovation Management</td>
<td>N/A</td>
<td>Case studies</td>
<td>The access to resources not owned or controlled by the individual innovator, bootstrapping involves imaginative and parsimonious strategies for marshalling and gaining control of resources.</td>
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<td>Bootstrapping is an essential feature of business technology-based start-ups.</td>
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<td>Three groups of founders were identified: cost-reducing bootstrappers, capital-constrained bootstrappers, and risk-reducing bootstrappers.</td>
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<tr>
<td>23</td>
<td>Markova &amp; Petkovska-Mircevska</td>
<td>2009</td>
<td>Financing options for entrepreneurial ventures.</td>
<td>Economic Interferences</td>
<td>N/A</td>
<td>N/A</td>
<td>Highly creative acquisition and use of resources without raising capital from traditional sources or borrowing</td>
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<td>To beat the odds, a start-up needs to reach 10-20 people and $2-3 million in revenue.</td>
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<td>Authors</td>
<td>Year</td>
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</tbody>
</table>
| 11| Bosse & Arnold     | 2010 | Trade credit: a real option for bootstrapping small firms            | Venture Capital                   | Real options                                    | Freear et al. (1995)  
The greater the cash flows generated by taking a discount, the more likely managers are to exploit it.                                                                                                   |
The influence of social networks on firm performance is mediated by bootstrapping.                                                                                                                   |
| 39| Neeley & Van Auken | 2010 | Differences between female and male entrepreneurs’ use of bootstrap financing | Journal of Developmental Entrepreneurship | TCE                                             | Financing commonly used by all small firms that is often easier to acquire, perceived as less expensive, and can be an important source of capital when traditional sources are unavailable.  
Government policy may be able to alleviate capital shortages through programs that better inform female entrepreneurs about the capital acquisition process. |
Entrepreneurs are actively managing the demand as well as supply of finance to narrow the “funding gap”.                                                                                               |
<table>
<thead>
<tr>
<th>No.</th>
<th>Authors</th>
<th>Year</th>
<th>Title</th>
<th>Journal/Method</th>
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<td>22</td>
<td>Yilmazer &amp; Schrank</td>
<td>2010</td>
<td>The use of owner resources in small and family owned businesses:</td>
<td>Journal of Family and Economic Issues</td>
<td>N/A</td>
<td>Bhide (1992)</td>
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<tr>
<td>42</td>
<td>Vanacker, Manigart,</td>
<td>2011</td>
<td>A longitudinal study on the relationship between financial</td>
<td>Entrepreneurship and Regional Development</td>
<td>TCE</td>
<td>Freear et al. (1995)</td>
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<td></td>
<td>Meuleman, &amp; Sels</td>
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<td>bootstrapping and new venture growth</td>
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<td>Multivariate analysis</td>
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<td>5</td>
<td>Falbe, Kumar, &amp; Welsh</td>
<td>2011</td>
<td>Franchisee use of bootstrapping: An exploratory study of financing</td>
<td>Small Business Institute® Journal</td>
<td>N/A</td>
<td>Bootstraping is defined as finding creative opportunities to launch and grow new ventures.</td>
</tr>
<tr>
<td>Page</td>
<td>Authors</td>
<td>Year</td>
<td>Title</td>
<td>Journal/Methodology</td>
<td>References</td>
<td>Summary/Note</td>
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<td>24</td>
<td>Patel, Fiet, &amp; Sohl</td>
<td>2011</td>
<td>Mitigating the limited scalability of bootstrapping through strategic alliances to enhance new venture growth</td>
<td>International Small Business Journal</td>
<td>Common method variance, control composites, self-selection and endogeneity</td>
<td>Excessive bootstrapping has decreasing returns to venture growth.</td>
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<tr>
<td>37</td>
<td>Politis, Winborg, &amp; Dahlstrand</td>
<td>2011</td>
<td>Exploring the resource logic of student entrepreneurs</td>
<td>International Small Business Journal</td>
<td>Instituio nal Theory t-tests and multiple regression analyses</td>
<td>Student entrepreneurs have a distinct reasoning in relation to acquisition and use of resources as compared to other entrepreneurs.</td>
</tr>
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<td>8</td>
<td>Perry, Chandler, Yao, &amp; Wolff</td>
<td>2011</td>
<td>Bootstrapping techniques and new venture emergence</td>
<td>New England Journal of Entrepreneurship</td>
<td>RBV Logistic regression</td>
<td>External bootstrapping is positively linked to firm emergence.</td>
</tr>
<tr>
<td>11</td>
<td>Salimath, &amp; Jones</td>
<td>2011</td>
<td>Scientific entrepreneurial management: Bricolage, bootstrapping, and the quest for efficiencies</td>
<td>Journal of Business and Management</td>
<td>Bricolage N/A</td>
<td>&quot;Bootstrapping is entrepreneurship in its purest form. It's the transformation of human capital into financial capital, sweat equity into bankable equity&quot; (Gendron, 1999, p. 11-12)</td>
</tr>
<tr>
<td>1</td>
<td>Rutherford, Coombes, &amp; Mazzei</td>
<td>2012</td>
<td>The impact of bootstrapping on new venture performance and survival: A longitudinal analysis</td>
<td>Frontiers of Entrepreneurship Research</td>
<td>Signaling Theory Random coefficients modeling</td>
<td>Bootstrapping that increases growth, may not increase the likelihood of survival.</td>
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<td>Source</td>
<td>Year</td>
<td>Title</td>
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<td>Methodology</td>
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<td>Padachi, Howorth, &amp; Narasimhan</td>
<td>2012</td>
<td>Working capital financing preferences: The case of Mauritanian manufacturing small and medium-sized enterprises (SMEs)</td>
<td>Asian Academy of Management Journal of Accounting &amp; Finance</td>
<td>Pecking order theory</td>
<td>Bootstrapping: A New Way Forward</td>
<td>Firms experience significant information costs that prevent them from gaining access to the traditional sources of financing</td>
</tr>
<tr>
<td>Atherton</td>
<td>2012</td>
<td>Cases of start-up financing: An analysis of new venture capitalization structures and patterns</td>
<td>International Journal of Entrepreneurial Behavior and Research</td>
<td>N/A</td>
<td>Case studies</td>
<td>Many of the new ventures were started with low levels of capitalization, which as the literature suggests is a strong determinant of reduced prospects for survival. This suggests a possible “financing deficit”, rather than gap, for a proportion of business start-ups.</td>
</tr>
<tr>
<td>Neely &amp; Van Auken</td>
<td>2012</td>
<td>An examination of small firm bootstrap financing and use of debt</td>
<td>Journal of Developmental Entrepreneurship</td>
<td>TCE</td>
<td>Regressions</td>
<td>Programs that provide educational assistance to owners of small firms, including university courses and practitioner seminars/workshops, can expand the coverage of bootstrap financing in the curriculum.</td>
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<td></td>
<td>Author(s)</td>
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<td>Method(s)</td>
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<td>Pergelova &amp; Angulo-Ruiz</td>
<td>2014</td>
<td>The impact of government financial support on the performance of new firms: the role of competitive advantage as an intermediate outcome</td>
<td>Entrepreneurship &amp; Regional Development</td>
<td>Institutional Theory &amp; RBV</td>
<td>Tobit regression</td>
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<td>2</td>
<td>Afolabi, Odebanmi, &amp; Ayo-Oyebiyi</td>
<td>2014</td>
<td>Bootstrap financing techniques among small enterprises in Osogbo metropolis</td>
<td>Global Business and Economics Research Journal</td>
<td>RBV</td>
<td>Univariate statistics (frequencies) and chi-squares</td>
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<td>Winborg</td>
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<td>The role of financial bootstrapping in handling the liability of newness in incubator businesses</td>
<td>International Journal of Entrepreneurship and Innovation</td>
<td>RBV</td>
<td>Regressions</td>
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<td>8</td>
<td>Kumar &amp; Rao</td>
<td>2015</td>
<td>A conceptual framework for identifying financing preferences of SMEs.</td>
<td>Small Enterprise Research</td>
<td>Pecking order theory</td>
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<td>Mac an Bhaird &amp; Lynn</td>
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<td>Seeding the cloud: Financial bootstrapping in the computer software sector</td>
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<td>Jayawarna, Jones, &amp; Marlow</td>
<td>2015</td>
<td>The influence of gender upon social networks and bootstrapping behaviors</td>
<td>Scandinavian Journal of Management</td>
<td>RBV</td>
<td>One-way ANOVA and chi-square analysis</td>
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<td>Ensign &amp; Woods</td>
<td>2016</td>
<td>Challenges in bootstrapping a start-up venture: Keenga Research turning the tables on venture capitalists</td>
<td>Journal of Entrepreneurship, Management and Innovation</td>
<td>N/A</td>
<td>Case study</td>
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<td>1</td>
<td>Culkin, Murzacheva, &amp; Davis</td>
<td>2016</td>
<td>Critical innovations in the UK peer-to-peer (P2P) and equity alternative finance markets for small firm growth</td>
<td>International Journal of Entrepreneurship and Innovation</td>
<td>TCE</td>
<td>Interviews</td>
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</table>

* New Venture Decision Making Model and Opportunity Search Model
** Behavioral Theory of the Firm
Table 2. An overview, with illustrative examples, of the future directions for research with regards to bootstrapping.

<table>
<thead>
<tr>
<th>Antecedents</th>
<th>Primary Research Focus</th>
<th>Illustrative Research Examples</th>
<th>Possible Correlates and Moderators</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>How do the preferences and characteristics of the entrepreneur (or entrepreneurial team) and/or the actual venture affect the decision to bootstrap?</td>
<td>Does the entrepreneur want to be “Rich” or to be the “King”? How much human and social capital has the entrepreneur (or entrepreneurial team) been able to accumulate already? Is the founder (or entrepreneurial team) a novice, serial, or portfolio entrepreneur</td>
<td>Industry Creditworthiness Familiness</td>
</tr>
<tr>
<td>Outcomes</td>
<td>How does signaling affect the propensity of stakeholders (e.g., customers, financiers) to view this venture positively in terms of quality and intent?</td>
<td>In what various ways do stakeholders judge entrepreneurs’ signaling? Do customers and financiers evaluate entrepreneurs’ signaling in terms of a current specific specialized capability and/or based on past achievements? What affects customers’ and financiers’ evaluations of entrepreneurs’ signaling (e.g., perceived cost, honesty, frequency, consistency)?</td>
<td>Customers’ and financiers’ trust propensity Source of signaling information about the venture (e.g., in person, online, etc.) Perceived cost and honesty of the signal</td>
</tr>
</tbody>
</table>
Figure 1. Article search processes and inclusion funnel.

18,618 records identified in initial searches

18,068 records excluded
• (e.g., duplicates, white papers, studies examining the “bootstrapping” statistical technique)

550 full-text articles assessed for eligibility

412 full-text articles excluded
• 109 news articles
• 90 books
• 175 construct not directly studied
• 7 press-related releases
• 31 conference proceedings

138 eligible studies

78 full-text articles excluded
• Articles appeared in non-peer reviewed journals

60 studies included
Figure 2. Citation Analysis of Bootstrapping Scholars (1989 – 2016)

<table>
<thead>
<tr>
<th>Scholars</th>
<th># Number of Cites 1989-2016</th>
</tr>
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<td>VAN AUKEN &amp; CARTER (1989)</td>
<td>98</td>
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Figure 3. The Nomological Net of the Bootstrapping Construct

Moderators
- Industry
- Credit worthiness
- Amount of inside funding
- Familiness
- Type of Stakeholder

Antecedents
- Firm Size
- Human Capital
- Social Capital
- Big 5 personality characteristics
- Autonomy
- Planning
- Pitching Behavior

Bootstrapping
- ~ Effectuation Behaviors
- ~ Bricolage
- ~ Creative Activities

Outcomes
- ~ Performance
- ~ Survival
- ~ Happiness
- ~ Legitimacy