

The Effects of Environmental Uncertainty on Young and Small Businesses¹

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ABSTRACT

Entrepreneurs face a wide variety of uncertainties in managing new or small businesses. Uncertainty can potentially magnify the liability of newness faced by younger businesses, as well as the challenges that smaller businesses face in having adequate resources to maintain performance. Here we present a model of environmental uncertainty tied to industry, geographic and macro-level effects. We hypothesize a moderating effect of uncertainty upon both new and small business performance, and present a pilot test of the model using NFIB data that supports one of our two hypotheses.

INTRODUCTION

Uncertainty is a major obstacle to decision making for small businesses. Young firms in particular face uncertainties of business model, competitors, customers, and overall viability. Some uncertainty is specific to a given firm, industry or region. More broadly, uncertainty in the economic, political or technological environment will impact a range of small or young firms across a wide range of industries.

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These issues have become particularly salient for young and small businesses since the financial crisis of 2008, when these firms faced severe economic uncertainty due in part to a rapid contraction of business credit and a dramatic decline in consumer confidence and spending. Conversely, public policy intervention by the U.S. Federal Government since the crisis has been principally on behalf of the largest firms — with an emphasis on saving firms deemed ‘too big to fail’ — to provide liquidity for financial institutions, and to assure the survival of large firms in mature industries such as the auto industry (Sorkin, 2009). Taken together, these changes in external environment mean that entrepreneurs and managers have been confronting extreme environmental uncertainty to a degree not witnessed in the U.S. for more than half a century.

What is the impact of high uncertainty on small businesses — both fledgling high-growth entrepreneurial ventures as well as more traditional small businesses? Optimistically, such businesses lack the inflexible bureaucracies and resource commitments that limit the organizational flexibility of large incumbents. Economic turbulence may also provide entry opportunities for new businesses lacking commitments to prior technologies or business models.

On the other hand, while they may be more nimble than their larger and older counterparts, younger and smaller businesses also often lack the resources to shape the rules of competition, or to win government intervention to do so. Even the most growth-oriented of new businesses may have limited legitimacy at a time that buyers are fleeing to the safest (i.e., largest, most stable) suppliers, while established small businesses may toil for decades on thin margins and limited cash reserves.

In either case, extreme uncertainty raises numerous threats to which the small business must plan for, address, and respond. Further, the health of America’s small businesses and the hospitableness of the climate for new entrepreneurial ventures holds serious economic

implications far beyond the internal stakeholders of these firms, as these types of firms have often accounted for the majority or even all net job creation in the United States.²

In this paper, we consider prior research to develop hypotheses about the effects of environmental uncertainty on small and young businesses. Using data from the National Federation of Independent Businesses (NFIB), we test our hypothesized effects of different types of uncertainty by comparing firms both by age and size, and in different industry classifications. We conclude with a discussion of the implications of our theory development and testing for entrepreneurship research and practice, as well as proposals for a future research.

PRIOR RESEARCH

In this section we consider prior research on environmental uncertainty and its possible effects on entrepreneurial decisions. To do so, we offer a general model of uncertainty that separates out internal and external factors that can affect the entrepreneur's view of uncertainty.

Sources of Entrepreneurial Uncertainty

Past research has shown that uncertainty about the environment will impact entrepreneurial strategy and decision making in several ways. For new and small companies, high uncertainty is associated with reduced planning by small and entrepreneurial firms and less complex strategies. (Matthews & Scott, 1995). It is also associated with increased use of external sources of information (McGee & Sawyerr, 2003).

The entrepreneurial decision-maker faces multiple sources of uncertainty in his or her strategic decision-making and operations. Here, we classify these sources of uncertainty into four

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broad categories (Figure 1).³ Together, these sources influence the uncertainty perceived by the entrepreneur.

--- Insert Figure 1 About Here ---

Industry-Specific Uncertainty. In many cases, industry-specific change may bring uncertainty to an entire industry, as when US auto parts suppliers awaited the likely bankruptcies of GM and Chrysler (Muller, 2009). The differences between industries may relate to differences within the industry, or the impact of external factors on the industry. For example, Hrebiniak & Snow (1980) found significant variation in supplier- and competitor-related uncertainty between four industries, but also in the level of uncertainty due to governmental actions.

Region-Specific Uncertainty. During periods of economic expansion or contraction, different geographic regions will be ahead or behind the national average. For example, in a study of four US recessions, Owyang et al (2005) identified states that were in sync with the national pattern and others that tended to be out of sync. Thus we would expect — at least during extremes of economic growth or recession — that economic and other external uncertainties will vary based on geographic region. Some of the regional variation may be tied to industry — e.g. autos or dot-com companies — but more broadly, the health of business to business firms that serve the local economy (such as caterers or accountants) will be tied to the health of that region.

Macroenvironmental Uncertainty. Some economic or other broader societal forces span any single industry or region. Such volatility or uncertain expectations that span multiple industries relate to the operation of the overall economy or the institutions that govern it. In general, uncertainty is greatest at times of turning of the business cycle; strong growth of an economy reduces economic uncertainty within that economy (Fidrmuc, 2003).

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Firm-Specific Uncertainty. Beyond the effects at the level of the economy, industry and region, each firm faces its own set of uncertainties — both about its external context and its internal capabilities. A firm often has to make decisions despite incomplete information about a rival's capabilities and intentions (Zahra & Bogner, 2000). The newest of firms also face an additional form of uncertainty: the lack of a track record means that the firm's stakeholders (both internal and external) don't know how competently it can execute on its own strategies (cf. Audretsch, 2001).

Sources of Uncertainty in the Macroenvironment

While a firm's external analysis often centers on customers and rivals, its growth, profit and other measures of success may also depend on forces outside the industry. As Ginter and Duncan (1990: 91) note, success for many firms “depend on how well they respond to macro social, economic, technological, or political/regulatory changes—the external macroenvironment.” In less developed countries, the formation and growth of new firms may depend less on small business support and more on the health of the macroeconomic environment (Dawson, 1990).

Some forces in the macroenvironment create less uncertainty than others. An example would be changes in the macroenvironment that are years or even decades in coming, as with the decline in the social acceptability of smoking or the increasing proportion of elderly customers (Ginter and Duncan, 1990).

Other changes are more short term and thus introduce a greater degree of unpredictability into entrepreneurial planning. Here we consider three types of uncertainty about the general business environment: economic, political and technological uncertainty.

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Economic uncertainty (or macroeconomic volatility) relates to the functioning of financial markets, economic growth, consumer confidence, exchange rates or inflation (Bourgeois, 1985; Milliken, 1987; DeSarbo et al 2005). For example, during a major recession, the risk of investing increases, and both business- and consumer-oriented credit markets contract as borrowers are less able to demonstrate ability to repay and lenders may be less willing to lend during periods of high economic uncertainty.

A second form of environmental uncertainty is *political uncertainty*. The most extreme form of uncertainty is political risk, which Robock (1971) defines as the risk of discontinuities in the business environment that result from political change — discontinuities that are difficult to anticipate and have a large potential impact on firm profits or other objectives. Normally political risk focuses on affects on cross-border trade and investment, as when Busee & Hefeker (2007) identified four dimensions that predicted FDI inflows for 83 developing countries. However, political risk can more generally be used for the adverse impacts of political activity upon business, even in its home country (Robock, 1971; Kobrin, 1979). Even without the risk of discontinuous intervention, increased policy uncertainty leads to decreased private investment by firms in their own countries as doubts about the future returns to investment discourage economic risk-taking (Bittlingmayer, 1998; Brunetti and Weder, 1998). For example, periods of increasing regulation and regulatory uncertainty demonstrate reduced levels of business investment (Bittlingmayer, 2001).

Economic and political uncertainty are often related. For example, times of high economic uncertainty can also lead to political uncertainty, when government officials pursue policies to repair their own credibility and legitimacy; examples could be seen in many countries during the recent recession. Thus, the two forms of uncertainty may be cumulative and

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interdependent, as small businesses seek to cope with both the economic uncertainty and the under- (or over-) reaction of political leaders in addressing those economic problems (cf. Fields, 2009).

Finally, *technological uncertainty* adds an additional level of exogenous uncertainty to a firm, industry or economy. Periods of greater technological innovation will tend to have higher technological uncertainty (Audretsch, 2001). At the same time, technological uncertainty creates entrepreneurial opportunities, as some firms will correctly accept (or reject) a new technology before others (McMullen & Shepherd, 2006). Such technological uncertainty may also contribute to economic uncertainty, until the potential for a new technology is widely recognized (cf. Alvarez & Barney, 2005).

Cognitive Perspectives on Uncertainty

Two different approaches have been used to operationalize uncertainty. One is to obtain objective measures of environmental uncertainty or volatility as might be obtained for an entire industry, sector or national economy. Another is to use cognitive uncertainty measures, i.e. uncertainty as perceived by individual managers.

Objective measures of volatility capture the actual economic environment faced by various firms in a given market or industry. On the other hand, gaps between actual and perceived environmental volatility may create a poor fit between strategy and context (Bourgeois, 1985). Objective measures of volatility also do not capture the unpredictability of the change that makes it more difficult for managers to make the correct decisions (Milliken, 1987).

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In fact, these two types of measures reflect different constructs, with the uncertainty external to the firm influencing the perceptions of the individual manager. Based on prior research, we would expect these two types of measures would capture different types of entrepreneurial effects. One potential effect of environmental uncertainty is on the decisions of the business owner, manager or potential entrepreneur. Given the information available to the decision-maker, we believe that the implications of uncertainty upon decision-making would be most closely associated with perceived uncertainty (cf. Milliken, 1987). Thus, we would expect perceived economic or political uncertainty to influence the decision-making process, both for fledgling high-growth entrepreneurial ventures and as well as traditional small businesses.

Environmental uncertainty could also adversely affect entrepreneurial outcomes such as survival, growth, profits, and/or employment. It is possible to imagine a wide range of links between uncertainty —both perceived and objective — and firm-level outcomes. High perceived uncertainty will impact the quality of managerial decisions and thus the fit of firm's strategy to its internal and external context. At a first order of approximation, high objective measures of such macroeconomic volatility should increase both the uncertainty perceived by the entrepreneurial manager, and also the perceptions of customers, competitors, suppliers, regulators and other stakeholders. If the environment becomes highly unpredictable, we would expect the perceptions to vary more widely across stakeholders, while at the same time encouraging behaviors (such as risk-aversion) associated with highly uncertain environments. Finally, periods of high uncertainty are often (though not always) associated with a period of dramatic environmental change — such as the 1973 and 1979 oil price shocks — and thus outcomes will also be affected by the perceptions of the rate of change, the expectation of the

eventual outcome as well as individual or collective uncertainty about that outcome (cf. Kilian, 2010).

Implications of Uncertainty for Firm Creation

While many of the effects of uncertainty upon entrepreneurial activity are likely similar between small and large firms, one is qualitatively different: the impact on firm creation. Specifically, high uncertainty might decrease willingness of nascent entrepreneurs to start new firms. While we assume entrepreneurs to be naturally optimistic, we would expect uncertainty to increase the perceived risk. Thus, perceived uncertainty (either economic or political) should be positively related with decision-making (i.e., influencing the decision-making process) for both entrepreneurial ventures and young businesses.

On the other hand, high environmental uncertainty might create an opening for entrepreneurs to identify market opportunities that have gone unrecognized by potential competitors and thus creating a vehicle for entrepreneurial entry (Alvarez and Barney, 2005). In addition, if high uncertainty leads to reduced business activity, it may also increase unemployment, leading to more entrepreneurial ‘push’ — termed the ‘refugee effect’ by Thurik et al (2008).

Thus far, the empirical evidence of uncertainty (or risk) on firm creation is mixed. An unstable macroeconomic environment was shown to increase the riskiness (and thus decreases the propensity) of potential UK entrepreneurs to leave paid employment (Parker, 1996). Perceived market risk also reduced firm formation in a panel study of Dutch entrepreneurs (van Gelderen et al, 2006). Further, two studies offered mixed support for the impact of high firm-specific perceived uncertainty upon firm creation among nascent entrepreneurs, using the 11

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Likert-scaled questions of the PSED. ⁴ Liao and Gartner (2006) identified a positive relationship between uncertainty and the willingness to engage in formal planning, while planning strongly predicted propensity to launch (or continue to prepare to launch) the new venture. Meanwhile, Matthews and Human (2000) found that perceived operational uncertainty (such as obtaining key inputs) predicted reduced growth expectations, although they did not report its impact on propensity to launch a new firm.

Impacts of Uncertainty Upon Firm Performance

While we might expect that all firms would be negatively affected to one degree or another by extreme environmental uncertainty, we believe that two types of firms will be most adversely affected: young firms and small firms.

The Effects of Uncertainty on Young Firms vs. Established Firms

First, young firms face the liability of newness (Stinchcombe 1965). The lack of reputation and track records impairs the ability of less established firms to attract resources, customers or other business relationships (Garsney, 1998; Ebben and Johnson, 2006). In cases of high environmental uncertainty, these firms will find it more difficult to attract the cooperation of external stakeholders necessary to profit, grow and succeed relative to competitors. Therefore, collectively, we predict:

Hypothesis 1: Young firms will perceive Uncertainty to be more negatively related to firm performance than will established firms.

The Effects of Uncertainty on Small Firms vs. Large Firms

Second, while the difference between young firms and established firms is important, the difference between small and large firms is perhaps more equivocal. On the one hand, small firms are often more nimble and able to react quickly to change (Dean et al, 1998). On the other hand, smaller firms have less organizational slack and do not benefit from the economies of scale necessary to profit in some industries (Scott & Bruce, 1987). Therefore, we predict:

Hypothesis 2: Small firms will perceive Uncertainty to be more negatively related to firm performance than will large firms.

DATA AND MEASURES

Sample

To test our hypotheses, we utilized data from the National Small Business Poll on Innovation from the National Federation of Independent Business (NFIB). Ideally, we would use a data set from a period of high political and economic uncertainty, and measures of multiple sources of environmental uncertainty. While that is a goal of this study, we do not currently have such a data set. So for a pilot study, we used a NFIB survey that measured the impact of technological uncertainty upon competitive advantage (NFIB 2005).

The NFIB data set consists of a validated survey instrument and interviews that were administered by the Gallup Organization to a random sample of firms between October 20th and December 2nd, 2005. For the purposes of the poll, the NFIB focused on small and medium sized firms, which they defined as an owner controlled firm employing no less than 1 individual in addition to the owner(s) and no more than 249 individuals (NFIB 2005). The study used a

stratified random sample of firms from the files of Dunn and Bradstreet, with the sampling overweighting firms of 10-19 and 20-249 employees to compensate for the skewed distribution of smaller businesses. The survey resulted in a sample of 753 observations.

Measures

Consistent with the best practices for measuring constructs from our collected data, we utilized subjective (survey-based) measures from the data, as well as created measures from the survey data for some constructs (Slater and Atuahene-Gima, 2004). These measures include our dependent variable competitive advantage, and independent variables for industry dynamism, firm size, and firm age. Further, we also utilize several other measures such as prior performance and industry group membership as control variables. We describe these variables and their measures in detail in the remainder of this section.

Dependent Variable: Competitive Advantage

Competitive Advantage. The NFIB survey does not have a direct measure of current performance, so instead we used an ordinal measure of competitive advantage (CA), which in this survey is the degree to which a firm has a technology competitive advantage over their primary competitors.⁵ This measure also provides a way to measure firm success across a wide range of industries, without regard to the size or age of the referent firm.

The NFIB poll asked respondents to indicate whether they believe that their firm had an overall technology advantage over their primary competitors, a technology disadvantage with them, or no technology advantage one way or another. As such, it is a trichotomous variable where firms can develop no advantage, an advantage or a disadvantage. While we recognize that

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perceptions of competitive advantage are not the same as actually competitive advantage, we believe that these perceptions speak to the actual competitive status of the firms. We coded these responses as 3 for respondents that believed their business had a competitive advantage over their competitors, 2 for respondents that believed their business had a competitive equilibrium with their competitors and 1 for respondents that believed their business had a competitive disadvantage versus their competitors.

Independent Variables

Environmental Uncertainty. We utilized a measure of industry dynamism to capture the degree of uncertainty and change found in a particular industry (Dess and Beard 1984). Since firms in dynamic industries are more likely to innovate in comparison to firms in more stable industries, we felt it prudent to control for industry dynamism (Thornhill 2006). Therefore, while we do not theorize that industry dynamism will significantly affect the relationship among our other independent variables, it is important to control for dynamism. We measured industry dynamism as the extent to which technology is changing in the firm's industry. We coded responses on a four-item scale from the NFIB survey for how rapidly technology was changing in the SME's major industry (1 = "Very rapidly" to 4 = "Not at all rapidly") (NFIB 2005). We then reverse coded the responses to this item to calculate our measure for industry dynamism.

Firm Size. We measured firm size as the number of employees. We grouped the respondents into three size categories: micro-size firms of 1-9 employees (labeled and coded as "MIC"); small-size firms of 10-19 employees (labeled and coded as "SML"); and medium-size firms of 20-249 employees (labeled and coded as "MED"). The measures for the small-size firms

(SML) and medium-size firms (MED) serve as control variables in our study, with respect to the excluded category of micro-size firms (MIC).

Firm Age. We measured firm age as the number of years the firm has been in operation, as reported in the NFIB poll. Younger firms often experience a “liability of newness” (Stinchcombe, 1965) because they do not have an accumulation of knowledge and experiences, and they often do not have the resources needed to generate innovation. Further, the capabilities required for innovation accrue from a firm’s cumulative learning and experience (Cohen and Levinthal, 1990) and younger firms are less likely to have access to accumulated learning and experience than are their older counterparts. Based on these arguments we use firm age as a proxy for firm experience.

Control Variables

We used several control variables in this study, which, while not of direct theoretical interest, could influence the relationships among the other variables in our model, and thus were necessary to include. These control variables consist of measures for prior firm performance and industry group membership.

Prior Firm Performance. Prior firm performance may greatly influence a firm’s ability to produce innovations as firms that are more successful often have more slack resources at their disposal to allocate to innovation activities. Therefore, we also control for prior firm performance. Respondents were asked in the NFIB survey over the last two years, have the real volume sales: “Increased by 30 percent or more”; “Increased by 20 to 29 percent”; “Increased by 10 to 19 percent”; “Changed less than 10 percent one way or the other”; or “Decreased by 10

percent or more.” Because of ordinal characteristics of this particular measure, we coded these responses on a 5 point scale—5 to 1, respectively.

Industry Group. We control for industry-specific effects by coding the respondent’s industry into four major groups. The industry choices in the NFIB survey include: Agriculture, Forestry, Fishing; Construction; Manufacturing and Mining; Wholesale Trade; Retail Trade; Transportation and Warehousing; Information; Finance and Insurance; Real Estate and Rental Leasing; Professional/Scientific/Technical Services; Administrative Support/Waste Management Services; Educational Services; Health Care and Social Assistance; Arts, Entertainment, or Recreation; Accommodations or Food Service; Other Service, including Repair and Personal Care; and Other. We then grouped the respondents into four industry categories: processing and manufacturing (labeled and coded as “MFG”), sales and service (labeled and coded as “SVC”), retail and wholesale (labeled and coded as “RTL”), and “other” category (labeled and coded as “OTH”) which includes such industries as utilities, chemicals, energy, and transportation. This approach is consistent with those of accepted practices in prior research (Kriauciunas and Kale 2006), and uses categories similar to those used by Khanna and Rivkin (2001). The measures for the manufacturing (MFG), sales/service (SVC), and retail/wholesale (RTL) industries serve as control variables in our study, with respect to the excluded industry, other (OTH).

We present an overview of these constructs with their specific item measures and questions in Table 1.

--- Insert Table 1 About Here ---

RESULTS

We used utilized Ordinary Least Squares (OLS) in SPSS to test our model and hypotheses. Subsequently, we used some supplemental analysis of the model results, to gain additional

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insight into some of the differences in the estimates. We began our analysis by coding and compiling the measures of interest to our study from the NFIB Innovation Poll into a single sample data set. For the variables of interest, we had 715 complete cases out of the 753 responses. Following the coding and compiling of our sample data, we standardized the data set and analyzed the descriptive statistics and correlation coefficients. We present the means, standard deviations, and correlations for our study variables in Table 2.

--- Insert Table 2 About Here ---

Table 3 shows the regression results for the fully populated model. (Additional specifications are available from the authors upon request.) The main effect of uncertainty upon performance was significant, as was the control variable of past performance. Explained variance was relatively low.

--- Insert Table 3 About Here ---

The sign of the main effect for uncertainty was positive and significant ($p < .01$). This points out an important point about the dual effects of uncertainty. On the one hand, environmental uncertainty may lower the average performance of firms as they defer investment waiting for resolution of the uncertainty, or make more mistakes due to imperfect information. On the other hand — as noted by McMullen and Shepherd (2006) among others — uncertainty may also increase the performance differential between firms: in the case of high information asymmetries, having scarce knowledge (in this case about technology) can heighten the opportunities for performance advantages over competitors.

For firm age, young firms were more likely to have competitive advantage, although the effect was weak ($p < .10$). As hypothesized in H1, the interaction effect of age and uncertainty

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was positive: that is to say, younger firms had their performance enhanced more by low uncertainty than did higher firms ($p < .05$).

There were no significant effects for firm size or the interaction effect of size and uncertainty, and thus H2 was not supported. This may be due to the nature of the sample, which emphasized small and medium-sized businesses: All of the manufacturing businesses in this NFIB dataset would be considered “small” by US government standards, as would two of the three categories of services and retail firms.⁶

DISCUSSION

Our pilot study has major limitations. It uses a secondary dataset with one measure of uncertainty, that regarding technological uncertainty. It focuses on one type of firm performance — that gaining advantage from the use of technology — and does not capture broader measures of uncertainty or performance that represent the sort of environmental uncertainty that are of greatest interest to policymakers and business owners today. The current statistical analysis does to parcel out uncertainty for regional or industry effects, which might better support the model presented in Figure 1 but would run into the same aforementioned limitations of this dataset.

We continue to search for more suitable datasets for a broader test of environmental uncertainty, or the resources to gather primary data. Ideally, we would use a sample gathered during a period of high economic uncertainty, such as immediate aftermath of 9/11 or during the current recession. We have identified several potential datasets for this purpose, and hope to report results in the next six months.

With such a dataset, we would hope to demonstrate two effects. For researchers, we seek to demonstrate the value of parceling out the external sources of uncertainty as a way of measuring the impacts of uncertainty upon firms. For policymakers, we would like to

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demonstrate differential effects that macro-economic and political uncertainty have on the youngest and smallest of firms, and thus the importance of reduced uncertainty for encouraging job growth and other measures of economic recovery.

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NOTES

- ¹ This paper presents preliminary results of an in-progress study. Please contact the authors for the most up-to-date findings and paper.
- ² Two Kauffman Foundation-published studies are particularly relevant: From 1980–2005, firms less than five years old accounted for all net job growth in the United States (Haltiwanger et al, 2009) and young firms (excluding startups) accounted for nearly two-thirds of job creation in 2007 (Stangler and Litan, 2009).
- ³ As an alternate representation, Freel (2005) represents macro, industry and firm uncertainty as a nested hierarchy, which captures the independence of these levels of uncertainty, but does not suggest a measurement model.
- ⁴ The PSED data does not include either objective measures of environmental volatility or perceptual measure of macroeconomic uncertainty.
- ⁵ Ideally we would have an objective measure of firm performance, but such data is rarely available for small privately-held companies.
- ⁶ The SBA (2008) reports the maximum legal size by NAICS code for firms to be eligible for Federal small business preferences. For manufacturing industries, this ranges from 500-1500 employees while for wholesalers, the cutoff is 100 employees. Other industries are measured using annual revenues — ranging from \$7-30 million for retailers — which do not allow for direct comparability to the NFIB data.

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FIGURES AND TABLES

Figure 1. Multiple sources of external uncertainty

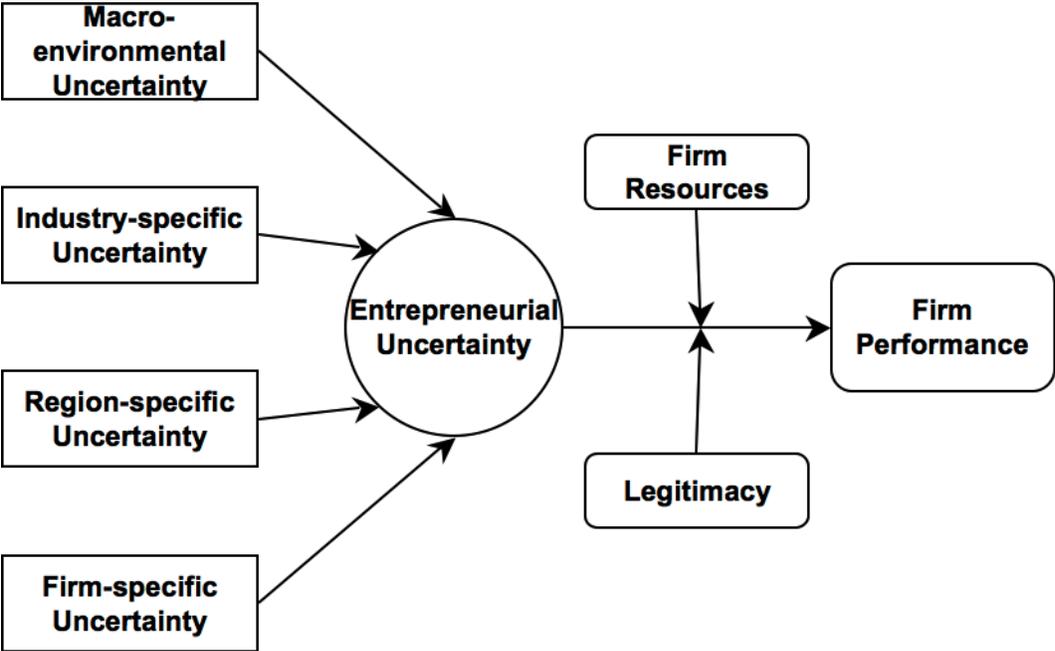


Table 1. Study Variable, Descriptions, and Measures

Dependent Variables	Variable Description	Measures
Competitive Advantage	Measures the degree to which a firm has a technology competitive advantage over their primary competitors	Ordinal scale variable: Does the firm have an overall technology advantage over their primary competitors (3), a technology disadvantage versus them (1), or no technology advantage (2)
Independent Variables	Variable Description	Measures
Environmental Uncertainty	Measures the degree to which technology is changing in the industry	Is the technology in your industry changing- 1 = “Very rapidly” to 4 = “Not at all rapidly”; reverse coded for analysis.
Firm Size (MIC, SML, or MED)	Firm Size in employees	Ordinal scale variable distinguishing micro-size firms (1-9 other employees), small-size firms (10-19), and medium-size firms (20-249).
Firm Age	Captures the number of years the firm has been in operation	How long has the business been in operation
Control Variables	Variable Description	Measures
Prior Performance	Self-reported trend on firm performance over the past 2 years	Ordinal scale (1-5) measuring unit sales growth, where 5 is 30+% growth
Industry (MFG, SVC, RTL or OTH)	Firm Industry Group	Categorical Variables for processing/manufacturing, sales/service, retail/wholesale, and “other” category

Table 2. Correlation Matrix and Summary Statistics

	Mean	Std. Dev.	1	2	3	4	5	6	7
1. CA	2.30	1.005							
2. Mfg. Ind.	.19	.396	-0.021						
3. Service Ind.	.56	.497	-0.039	-0.554**					
4. Retail Ind.	.17	.375	0.038	-0.22**	-0.509**				
5. Prior Perf.	2.84	1.25	0.153**	-0.005	-0.053	0.052			
6. Uncertainty	2.24	.994	0.241**	0.065	-0.131**	0.103**	0.120**		
7. Age	17.25	14.80	0.023	0.111**	-0.215**	0.130**	0.198**	0.018	
8. Size	18.31	27.69	-0.054	0.045	-0.021	0.001	-0.025	-0.079*	0.052

N = 715. Note: * $p < .05$, ** $p < .01$

Table 3. Regression Results

Dependent Variable:	Competitive Advantage
Uncertainty	0.170**
Firm Age	-0.178†
Age x Uncertainty	0.208*
Firm Size	0.078
Size x Uncertainty	-0.118
Control Variables:	
Past Performance	0.126**
Mfg. Industry	-0.102
Service Industry	-0.093
Retail Industry	-0.061
R ²	0.085
F	7.269
N	715

† $p < .10$, * $p < .05$, ** $p < .01$