Intellectual Property Licensing Among Incorporated and Unincorporated Entrepreneurs

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Abstract: We classify entrepreneurs according to whether they are incorporated or unincorporated business owners. Previous studies have reported incorporated entrepreneurs are consistent with "gazelles" and unincorporated entrepreneurs are consistent with "lifestyle" businesses. We contribute to this literature in two ways. First, we document several important stylized facts about incorporated and unincorporated entrepreneurs. Second, we examine differences in intellectual property licensing between incorporated and unincorporated entrepreneurs. We use proprietary data from the Kauffman Firm Survey, comprising a sample of 2,989 U.S. firms founded in 2004 and followed annually until 2011 to document these findings and test our hypotheses. Our analysis reveals that, compared to unincorporated entrepreneurs, incorporated entrepreneurs are more likely to have intellectual property licensing and have a higher number of patents, copyrights, and trademarks. We use various matching, instrumental variable, and selection methods to control for endogeneity related concerns. Our findings reveal another difference between gazelle and lifestyle businesses—the use of intellectual property licensing.

Keywords: Entrepreneurship, Incorporated, Innovation, Intellectual Property, Legal Form of Organization, Unincorporated

JEL Classifications: L26, M13, O30, O34

1. Introduction

A substantial body of research demonstrates entrepreneurship is good for economic growth (Acs, 2006; Acs and Szerb, 2007; Audretsch et al., 2006; Baumol, 1986; Baumol and Strom, 2007; Holcombe, 1998). Entrepreneurs introduce new products, processes, manufacturing methods, and other sources of innovation to displace incumbent businesses with fresh new ones (Schumpeter, 1942). Entrepreneurs are alert to new opportunities (Kirzner, 1973) and often create their own (Alvarez and Barney, 2007), facing considerable uncertainty in the process (Schultz, 1975).

Yet, a growing body of literature reveals substantial heterogeneity in entrepreneurship. It is often questioned, for instance, if self-employment is an appropriate measure of entrepreneurship (Levine and Rubinstein, 2018, 2017; Shane, 2008). The self-employed, on average, earn less than their salaried counterparts (Evans and Leighton, 1989; Hamilton, 2000; Parker, 2018), suggesting that self-employment often is pursued for reasons other than risk-taking and growth-creation, such as autonomy and flexibility (Hurst and Pugsley, 2011; Shane, 2008). Whereas self-employment is often a poor proxy for entrepreneurship, the literature has identified important key differences between entrepreneurs and other business owners by conceptualizing those who possess high-growth aspirations as "gazelles" and those who do not as "lifestyle entrepreneurs" (Henrekson and Johansson, 2010). Levine and Rubinstein (2017) argue that it is important to distinguish the incorporated self-employed from the unincorporated self-employed for purposes of defining an entrepreneur. The former earns more than, while the latter earn less than, their salaried counterparts. Moreover, incorporated self-employed perform tasks that require greater cognitive and less manual skills than their unincorporated counterparts. The literature also documents that, once established, entrepreneurs seldom change their legal form of organization (Cole and Sokolyk, 2018a; Levine and Rubinstein, 2017), thereby casting doubt on the conventional wisdom that entrepreneurs begin small and simple but then mature into more highly-complex legal forms of organization like C-Corporations (i.e., the

"life-cycle of the firm" hypothesis)[1]. One takeaway lesson from this strand of the literature is that high-growth entrepreneurs are *fundamentally* different from others, with incorporation appearing to be an important distinguishing factor.

Despite the importance of these studies, we still know little about key differences between incorporated and unincorporated entrepreneurs, which has important implications for both innovation and entrepreneurship (Lerner, 2009; Mason and Brown, 2013; Shane, 2009). Although these studies shed light on the ways incorporated entrepreneurs differ from unincorporated ones, the literature has not fully explored *how* they are different. A recent attempt to do this is by Levine & Rubinstein (2017), who document a number of important distinctions between the incorporated and unincorporated self-employed. These researchers, however, have only scratched the surface in this area, leaving several remaining questions. For instance, if incorporated entrepreneurs are more involved in nonroutine cognitive tasks, then what are these types of tasks? Moreover, are there additional ways to differentiate high-growth entrepreneurs from other business owners, besides incorporated and unincorporated? We contend more work is needed to fully address these and other related questions and to explore their implications.

The objective of our study is to examine whether incorporated and unincorporated entrepreneurs differ as they relate to innovation and the licensing of intellectual property (IP), and, if so, how they differ. Innovation fits the mold of Levine and Rubinstein (2017) because it requires nonroutine cognitive abilities. As such, we should expect incorporated entrepreneurs to be more involved in innovation activity and the creation of IP. Moreover, we are able to extend the literature by examining not just incorporated and unincorporated entrepreneurs, but also by decomposing incorporated entrepreneurs into a variety of increasingly complex legal forms of organization (LFO)—limited-liability companies (LLCs), S-

[1] One exception to this is with tax law changes. For instance, the Tax Cuts and Jobs Creation Act changed the corporate tax rate from 35 percent to 21 percent. This is likely to incentivize some entrepreneurs to incorporate due to the tax savings of switching if their marginal tax rate exceeds the corporate tax rate.

Corporations and C-Corporations.[2] We note a paucity of research exists on the effects of legal form of organization on firm outcomes such as innovation and other high-growth entrepreneurship measures (Cole and Sokolyk, 2018a).[3] Examining the different legal forms of organization, rather than only incorporated and unincorporated entrepreneurs, allows us to develop a more nuanced understanding of the ways in which heterogeneous entrepreneurs pursue innovation and IP licensing. Using proprietary data from the Kauffman Firm Survey of U.S. start-ups to test our hypotheses, we first find that incorporated entrepreneurs are more likely to use innovation and use it to a greater extent as compared to unincorporated entrepreneurs. Specifically, compared to unincorporated entrepreneurs, incorporated entrepreneurs are more likely to use IP licensing and to have a higher number of patents, copyrights, and trademarks. We use a battery of matching, instrumental variable, and selection methods to address and mitigate concerns about endogeneity. Next, we decompose incorporated entrepreneurs into subsamples of LLCs, S-Corporations and C-Corporations, which are increasingly complex forms of ownership with different advantages and disadvantages. We find that both the likelihood of using IP licensing and the number of patents, copyrights and trademarks increase with the complexity of incorporation. C-Corporations are significantly more likely to use IP licensing and to have a greater number of patents, copyrights, and trademarks than either S-Corporations or LLCs.

Our findings make several contributions to the literature. First, we extend the literature on the traits and characteristics differentiating high-growth entrepreneurs from other businesses, commonly referred to as "gazelles" and "lifestyle businesses" (Henrekson and Johansson, 2010). Although studies have identified incorporated entrepreneurs to be more consistent with the gazelle typology (Levine and Rubinstein, 2018, 2017), we still know little about *how* they are different from other entrepreneurs. Our findings speak to this literature by revealing another difference between gazelle and lifestyle businesses—the use of IP licensing

[2] Our study examines legal forms of organization in the U.S. and may not be generalizable to entrepreneurs in other countries that do not have the same classifications.

[3] One exception is a study by Cole and Sokolyk (2018a), but they only explore the choice of LFO and not the effects on innovation and other firm-level outcomes.

such as patents, copyrights, and trademarks. We find that incorporated entrepreneurs are more likely to have all types of IP including patents, trademarks, and copyrights. Moreover, with the exception of copyrights, incorporated entrepreneurs engage in a higher number of IP than unincorporated entrepreneurs. Specifically, our estimates reveal a six-percentage point increase in IP and 2.5 more IP for incorporated entrepreneurs relative to unincorporated entrepreneurs, on average.

Second, our study contributes to the literature on IP licensing and the choice of a firm's legal form of organization. To our knowledge, no studies have examined how a firm's choice of legal form of organization affects innovation and IP licensing activity. Cole and Sokolyk (2018a) is the only study of which we are aware that examines determinants of a firm's legal form of organization. However, they focus on the antecedents rather than the consequences and do not consider any implications for innovation and IP licensing. Our study also speaks to the "dilemma of patenting" literature (Baldini et al., 2007; Chirico et al., 2020; Cohen et al., 2000; Horstmann et al., 1985) where entrepreneurs must decide between patenting—and exposing the IP to imitation—or not. Our study examines the patenting behavior of incorporated and unincorporated entrepreneurs, which extends this literature. Thus, we speak to this literature by examining how the legal form of organization influences innovation and IP licensing, which has been hitherto neglected. Our study reveals that incorporated entrepreneurs, and especially C-Corporations, are more likely to use IP licensing and use it to a greater extent than other legal forms of organization. Our findings reveal, however, that other legal forms of organization such as S-Corporations and LLCs also use IP licensing, though they use it less relative to C-Corporations but more relative to unincorporated entrepreneurs and partnerships (both general and limited partnerships). Therefore, our findings reveal it is not only C-Corporations that use IP licensing, but other legal forms of organization, which provides a more nuanced picture than bifurcating along the lines of incorporated and unincorporated.

Lastly, our study makes important contributions to entrepreneurship and innovation policy. Policymakers often target entrepreneurs who have the highest prospects for employment and net business creation (Holtz-Eakin, 2000; Lucas and Boudreaux, 2020; Shane, 2009). Scholars have noted that policies targeting high-growth aspiring entrepreneurs often fall short, due to the substantial heterogeneity in entrepreneurship (Mason and Brown, 2013). Our study informs this debate by documenting that incorporated entrepreneurs are different from the unincorporated when it comes to IP. Thus, rather than focusing on innovation activity, which is riddled with endogeneity problems (Buddelmeyer et al., 2010), policymakers can identify firms based on their legal form of organization and use this as an alternative identification strategy. Firms rarely change their legal form of organization once established, which lessens endogeneity concerns (Cole and Sokolyk, 2018a). As such, our findings reveal that incorporated entrepreneurs use IP more often and to a larger extent than unincorporated entrepreneurs, and that C-Corporations use IP more often and to a larger extent than other incorporated LFOs. Policymakers then could focus on incorporated entrepreneurs, especially those incorporated as C-Corporations, as having greater potential for high-growth.

2. Theoretical Framework

2.1. Background

Organizational theories began with Knight (1921) and Coase (1937) who discuss the importance of firms to solve problems with risk sharing and transactions costs. Demsetz (1988, p. 141) explains that economists' preoccupation with the price system and Alfred Marshall's representative firm, "undermines serious consideration of the firm as a problem solving institution." Demsetz (1988) urges scholars to consider the importance of information and information costs to the theory of the firm. Other scholars like Fama (1980) and Fama and Jensen (1983) extend these ideas to introduce the concept of the agency problem to the firm. Since then, organization scholars have considered how the legal form of an organization encourages diversification, especially as it relates to subsidiaries (Bethel and Liebeskind, 1998). Others have found that

the LFO is an important factor for resource-dependency, affecting the "liability of adolescence" (Bruderl and Schussler, 1990). Although scholars in economics and finance have considered the role of the LFO (Cole and Sokolyk, 2018a; Levine and Rubinstein, 2017), entrepreneurship and innovation scholars have largely overlooked this literature. We contend this is an oversight, and addressing this gap helps shed light on important differences between entrepreneurs.

Incorporation has several different definitions in the literature. Typically, what is meant by incorporation, at least in the U.S.[4], is that the firm is registered as a C-Corporation, which is a legal means to structure the organization. Named for the subchapter of the Internal Revenue Code (subchapter C), organizations structured as a C-Corporation are taxed separately from shareholders. This situation can create double taxation, in which profits are taxed separately at the corporate level and personal level. Alternatives to C-Corporations include S-Corporations and Limited Liability Companies (LLCs). Like C-Corporations, S-Corporations and LLCs also create a separation of assets between owners and entity, but they have different legal structures and are taxed differently.

In this study, we define incorporation as either a C-Corporation, S-Corporation, or LLC because they all have limited liability in common. In an additional analysis, we also treat incorporation as C-Corporations only. The reason we make a distinction between C-Corporations, S-Corporations, and LLCs is to compare and contrast important differences between these LFOs. This additional analysis allows us to gain a more granular picture on LFO's effects on IP.

2.2. Incorporation and IP Licensing

We contend that incorporation has a positive and direct effect on IP licensing. That is, firms that incorporate are more likely to invest in IP licensing and make larger IP licensing investments. We base this argument on four distinctions among unincorporated and incorporated entrepreneurs. The first is that

[4] In other countries such as Sweden, all firms are considered corporations and there is no such distinction.

incorporation provides limited liability protection, which means that the firm's owners are only liable for the amount of their investment in the firm (Easterbrook and Fischel, 1985; Manne, 1967).[5] The second is that incorporation, and in particular organizing as a C-Corporation, has important signaling mechanisms (Spence, 1973). The third is that incorporation facilitates raising capital from outside investors. The fourth is that incorporated entrepreneurs have a legal life that is independent from the firm's owner(s). We discuss these four distinctions in the following subsections.

2.2.1. Incorporation provides limited-liability protection

Experimentation with new products, processes, and recombinations of existing resources are all important and necessary parts of the innovation process (Schumpeter, 1942). However, this experimentation by entrepreneurs is inherently risky. Innovation is characterized by failures and unpredictable breakthroughs (Aldrich, 1999). New ventures have a high failure rate (Lee et al., 2022) and are fraught with uncertainty (Knight, 1921). In the event of business failure, debtors can make claims against an entrepreneur's business and personal assets, unless the business is organized as an entity with limited liability protection.[6] In that case, debtors can only make claims against business assets and not personal ones (Easterbrook and Fischel, 1985). Incorporation, therefore, provides limited-liability protection, which is a useful tool for innovators. Incorporated entrepreneurs have limited liability in the event their venture fails or faces another risk such as a legal dispute. This protection allows for the entrepreneur to focus on innovation without the fear that they will be personally liable for the decisions they make in managing their businesses. Consequently, we anticipate a positive effect of incorporation on IP licensing.

2.2.2. Incorporation as signaling mechanism

In addition to the benefits of limited liability, incorporation can also be viewed as an important signal of the firm's quality. Signaling is useful in situations of incomplete information, where one party has more

[5] See, e.g., https://www.law.cornell.edu/wex/limited_liability.
[6] C-Corporations, S-Corporations, LLCs, and limited partnerships all provide limited liability protection to firm owners.

information than the other (Spence, 1973). Entrepreneurs will desire to establish legitimacy (Suchman, 1995) so as to attract positive attention from consumers, investors, and government regulators. Recent entrepreneurship research suggests the use of business debt serves as a credible signal of firm quality to outside investors (Epure and Guasch, 2020) and is associated with greater future revenues and lower failure rates (Cole and Sokolyk, 2018b). Moreover, paying voluntary taxes provides another useful signal concerning firm quality (Satterthwaite, 2020). We argue there are similar signaling benefits associated with incorporation.

In the case of IP licensing, incorporation provides a useful signal to lenders, outside investors and government regulators that the entrepreneur is serious about the venture. Although incorporation provides a useful signal to establish legitimacy, a signal must establish a separating equilibrium to be credible (Spence, 1973). That is, while incorporation can be a useful way to signal "high effort", it is only useful if others (i.e., the "low effort" group) must not find it worthwhile to incorporate.

There are several reasons why only some entrepreneurs might find it worthwhile to incorporate, thus providing a credible signal. First, there are costs associated with incorporation that include both annual and initial filing fees. These fees can be as little as $100 and as much as $500 for LLCs, but they are substantially greater for S- and C-Corporations. In addition, some states like California have corporate taxes assessed as a percentage of an LLCs' net income, although many other states only have a flat annual fee.[7] C-Corporations differ from other LFOs—they are subject to double taxation. The earnings of a C-Corporation are taxed first at the corporate level, both by the Federal government and by many state governments. Any remaining income distributed to shareholders in the form of dividends is then taxed a second time at the marginal tax rate of the investor receiving the dividend. Combined, these taxes can be quite substantial. In contrast, income earned by the S-Corporation and LLC is "passed through" to the shareholders, avoiding taxation at the corporate level. Consequently, this differential tax treatment influences an entrepreneur's choice of LFO

[7] https://smallbusiness.chron.com/disadvantages-forming-llc-72959.html. Accessed May 30, 2022.

(Gordon and MacKie-Mason, 1994; Gravelle and Kotlikoff, 1993, 1989; Mackie-Mason and Gordon, 1997). In the case of C-Corporations, corporate tax rates can be lower than an individual's marginal tax rate, which is the appropriate comparable tax rate since all other entities are considered pass-through entities for taxation. This can be a potential benefit of a C-Corporation, however, C-Corporations have additional costs and complexity to consider.

Second, aside from the fees, entrepreneurs must file annual paperwork with their state governments, which increases complexity. Some states like Florida provide templates that simplify the process, but the burden can be more complicated in other states. Many entrepreneurs hire lawyers or legal services to file the paperwork for them, significantly increasing the costs of incorporation. Corporations are required to have a board of directors and to hold annual shareholder meetings, whereas LLCs can be managed informally by a single managing member and are not required to hold annual meetings.[8]

Lastly, in addition to the costs and added complexity, many entrepreneurs will not find it worthwhile to incorporate. One reason is less educated and less experienced entrepreneurs are likely to underestimate the value of limited liability. Another reason is that it is also possible to purchase business-liability insurance, which provides a similar level of protection of personal assets but without the need to incorporate.

2.2.3. Incorporation facilitates raising equity capital

One of the key advantages of incorporation is that incorporated entrepreneurs can raise additional capital by selling new shares of equity to outside investors (Manne, 1967). In contrast, the equity capital available to a proprietorship is limited to the wealth of its proprietor and the equity capital available to a partnership is limited to the wealth of its partners. S-Corporations also limit the amount of equity capital available to the firm due to a cap on the number of shareholders in an S-Corporation. This makes the LLC and the C-Corporation the most appropriate LFOs for a firm needing to raise capital from a large number of

[8] https://www.wolterskluwer.com/en/expert-insights/ten-differences-llcs-or-corporations-consider-nontax-differences . Accessed June 10, 2022.

outside investors. Moreover, limited liability afforded by incorporation protects the personal assets of new investors, limiting any losses to the amount of their investment in the firm. This makes such investments more attractive (Manne, 1967). The share structure of incorporated entrepreneurs also facilitates both the issuance of new shares and the sale of existing shares. Because the creation of IP typically requires considerable investments, incorporation facilitates the creation of IP.

2.2.4. Incorporated entrepreneurs have independent legal lives

Incorporation creates a legal entity separate from its owners. If an owner of an incorporated firm dies or sell her stake, then the firm continues to do business as usual. In contrast, a firm organized as a proprietorship ceases to exist when the proprietor dies or sells the firm's assets. Because incorporation provides greater certainty about the firm's survival, incorporation reduces the riskiness of investing in IP.

2.2.5. Summary and hypothesis

In sum, entrepreneurs can use incorporation to help them increase investments in IP licensing. Because innovation is risky and characterized by failures and unpredictable breakthroughs (Aldrich, 1999), incorporation provides the benefit of limited liability. In addition, incorporation provides a useful signal to government regulators, investors, and consumers alike. Entrepreneurs who incorporate will be viewed with enhanced legitimacy, which helps with their IP licensing endeavors. Overall, then, we develop our first hypothesis as follows:

Hypothesis 1: There is a positive and direct effect of incorporation on IP licensing

2.3. Conceptualization by Legal Form of Organization

There are several different LFOs. Some of them—C-Corporations, S-Corporations, LLCs, and Limited Partnerships—provide the benefit of limited liability. Do they all exert the same signal to regulators, investors, and consumers? If so, we should expect similar effects upon IP licensing. However, if some LFOs have stronger or weaker signals, their effects will likely differ. We discuss these aspects in this section.

Although LLCs, C-Corporations, and S-Corporations provide limited liability protection, we expect C-Corporations to provide a more credible signal about the firm's quality and effort type. First, it is worth noting the costs to organize as a C-Corporation and even S-Corporation are more substantial than an LLC. This includes both pecuniary and non-pecuniary costs such as time and effort. It is unlikely that lifestyle businesses will find it worthwhile to organize as a C-Corporation, due to the added costs, complexity, and limited benefits they can derive. Consequently, incorporating as a C-Corporation provides the strongest signal to consumers and regulators.

Among the LFOs that provide limited liability, there also are differences in their suitability for raising equity capital. In particular, S-Corporations have a cap on the number of shareholders at 100. Hence, for firms that would like to raise capital from a larger number of shareholders, either now or in the future, organizing as an LLC or C-Corporation would be preferable.

There also are differences in the legal environments facing different LFOs. In particular, LLCs are organized under the laws of each individual state. This creates uncertainty about the legal environment for an LLC should it decide to move from one state to another. An LLC also must choose a different LFO for tax purposes, as the IRS does not recognize an LLC as a distinct entity; instead, it must choose to be taxed as a proprietorship, partnership, S-Corporation or C-Corporation. If it chooses to be taxed as a C-Corporation, the firm would be better off if organized as a C-Corporation. Finally, if a firm is ultimately looking to be acquired by a publicly traded company, it might prefer to organize as a C-Corporation.

As a result of these differences among limited-liability LFOs, we develop our second hypothesis as follows:

> **Hypothesis 2**: Among organizational forms that provide limited liability, the effect of incorporation on IP licensing is greatest for C-Corporations.

3. Data and Methods

3.1. Sample and data description

We use data from the confidential versions of the Kauffman Firm Survey (KFS) to test our hypotheses. The KFS provides individual and organizational data and uses a multi-mode survey design (Ballou et al., 2008). This design includes an internet survey and computer assisted telephone-interviewing follow-up. Our sample consists of 2,989 new U.S. businesses (i.e., start-ups) founded in 2004 and followed annually through 2011 for a total of 13,921 observations. Our sample firms are comprised of small businesses in the US and come from each of the 50 states. The three largest states (California, Texas, and Michigan) comprise 23.11 percent of all observations in the sample, and 23 states each comprise less than one percent.

The initial survey response rate was 43 percent with a follow-up response rate of over 80 percent (Boudreaux, 2021). There are both public and confidential versions of the KFS. The public versions provide less detailed information, such as ranges for numeric variables rather than actual values and provides much more limited geographic information about each firm. We rely upon the confidential versions of the surveys.

In addition to the KFS, we also gather data from other sources. Following Boudreaux (2021), we gather data on the intensity of competition at the three-digit level (NAICS) as our measure of competitive density (Hannan and Freeman, 1988). The US County Business Patterns provides these data.[9] We also collect income data from the US Census' Bureau of Economic Analysis.[10] Appendix Table A1 defines our variables.

3.2. Variables

3.2.1. Dependent Variables

[9] As of May 5, 2022, these data were publicly available for download from the website of the U.S. Census Bureau at: https://www.census.gov/programs-surveys/cbp.html.

[10] As of May 5, 2022, these data were publicly available for download from the website of the U.S. Census Bureau at: https://apps.bea.gov/regional/downloadzip.cfm

For each firm in each year of the survey, the KFS provides information on three different types of IP—the number of copyrights, the number of patents, and the number of trademarks. We use this information to create eight different dependent variables. The first four measure IP at the extensive margins:

(1) Have IP: is equal to one if the firm has any copyrights, patents, or trademarks and equal to zero otherwise;

(2) Have Copyright: is equal to one if the firm has any copyrights and equal to zero otherwise;

(3) Have Patent: is equal to one if the firm has any patents and equal to zero otherwise; and

(4) *Have Trademark*: is equal to one if the firm has and trademarks and equal to zero otherwise.

The second four of our dependent variables measure IP at the intensive margins:

(5) Number IP: is equal to the total number of the firm's copyrights, patents and trademarks;

(6) Number Copyrights: is equal to the number of the firm's copyrights;

(7) Number Patents: is equal to the number of the firm's patents; and

(8) *Number Trademarks*: is equal to the number of the firm's trademarks.

Because of the skewness of these intensive measures, we winsorize each at its 95th percentile value.

3.2.2. Independent Variables

Our focal variables are indicators for legal form of organization (LFO). The KFS classifies each firm in each year by LFO—Proprietorship, General Partnership, Limited Partnership, Limited Liability Company (LLC), S-Corporation, or C-Corporation. We create binary indicator variables for each of these LFOs. We also create the variable *Incorporated* that is equal to one if the firm is an LLC, S-Corporation or C-Corporation and equal to zero otherwise.

3.2.3. Control Variables

The KFS provides many relevant control variables, which we classify into two categories—firm characteristics and founder characteristics. We include the natural logarithm of the number of employees (*Employees*) as a measure of firm size. We expect that larger firms are more likely to have IP. We include an indicator for home-based businesses (*Home Based*), which is equal to one if the firm operates at the residence of the founder and equal to zero otherwise. We expect that home-based businesses are less likely to have IP. We include an indicator for whether the firm reports that it has a "comparative advantage" (*Comp. Advantage*) over its competitors. Reported reasons for comparative advantage include speed, reputation, price, marketing, expertise, design, and cost. We expect that firms reporting a competitive advantage are more likely to have IP. We include an indicator for firms that provide services (*Provide Service*) and an indicator for firms that provide products (*Provide Product*). We expect that firms that provide products are more likely to have IP while firms that provide services are less likely to have IP. We include an indicator for firms that own land or a building (*Has Land or Building*) and an indicator for firms that have equipment (*Has Equipment*). We expect that firms that have real estate or equipment to be more likely to have IP. We include variables for the number of owners and for the number of owner-operators. We expect firms with more owners and firms with more owner-operators are more likely to have IP. We include an indicator for firms that are in high-tech industries (High Tech) and expect such firms to be more likely to have IP. We include the variable, *Credit Risk*, which reports the firm's credit score ranging from one (least risky) to five (most risky).

We also include a number of founder characteristics. The KFS reports information on up to ten owners for each firm in each year. *Founder Education* is equal to one if the average of the owners' reported highest level of education is above the median and equal to zero otherwise. We expect that more educated owners are more likely to have IP. *Founder Gender* is equal to the percentage of male owners of the firm. We expect that firms with a larger percentage of male owners are more likely to have IP. *Founder Work*

Experience is the average number of years of work experience of the owners. We expect that firms where owners have more work experience are more likely to have IP. *Founder Age* is the average age of the owners. We expect that firms with older owners are more likely to have IP. *Hours Per Week* is the average number of hours worked per week by the owners. We expect that firms where owners work more hours per week are more likely to have IP. *Founder Race* is the proportion of owners that are Caucasian. We expect that firms where a higher percentage of owners are Caucasian are more likely to have IP.

We also include two regional characteristics as control variables. *GDP Per Capita* is the natural logarithm of GDP per capita measured at the county level. We expect firms located in counties with higher GDP per capita are more likely to have IP. *Competitive Density* is the number of establishments in the firm's county in the focal firm's industry, as measured by three-digit NAICS code. We divide by 1,000 to rescale this measure. We expect firms located in a county with greater competitive density are more likely to have IP.

3.3. Methods

To test our hypotheses, we employ a number of different methods. First, we test for statistically significant differences in group means between firms that have IP and firms that do not. Second, we calculate pair-wise correlation coefficients for our variables. Third, we estimate a series of logistic regression models for each of our four extensive-margin measures of IP. We include industry fixed effects to control for time-invariant heterogeneity and year fixed effects to control for time-variant economic shocks. The latter are especially important because our sample includes the global financial crisis years 2008-2010, which were especially problematic for small businesses.

$$IP_{i,t} = \beta_0 + \beta_1 Incorporated_{i,t} + \delta Controls_{i,t} + I_i + Y_t + \varepsilon_{i,t} \quad (1)$$

Where:

$IP_{i,t}$ is one of our four extensive-margin measures of IP (*Have IP, Have Copyright, Have Patent, Have Trademark*) for firm *i* in year *t*;

Incorporated $_{i,t}$ is an indicator for incorporated entrepreneurs (*LLC, S-Corporation,* or *C-Corporation*) for firm *i* in year *t*.

Controls $_{i,t}$ is a vector of control variables for firm *i* in year *t*;

I_i is a vector of industry fixed effects;

Y_t is a vector of year fixed effects; and

$\varepsilon_{i,t}$ is an i.i.d error term.

We also estimate a series of logistic regression models where we replace the indicator variable *Incorporated* with a set of five indicators for different LFOs—*LLC, S-Corporation, C-Corporation, General Partnership* and *Limited Partnership*. In these models, *Proprietorship* is the omitted category, so these indicators measure the effect of each LFO on having IP relative to the effect of the omitted proprietorship classification.

Fourth, we estimate a series of Tobit regression models for each of our four intensive-margin measures of IP.

$$IP_{i,t} = \beta_0 + \beta_1 Incorporated_{i,t} + \delta Controls_{i,t} + I_i + Y_t + \varepsilon_{i,t} \quad (2)$$

Where:

IP $_{i,t}$ is one of our four intensive-margin measures of IP (*Number IP*, *Number Copyrights*, *Number Patents*, *Number Trademarks*) for firm *i* in year *t*.

Other terms in equation (2) are the same as in equation (1).

We also estimate a series of Tobit regression models where we replace the indicator variable *Incorporated* with a set of five indicators for different LFOs.

4. Results

4.1. Main Results

4.1.1. Univariate Results.

Table 1 presents means and standard deviations for our full sample and for the groups of firms that do and do not have IP, along with a *t*-test for assessing the statistical significance of the difference in means. Among our full sample, 17.8 percent of firms have at least one type of IP, but only 3.5 percent of firms have a patent, 8.4 percent have a copyright, and 12.2 percent have a trademark. The average firm has approximately 1 IP license, but there is substantial heterogeneity, as indicated by a 4.52 standard deviation. We observe considerable skewness in IP licensing—82 percent of firms have zero IP licenses while only 7.44 percent, 3.27 percent, and 1.44 percent have 1, 2, and 3 IP licenses, respectively. As discussed in the methods section, this is one reason for choosing the Tobit regression when the dependent variable is the distribution of the number of IP licenses. The average firm has 0.44 patents, 1.2 trademarks, and 3.5 copyrights.

We observe that LLCs comprise the largest percentage (32.9%) of businesses by LFO followed closely by sole proprietorships (32.2%) and S-Corporations (24.3%). C-Corporations comprise only 6.7 percent of the sample and partnerships comprise only 3.6 percent of the sample.

The average firm's primary owner is 48 years old, has 13 years of experience, and works 37 hours per week. Approximately 72 percent of primary owners are male, and approximately 87 percent are Caucasian. On average, there are fewer than two firm owners. Over half of our firms are home-based, and over half report having a comparative advantage. About 86 percent of our firms provide a service, while 47 percent provide a product. About 67 percent of firms have equipment, but only 11 percent have land or buildings. About 13% of our firms are classified as high tech.

We observe significant differences when comparing the groups of firms that do and do not have IP licenses. Among our focal indicator variables for LFO, we observe that firms with IP are significantly more likely to be organized as LLC, S-Corporations, or C-Corporations and are significantly less likely to be organized as Proprietorships or General Partnerships.

[Insert Table 1 here]

Among our firm characteristics, we observe that firms with IP have more employees, are less likely to be home-based, are more likely to report having a comparative advantage, are more likely to provide a produce and less likely to provide a service, are more likely to have equipment but less likely to have land/building; have more owners and more owner-operators, and are more likely to be "high-tech." We find no differences in credit risk.

Among our founder characteristics, we observe that firms with IP have more educated owners, have a greater percentage of male owners, and have owners who work more hours per week. We find no significant differences by owner age, work experience, or race.

Among our regional characteristics, we find that firms with IP are more likely to be located in a county with higher GDP per capita and higher competitive density.

4.1.2. Correlations

Table 2 presents the pairwise correlations for our dependent and independent variables. We observe positive correlations between our IP measures and indicators for LLCs, S-Corporations and C-Corporations and negative correlations between our IP measures and indicators for Proprietorships and General Partnerships.

[Insert Table 2 here]

4.1.3. Logit and Tobit Regression Results for Incorporated Status

Panel A of Table 3 presents the results from a series of logistic regression models where the dependent variables are our four extensive measures of IP. For ease of interpretation, Panel A presents odds ratios rather than coefficients. An odds ratio greater than one indicates a positive relationship while an odds ratio of less than one indicates a negative relationship. Our focal variable in these models is the variable *Incorporated* which takes on a value of one if the firm is an LLC, an S-Corporation or a C-Corporation and zero otherwise.

[Insert Table 3 here]

Model 1 of Table 3 reports the effect of *incorporated* on the odds of having IP. The odds ratio for *Incorporated* in model 1 (1.623) indicates that incorporated entrepreneurs are 62.3 percent (1.623-1.00; p = 0.000) more likely to have IP than unincorporated entrepreneurs. Model 2 of Table 3 reports the effect of *incorporated* on the odds of having a patent. The odds ratio for *Incorporated* in model 2 (1.448) indicates that incorporated entrepreneurs are 44.8 percent (1.448-1.00; p = 0.011) more likely to have a patent than unincorporated entrepreneurs. Model 3 of Table 3 reports the effect of *incorporated* on the odds of having a trademark. The odds ratio for *Incorporated* in model 3 (2.246) indicates that incorporated entrepreneurs are 124.6 percent (2.246-1.00; p = 0.000) more likely to have a trademark than unincorporated entrepreneurs. Model 4 of Table 3 reports the effect of *incorporated* on the odds of having a copyright. The odds ratio for *Incorporated* in model 4 (1.223) indicates that incorporated entrepreneurs are 22.3 percent (1.223-1.00; p = 0.011) more likely to have a copyright than unincorporated entrepreneurs. In summary, our logistic regression results in Panel A of Table 3 provide strong evidence that incorporated entrepreneurs are significantly more likely to have IP as measured on the extensive margins. These findings provide support for hypothesis 1.

Panel B of Table 3 presents the results from a series of Tobit regression models where the dependent variables are the numbers of IP licenses. Like Panel A, our focal variable in these models is *Incorporated*. Model 5 of Table 3 reports the effect of *Incorporated* on the number of IP licenses. The coefficient for *Incorporated* in model 5 (β = 2.583; p = 0.000) indicates that incorporated entrepreneurs have 2.583 more IP licenses, on average, relative to unincorporated entrepreneurs. Model 6 of Table 3 reports the effect of *Incorporated* on the number of patents. The coefficient for *Incorporated* in model 6 (β = 0.589; p = 0.012) indicates that incorporated entrepreneurs have 0.589 more patents, on average, relative to unincorporated entrepreneurs. Model 7 of Table 3 reports the effect of *Incorporated* on the number of trademarks. The coefficient for *Incorporated* in model 7 (β = 1.038; p = 0.000) indicates that incorporated entrepreneurs have 1.038 more trademarks, on average, relative to unincorporated entrepreneurs. Model 8 of Table 3 reports the

effect of *incorporated* on the number of copyrights. The coefficient for *Incorporated* in model 8 (β = 1.181; p = 0.067) indicates that incorporated entrepreneurs have 1.181 more copyrights, on average, relative to unincorporated entrepreneurs. In summary, our Tobit regression results in Panel B of Table 3 provide evidence that incorporated entrepreneurs have more IP licenses relative to unincorporated entrepreneurs, as measured on the intensive margins. These findings provide additional support for hypothesis 1.

4.1.4. Logit and Tobit Results for Different Legal Forms of Organization

Table 4 repeats the analysis reported in Table 3 but replaces our focal variable *Incorporated* with a set of five focal indicator variables for different legal forms of organization—*LLC*, *S-Corporation*, *C-Corporation*, *General Partnership*, and *Limited Partnership*. Our omitted category of LFO is sole proprietorship, so the odds ratio shown in Panel A of Table 4 for each of the included focal variables indicates the odds of having IP relative to a sole proprietorship. For brevity, we suppress the results for the control variables, but they are available upon request. Each model also includes both industry and year fixed effects.

[Insert Table 4 here]

Model 1 of Table 4 reports the effect of each LFO on the odds of having IP. The odds ratios indicate that LLCs are 56.5 percent (1.565-1.00; p = 0.000) more likely to have IP, S-Corporations are 60.3 percent (1.603-1.00; p = 0.000) more likely to have IP, and C-Corporations are 109.6 percent (2.096-1.00; p = 0.000) more likely to have IP, relative to a sole-proprietorship.

Model 2 of Table 4 reports the effect of each LFO on the odds of having a patent. The odds ratios indicate that LLCs are 19.4 percent (1.194-1.00; p = 0.276) more likely to have a patent, S-Corporations are 30.5 percent (1.305-1.00; p = 0.125) more likely to have a patent, and C-Corporations are 158.1 percent (2.581-1.00; p = 0.000) more likely to have a patent, relative to a sole-proprietorship. Although our evidence indicates LLCs and S-Corporations have higher odds of having a patent, only the odds ratio for C-Corporation is statistically significant.

Model 3 of Table 4 reports the effect of each LFO on the odds of having a trademark. The odds ratios indicate that LLCs are 131.2 percent (2.312-1.00; $p = 0.000$) more likely to have a trademark, S-Corporations are 130.5 percent (2.305-1.00; $p = 0.000$) more likely to have a trademark, and C-Corporations are 159.9 percent (2.599-1.00; $p = 0.000$) more likely to have a trademark, relative to a sole-proprietorship.

Model 4 of Table 4 reports the effect of each LFO on the odds of having a copyright. The odds ratios indicate that LLCs are 19.7 percent (1.197-1.00; $p = 0.045$) more likely to have a copyright, S-Corporations are 23.4 percent (1.234-1.00; $p = 0.034$) more likely to have a copyright, and C-Corporations are 61.1 percent (1.611-1.00; $p = 0.000$) more likely to have a copyright, relative to a sole-proprietorship. In none of the models do we find evidence that general and limited partnerships have significantly greater odds of having IP than sole-proprietorships.

In summary, our logistic regression results in Panel A of Table 4 provide evidence that, relative to unincorporated entrepreneurs, incorporated entrepreneurs are more likely to have IP as measured on the intensive margins. These findings provide additional support of hypothesis 1. Moreover, our evidence indicates this relationship is strongest for C-Corporations; in each of the four models, the odds ratio is highest for C-Corporations. This is especially the case in the model for patents, where only the indicator for C-Corporations is statistically significant. These findings provide support for hypothesis 2. We provide additional evidence on this distinction in model 11 of Table 5, where we test whether C-Corporations have more IP than S-Corporations and LLCs by omitting proprietorships and partnerships from the analysis.

Panel B of Table 4 is similar to Panel B of Table 3, presenting the results from a series of Tobit regression models where the dependent variables are our four intensive measures of IP. Like Panel A, we replace our focal variable, *Incorporated*, with a set of five focal indicator variables for different LFOs—*LLC*, *S-Corporation*, *C-Corporation*, *General Partnership* and *Limited Partnership*. Our omitted category of LFO

is sole proprietorship, so the coefficient for each of the included focal variables indicates if each of these LFOs has a greater number of trademarks, patents, and copyrights compared to a sole proprietorship.

Model 5 of Table 4 reports the effect of each LFO on the number of IP. The coefficients indicate that, relative to a sole-proprietorship, LLCs have 2.279 more IP ($\beta = 2.279$; $p = 0.000$), S-Corporations have 2.493 more IP ($\beta = 2.493$; $p = 0.000$), and C-Corporations have 4.459 more IP ($\beta = 4.459$; $p = 0.000$). Model 6 of Table 4 reports the effect of each LFO on the number of patents. The coefficients indicate that, relative to a sole-proprietorship, LLCs have 0.273 more patents ($\beta = 0.273$; $p = 0.288$), S-Corporations have 0.289 more patents ($\beta = 0.289$; $p = 0.300$), and C-Corporations have 1.731 more patents ($\beta = 1.731$; $p = 0.000$). Although our evidence indicates LLCs and S-Corporations have more patents relative to sole-proprietorships, only the coefficient for C-Corporation is statistically significant and different from zero.

Model 7 of Table 4 reports the effect of each LFO on the number of trademarks. The coefficients indicate that, relative to a sole-proprietorship, LLCs have 1.052 more trademarks ($\beta = 1.052$; $p = 0.000$), S-Corporations have 1.071 more trademarks ($\beta = 1.071$; $p = 0.000$), and C-Corporations have 1.203 more trademarks ($\beta = 1.203$; $p = 0.000$).

Model 8 of Table 4 reports the effect of each LFO on the number of copyrights. The coefficients indicate that, relative to a sole-proprietorship, LLCs have 0.979 more copyrights ($\beta = 0.979$; $p = 0.181$), S-Corporations have 1.160 more copyrights ($\beta = 1.160$; $p = 0.157$), and C-Corporations have 3.022 more copyrights ($\beta = 3.022$; $p = 0.010$). Although our evidence indicates LLCs and S-Corporations have more copyrights relative to sole-proprietorships, only the coefficient for C-Corporation is statistically significant and different from zero. In none of models do we find evidence that general and limited partnerships have significantly higher levels of IP than do sole-proprietorships.

In summary, our Tobit regression results in Panel B of Table 4 provide evidence that, relative to unincorporated entrepreneurs, incorporated entrepreneurs are more likely to have IP as measured on the

extensive margins, and that this relationship is strongest for C-Corporations. These findings provide additional support for both hypothesis 1 and hypothesis 2.

[Insert Figures 1-4 here]

To get a better understanding of the magnitude of these effects, we report effect sizes in Figures 1-4. We generated these results by reporting the predicted effects of each dependent variable, following the regression models reported in Table 4. Figure 1 reports firms' predicted probability of having IP for each LFO. The results indicate C-Corporations are the most likely to have IP followed by S-Corporations and LLCs, which are indistinguishable. Each of these LFOs are more likely to have IP compared to sole-proprietorships. Figure 2 reports firms' predicted probability of having a patent for each LFO. These results are similar except that S-Corporations and LLCs do not have a higher likelihood of having patents compared to sole-proprietorships. Figure 3 reports firms' predicted probability of having copyrights for each LFO. These results are similar to those reported in Figure 2. One difference is that, although C-Corporations are more likely to have copyrights compared to sole-proprietorships, the difference compared to S-Corporations and LLCs is not statistically and significantly different. Another difference is that there appears to be a much higher variance for general and limited partnerships. Lastly, figure 4 reports firms' predicted probability of having a trademark. Once again, the results are similar to the results presented in the earlier figures, with a few differences. These results indicate that C-Corporations, S-Corporations, and LLCs are more likely to have trademarks compared to sole-proprietorships. The differences between these LFOs, however, is statistically indistinguishable.

4.2. Robustness Checks

4.2.1. Subsample Analyses

One concern is that our findings might be driven by various outliers. In particular, we consider whether our findings are affected by the presence of "life-style" firms, which are undoubtedly different from

firms focused on innovation and IP licensing. To address this issue, we examine a number of sub-samples in our data to assess the robustness of our findings.

First, in Model 1 of Table 5A and Table 5B, we restrict our sample to include only firms with international sales. Firms without international sales are excluded from the analysis. We observe a positive and statistically significant relationship between incorporation and IP. Next, we split our sample into low innovation samples and high innovation samples in models 2 and 3 of Table 5A and Table 5B. The results reveal a positive and statistically significant relationship between incorporation and IP, though the magnitude of the coefficient is larger for firms from lower innovation industries. Next, we exclude firms that do not have employees and examine the relationship between innovation and IP only for firms that have at least one employee. The results, reported in model 4 of Table 5A and Table 5B, reveal a positive and statistically significant relationship between incorporation and IP. In model 5 of Table 5A and Table 5B, we restrict our sample to exclude home based firms. Once again, our results reveal a positive and statistically significant relationship between incorporation and IP. Lastly, in model 6 of Table 5A and 5B, we exclude firms that changed LFO during the sample period. Again, we find a positive and statistically significant relationship between incorporation and IP.

[Insert Table 5A here]

4.2.2. Instrumental Variables, Matching, and Selection

In this section, we address concerns about endogeneity. That is, it is possible there are omitted variables that explain IP but are correlated with our potentially endogenous incorporation variable, such that a significant coefficient on *Incorporated* reflects the impact of the omitted variable(s) rather than a causal effect of incorporation on IP. Reverse causality presents another potential problem. That is, an entrepreneur's decision to incorporate is likely to influence IP, but IP might also influence a firm's incorporation choice.

To address these concerns, we estimate a series of instrumental variable (IV) models. Specifically, we estimate a two-stage least squares model (2SLS), where the first stage is a logit model where *Incorporated* is the dependent variable and the explanatory variables include our instrument, which must be correlated with incorporation but not with the IP dependent variable in our second stage (Wooldridge, 2010). We use two alternative instruments for incorporation. The first is the incorporation rate for firms in the focal firm's industry, excluding the focal firm. This IV strategy is similar to those used by Jha and Cox (2015) and Boudreaux (2021, 2020). This industry incorporation rate (minus the focal firm) is highly correlated with that of the focal firm but should only affect the firm's IP through the incorporation status of the firm. Our second IV strategy is comprised of two instruments—percentage of sales to other businesses (i.e., B2B) and percentage of sales to individuals. These two instruments are likely correlated with a firm's incorporation status because incorporated entrepreneurs are more likely to sell directly to other businesses whereas unincorporated entrepreneurs are more likely to sell directly to customers. However, it is less likely that whom the entrepreneur sells to matters for IP licensing.

The results, available in Panel B of Tables 5A and 5B, suggest incorporated entrepreneurs are more likely to have IP and have more instances of IP, even after addressing endogeneity through IV analysis.[11] We also assess instrument strength, the exclusion restriction, and overidentification using standard tests. To assess the first condition of instrument strength, also known as instrument relevance, we report the first-stage F-statistics. The first-stage *t*-statistic in Model 7 of Table 5A is -13.81*** and the first-stage *F*-statistic is 190.78***, both of which indicate the instrument is positively and significantly correlated with our endogenous regressor. The first-stage *t*-statistic in Model 8 of Table 5A is 5.18*** and -7.10*** for percent sold to businesses and individuals, respectively. for using both instruments is 1,930. Both of these F-statistics well exceed the suggested threshold of 10 (Staiger and Stock, 1997). Hence, we conclude that the instruments

[11] First stage regression results are available in appendix Table A4.

satisfy the instrument relevance condition. That is, they are sufficiently correlated with the potentially endogenous variable.

To satisfy the second condition, namely the exclusion restriction, the instrumental variables must be uncorrelated with the error term in the second stage model. In other words, the instruments must only influence IP through their effect on the endogenous variable. Because our instruments are based on other firms in the focal firms' industry or region, it is likely these instruments are correlated with the focal firm's incorporation choice, but unlikely that these instruments will influence a firm's choice of IP directly. Hence, the instruments should satisfy the exclusion restriction. Lastly, we present results from the Wald tests of endogeneity and Durbin-Wu-Hausman (DWH) tests. We observe statistically insignificant tests of endogeneity, indicating endogeneity is not a serious concern. In addition, the over-identification tests, which tests the hypothesis that the additional instruments are exogenous, further indicates an appropriate model specification. Model 8 reports the results from this test ($p = .773$).[12]

4.2.3. Matching and Selection

Although we have attempted to address endogeneity concerns using IV-2SLS methods, we cannot completely rule out endogeneity. We therefore have examined a variety of alternative models to ensure a robust relationship between incorporation and IP licensing. One such alternative is through various matching methods, namely Coarsened Exact Matching (CEM) (Blackwell et al., 2009; Iacus et al., 2012) and entropy matching (Hainmueller, 2012).

CEM coarsens the variables in strata and weights firms depending on their closeness to the treated firms (Gustafsson et al., 2016). For a successful matching procedure, the $L1$ distance should be reduced, after matching. The results from the matching diagnostics reveal a reduced $L1$ distance, which indicates CEM is

[12] Overidentification refers to situations where there are more instruments than endogenous variables. In our case, Model 7 has two instruments and one variable treated as endogenous. As a result, we can perform an over-identification test in Model 7 but not Model 6, which only has one instrument and one endogenous variable.

appropriate. Model 9 in Table 5A and Table 5B reports the results when including CEM weights in the regression and finds a positive and statistically significant relationship between incorporation and IP licensing on both the intensive and extensive margins.

As an alternative to CEM, we use entropy balancing as an additional robustness check. First, entropy balancing (Hainmueller, 2012) creates a group of statistically identical individuals based on observable characteristics. We then examine a weighted regression model using the entropy balancing weights from the first stage. The results, reported in Model 10 of Table 5A and Table 5B, reveal a positive and statistically significant relationship between incorporation and IP licensing on both the intensive and extensive margins.

We also estimate a two-step Heckman procedure to address concerns about sample-selection bias when analyzing the only the subset of firms that are incorporated. In this procedure, we first estimate a probit selection model where *Incorporated* is the dependent variable, and we use the percent of sales to businesses and percent of sales to customers as our exclusion restriction. That is, these two variables appear in the selection equation but not the outcome equation, which is necessary for the Heckman procedure. The logic for including these variables in the selection equation is that incorporated entrepreneurs (LLCs, S-Corporations, C-Corporations) are more likely to sell to other businesses. Conversely, unincorporated entrepreneurs like sole-proprietors are more likely to sell directly to customers. As a result, these variables help predict the selection into incorporation.

Next, we re-estimate equation (1), but limiting the sample to incorporated entrepreneurs (LLCs, S-Corporations and C-Corporations) and including the inverse Mills ratio calculated from results of the selection equation. In this model, we create a new variable, *Corporation*, equal to one if the firm is a C-Corporation and equal to zero if the firm is an LLC or S-Corporation. This analysis enables us to determine if C-Corporations are more likely to have IP (or have more IP) than LLCs and S-Corporations. In other words, is there a distinction among incorporated entrepreneurs as well as a distinction between unincorporated and

incorporated entrepreneurs? Model 11 of Table 5A and Table 5B reports the results from the Heckman selection model. The results reveal a positive and statistically significant relationship between C-corporation status and IP licensing on both the intensive and extensive margins. Note the magnitude of the coefficient in the Heckman model is smaller than the results from the IV and matching models. The reason is due to the omitted category in the incorporation variable. That is, incorporation is recoded as one if the firm is a C-Corporation and zero if LLC or S-Corporation. Hence, although the coefficient is smaller in magnitude, the results reveal a distinction in IP even among incorporated entrepreneurs. Specifically, C-Corporations have a higher likelihood of having IP licensing compared to LLCs and S-Corporations, and this takes into consideration the initial self-selection into limited liability.

Lastly, we estimate an endogenous switching regression (ESM) model using Stata's "move-stay" maximum likelihood estimator (Lokshin and Sajaia, 2004). This enables us to create a counterfactual analysis asking what would have been the likelihood of having IP had the incorporated firm been unincorporated or had it been incorporated. This is similar to the Heckman analysis, but we sequentially select only the incorporated (unincorporated) firms in the first stage and then estimate the likelihood of having IP for each of these selected subsamples. We then generate predicted values for each group using the other group's model. We observe the percentage of unincorporated firms with IP would have risen from the observed percentage of 11.7 percent up to 17.0, an increase of 45 percent. Similarly, we observe the percentage of incorporated firms with IP would have fallen from the observed percentage of 21.2 to only 9.8, a decline of 54 percent.

We perform a similar analysis for the natural logarithm of the number of IP licenses. We find that, among the unincorporated firms, the number of IP would have risen from 1.19 licenses to 1.23 licenses. Among the incorporated firms, the number of IP would have fallen from 1.36 licenses to 1.10 licenses.

[Insert Table 5B here]

4.2.4. Linear Probability Model and Log-Linear Model

One final robustness check concerns alternative estimators to our Logistic, Tobit, and Probit regression models. For our binary dependent variables, we used logistic and probit regression models in our analysis. As an alternative, however, we use the linear probability model (LPM), which is an OLS estimator applied to a model with a binary dependent variable. For our continuous dependent variables, we used Tobit regression in our analysis. As an alternative to Tobit, we use the log-linear regression model. Log-linear models are of the form, $\ln(y) = a + bx$, where y is the dependent variable and x is the explanatory variable. Coefficient estimates from log-linear models are semi-elasticities and interpreted as a one unit increase in x is associated with a beta percentage change in y.

Table A2 in the online appendix replicates the results in Table 3 in the manuscript but uses LPM instead of logistic regression and log-linear models instead of Tobit regression models. The results in Panel A of Table A2 are qualitatively similar to those reported in Table 3. Specifically, the results indicate incorporated entrepreneurs are more likely to have IP (β=0.054; p = 0.000), patents (β=0.004; p = 0.456), trademarks (β=0.061; p = 0.000), and copyrights (β=0.011; p = 0.231). Although the effect of incorporation is positive in all models, it is only statistically and significantly different from zero for the overall measure of IP and trademarks.

The results in Panel B of Table A2 are also qualitatively similar to those reported in Table 3. Specifically, the results indicate that incorporated entrepreneurs, relative to incorporated entrepreneurs, have 4.9 percent more IP (β=0.049; p = 0.028), 5.2 percent more trademarks (β=0.052; p = 0.000), -0.2 percent less patents (β=-0.002; p = 0.836), and 0.6 percent more copyrights (β=0.006; p = 0.740). However, only the coefficients on IP and trademarks are statistically significant and different from zero.

Table A3 in the online appendix replicates the results in Table 4 in the manuscript but uses LPM instead of logistic regression and log-linear models instead of Tobit regression. Once again, the results are

qualitatively similar to those reported in Table 4. Specifically, the results indicate that, relative to sole-proprietorships, LLCs (β=0.050; p = 0.000), S-Corporations (β=0.048; p = 0.004), and C-Corporations (β=0.109; p = 0.000) are all more likely to have IP. Only C-Corporations, however, are more likely to have a patent (β=0.056; p = 0.003). Moreover, the results indicate that, relative to sole-proprietorships, LLCs (β=0.061; p = 0.000), S-Corporations (β=0.058; p = 0.004), and C-Corporations (β=0.088; p = 0.000) are all more likely to have trademarks. Yet, only C-Corporations are more likely to have copyrights (β=0.040 p = 0.032). The results in Panel B of Table A3 indicate that, relative to sole-proprietorships, C-Corporations have 1.7 percent more IP (β=0.0167; p = 0.002), 9.4 percent more patents (β=0.094; p = 0.009), 7.9 percent more trademarks (β=0.079; p = 0.008), and 4.1 percent more copyrights (β=0.041; p = 0.304), though the latter is not statistically significant and different from zero. Compared to sole-proprietorships, LLCs have 4.5 percent more trademarks (β=0.045; p = 0.001) and S-Corporations have 5.3 percent more trademarks (β=0.053; p = 0.001). In contrast to C-Corporations, LLCs and S-Corporations do not have more patents or overall IP, relative to sole-proprietorships.

In sum, these findings support the results in our main analysis. That is, incorporated entrepreneurs are more likely to have IP and have higher amounts of IP. Moreover, these results are strongest for C-Corporations. These findings provide additional evidence to support hypotheses 1 and 2.

5. Discussion

Our study's objective was to provide theoretical and empirical insights into whether and how incorporated and unincorporated entrepreneurs differ as they relate to innovation and the licensing of intellectual property (IP). With respect to whether incorporated and unincorporated entrepreneurs differ, our analysis of U.S. startups comprising 13,398 firm-year observations reveals important differential effects on both extensive and intensive margins. On the extensive margin, we find incorporated entrepreneurs are more likely to use IP, particularly with patents and for C-Corporations. On average, incorporated entrepreneurs are

sixty percent more likely to have IP compared to unincorporated entrepreneurs. On the intensive margin, we find incorporated entrepreneurs have 2.5 more IP compared to unincorporated entrepreneurs, on average. These results hold for patents and trademarks, but we find no statistical difference between incorporated and unincorporated entrepreneurs for copyrights. We also test whether there are differences within the subset of incorporated entrepreneurs and find that C-Corporations have more IP on both the extensive and intensive margins that do LLCs and S-Corporations.

5.1. Contributions to and Implications for the Entrepreneurship Literature

Our results extend the entrepreneurship literature in several ways. First, the literature documents substantial heterogeneity in the types of entrepreneurship (Welter et al., 2017). For instance, entrepreneurs can possess high-growth aspirations (Estrin et al., 2013), but they are often not driven by growth and instead value non-pecuniary benefits such as autonomy and flexibility (Parker, 2018; Shane, 2008). The former categorization are often referred to as "gazelles" and the latter "lifestyle" entrepreneurs (Henrekson and Johansson, 2010). Studies have identified key differences between the incorporated and unincorporated entrepreneurs—incorporated entrepreneurs and their employees tend to engage in tasks involving highly complex and nonroutine cognitive abilities whereas unincorporated entrepreneurs rely more on manual skills (Levine and Rubinstein, 2017).

Building on this literature, our study offers another key distinction between incorporated and unincorporated entrepreneurs—the usage of intellectual property (i.e., patents, copyrights, and trademarks). Our study also is a first step in understanding some of the heterogeneity *within* incorporated entrepreneurs. We document that C-Corporations are the most likely to use intellectual property out of all LFOs, and that C-Corporations are more likely to use intellectual property (extensive margin) and to use more of such property (intensive margin) than either LLCs or S-Corporations. We also document that both LLCs and S-Corporations are more likely to use intellectual property than are unincorporated entrepreneurs. This finding,

however, only applies to trademarks and not patents and copyrights. Hence, we conclude that incorporated entrepreneurs are more likely to use IP and use more of it when compared to unincorporated entrepreneurs with C-Corporations having the strongest relationship with IP.

Future work could examine alternative distinctions between incorporated and unincorporated entrepreneurs. One fruitful avenue is to analyze the different suppliers and customers of incorporated and unincorporated entrepreneurs. Our Heckman selection model revealed that incorporated entrepreneurs are more likely to sell business-to-business (B2B). In contrast, unincorporated entrepreneurs are more likely to sell directly to customers and not to other businesses. What explains this distinction? Are incorporated and unincorporated entrepreneurs fundamentally different, or is it a difference in strategy?

We also extend nascent work on the "life cycle of the firm" hypothesis. Recent studies have documented that, once established, entrepreneurs seldom change their legal form of organization (Cole and Sokolyk, 2018a; Levine and Rubinstein, 2017), thereby casting doubt on the conventional wisdom that entrepreneurs begin small and simple but then mature into more highly-complex legal forms of organization like C-Corporations. One implication is that entrepreneurs are either high-growth oriented or not, and this does not change from inception. Of course, there are likely exceptions to this, as entrepreneurs pivot and use effectuation (Sarasvathy, 2001). Nevertheless, the evidence suggests such changes are rare. Future studies could consider documenting the conditions underlying when entrepreneurs do change their legal form of organization. Are there situations where the life cycle of the firm does hold? Changes to tax law treatment might affect whether entrepreneurs decide to incorporate as a pass-through entity (i.e., LLC, S-Corporation, Sole-Proprietorship) or a C-Corporation. This would not explain, however, the transition from a small and simple legal form into a more highly-complex legal form of organization.

5.2. Contributions to and Implications for the Innovation and Intellectual Property Literature

Our study also extends and possesses implications for innovation research. The literature notes the importance of IP and intellectual property rights (IPR) protection for innovation and firm growth. Entrepreneurs can use innovation strategically to increase profitability (Pisano, 2006; Teece, 1986), and studies demonstrate that patent protection is important for innovation and economic growth (Kim et al., 2012).

Our study contributes to this literature by identifying incorporated entrepreneurs, and especially C-Corporations, as being the most likely to invest in IP (intensive) and as making the greatest IP investments (extensive). As such, our study suggests that incorporation is another factor for innovation, since incorporation promotes investments in IP, which is an important determinant of firm innovation and economic growth.

We also invite future research to consider the institutional context that influences innovation and entrepreneurship (Boudreaux et al., 2019; Bowen and Clercq, 2008). Our study examines startups in the U.S., but future research could extend our analysis to a cross-country setting, allowing for an examination of how the external environment influences the use of IP and innovation. Studies have found that market-oriented institutions encourage innovation through increased creativity and knowledge investments (Boudreaux, 2017). Although these studies have examined the relationship between institutions and innovation, there is a paucity of research on how institutions influence the choice of legal form of organization. Adopting a Baumol (1990) perspective, we conjecture there will be more highly-complex forms of organization when the institutional environment encourages productive entrepreneurship and more simple forms of organization when it encourages unproductive entrepreneurship. Future research can consider this in more detail.

5.3. Implications for Policy

Our findings also have important policy implications. Policymakers often target entrepreneurs who have the highest prospects for employment and net business creation (Holtz-Eakin, 2000; Lucas and Boudreaux, 2020; Shane, 2009). Scholars have noted that even policies targeting high-growth aspiring entrepreneurs often fall short, since there is substantial heterogeneity in entrepreneurship (Mason and Brown,

2013). Our study informs this debate by documenting that incorporated entrepreneurs are different from the unincorporated when it comes to IP, and that C-Corporations are different from other incorporated LFOs. Thus, rather than focusing on innovation activity, which is riddled with endogeneity problems (Buddelmeyer et al., 2010), it is better to identify firms based on their legal form of organization since firms rarely change their legal form of organization once established, lessening endogeneity concerns (Cole and Sokolyk, 2018a). As such, our findings reveal that incorporated entrepreneurs use IP more often and to a larger extent than unincorporated entrepreneurs. Policymakers might therefore consider incorporated entrepreneurs, especially those incorporated as C-Corporations, as having higher potential for high-growth.

A caveat is in order. If policymakers begin using C-Corporations as a predictor of whom to fund or support, this creates a moral hazard problem whereby firms seeking to gain government funding will find it beneficial to become a C-Corporation. The incorporation costs remain the same, but the benefits now increase. This is reminiscent of Goodhart's (1981) law, "When a measure becomes a target, it ceases to be a good measure." In such a scenario, policymakers would find it difficult to then predict who has the potential for IP and high growth aspirations, since incorporating as a C-Corporation loses its value. As a result, we do not intend our findings to be prescriptive. Rather, our study offers one indicator—an entrepreneur's incorporation status—that explains differences in IP licensing and innovation. We urge policymakers to consider this as merely one indicator of high-growth entrepreneurship and to continue to look at a variety of other important firm and founder characteristics.

5.4. Limitations and Suggested Directions

Like any study, our findings have limitations that guide future research. One limitation is making causal inferences about LFOs' effect on IP. We observe that incorporated entrepreneurs are more likely to have IP and have more of it when compared to unincorporated entrepreneurs. This, however, does not necessarily mean the LFO *caused* the investments in IP. Sources of endogeneity like omitted variable bias

and reverse causality could limit our causal claims. We have attempted to address such concerns through the use of various robustness checks—instrumental variables, matching, and selection models—and our results are qualitatively similar in each model. Nevertheless, future research might be able to consider other approaches, such as natural experiments, difference in differences, and regression discontinuity models.

Another limitation is that we focus on IP and then discuss the implications on innovation activity. This is a data limitation because our dataset does not include indicators of innovation such as new products, processes, marketing, or organizational methods. Although IP is strongly associated with innovation, future research could examine how LFOs influence innovation directly. Further, it might be the case that IP should be treated as an input to the innovation process, which is the output. As such, future studies could report a mediation model where IP mediates the relationship between LFO and innovation. Likewise, R&D could serve as a mediator in this relationship.

Finally, we also encourage conducting qualitative, in-depth, or ethnographic studies of *why* entrepreneurs choose different LFO and the implications of IP and innovation. We have proposed several underlying mechanisms that might help explain the reasons why—limited liability protection, signaling, raising equity capital, separate legal entities. Future studies using qualitative analyses could, however, probe deeper into these underlying mechanisms and potentially identify new ones. Such a qualitative analysis could also dig deeper into the life-cycle of the firm hypothesis to explore the reasons why entrepreneurs might choose more highly-complex legal forms as they mature or not.

6. Conclusion

Our objective in this study was to examine whether and how incorporated and unincorporated entrepreneurs differ as they relate to innovation and IP licensing. Based on the evidence reported in this study, we conclude that incorporated entrepreneurs have more IP and make greater investments in IP than unincorporated entrepreneurs. We also found that out of all forms of incorporation, C-Corporations have the

strongest relationship with IP, particularly through patents. Moreover, our analysis revealed that entrepreneurs seldom change their legal form of organization once established, rejecting the life-cycle of the firm hypothesis.

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TABLES AND FIGURES

Table 1: Descriptive Statistics

	Panel A: Overall Sample		Panel B: Have IP		Panel C: No IP		
Variable	Mean	SD	Mean	SD	Mean	SD	Diff stat.
Have IP	.178	.383	--	--	--	--	--
Have Patent	.035	.185	.198	.399	--	--	--
Have Trademark	.122	.327	.685	.465	--	--	--
Have Copyright	.084	.277	.471	.499	--	--	--
Number of IP	1.05	4.52	5.88	9.29	--	--	--
Number of Patents	0.078	0.474	0.438	1.051	--	--	--
Number of Trademarks	0.615	3.53	3.452	7.769	--	--	--
Number of Copyrights	0.221	0.708	1.187	1.287			--
Sole Proprietorship	.322	.467	.21	.408	.346	.476	t=12.966***
C-Corporation	.067	.25	.127	.333	.054	.226	t=-12.963***
S-Corporation	.243	.429	.275	.447	.236	.425	t=-4.048***
LLC	.329	.47	.361	.48	.322	.467	t=-3.644***
General Partner	.023	.15	.015	.12	.025	.156	t=3.0329***
Limited Partner	.013	.115	.011	.106	.014	.117	t=.989
Employees (ln)	1.02	.906	1.22	1.033	.97	.87	t=-12.455***
Home Based	.535	.499	.465	.499	.551	.497	t=7.572***
Comparative Advantage	.576	.494	.767	.423	.535	.499	t=-21.158***
Founder's Education	.527	.499	.65	.477	.501	.500	t=-13.295***
Founder's Gender	.718	.402	.752	.372	.71	.408	t=-4.605***
Founder's Work Experience	13.23	10.26	13.06	10.03	13.27	10.31	t=.931
Founder's Age	48.01	10.44	47.83	10.55	48.04	10.422	t=.923
Hours Per Week	37.68	21.67	40.35	21.31	37.10	21.699	t=-6.671***
Founder's Race	.866	.33	.86	.33	.867	.329	t=.949
Credit Risk	3.021	.921	3.017	.916	3.021	.921	t=.224
Provide Service	.859	.348	.749	.434	.883	.322	t=17.171***
Provide Product	.474	.499	.674	.469	.43	.495	t=-22.015***
Has Land or Building	.113	.317	.085	.279	.119	.324	t=4.737***
Has Equipment	.673	.469	.704	.456	.666	.472	t=-3.614***
Number of Owners	1.864	4.597	3.395	10.239	1.533	1.548	t=-18.159***
Number of Owner-Operators	1.351	.793	1.593	1.248	1.299	.642	=-16.601***
GDP per capita (ln)	10.55	.277	10.57	.274	10.543	.277	t=-4.247***
Competitive Density	1.357	3.32	1.463	3.511	1.334	3.279	t=-1.728***
High Tech	.131	.337	.212	.409	.113	.317	t=-13.071***
		N=13,398	N=2,385 (17.8%)		N=11,013 (82.2%)		

Table 2: Correlation Matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)	(29)	(30)
(1) Have IP	1																													
(2) Have Patent	0.41	1																												
(3) Have Trademark	0.80	0.26	1																											
(4) Have Copyright	0.66	0.19	0.35	1																										
(5) Number of IP	0.29	0.12	0.15	0.38	1																									
(6) Sole Proprietorship	-0.10	-0.08	-0.13	-0.02	0.00	1																								
(7) C-Corporation	0.11	0.17	0.09	0.05	0.02	-0.19	1																							
(8) S-Corporation	0.02	0.00	0.05	-0.01	-0.01	-0.38	-0.16	1																						
(9) LLC	0.03	-0.01	0.04	0.00	0.00	-0.48	-0.20	-0.39	1																					
(10) General Partner	-0.02	-0.01	-0.03	-0.01	-0.01	-0.11	-0.04	-0.09	-0.11	1																				
(11) Limited Partner	0.00	-0.01	0.01	0.00	0.00	-0.08	-0.03	-0.07	-0.08	-0.02	1																			
(12) Employees (ln)	0.11	0.10	0.15	0.02	0.03	-0.28	0.17	0.24	-0.03	-0.04	0.04	1																		
(13) Home Based	-0.06	-0.09	-0.10	0.02	0.01	0.22	-0.12	-0.14	0.00	-0.04	-0.04	-0.40	1																	
(14) Comparative Adv	0.19	0.12	0.16	0.13	0.06	-0.05	0.05	0.02	0.00	0.01	-0.01	0.14	-0.11	1																
(15) Founder's Educ	0.12	0.08	0.09	0.11	0.03	-0.11	0.03	0.01	0.11	-0.07	0.00	0.02	0.00	0.06	1															
(16) Founder's Gender	0.04	0.05	0.04	0.03	0.01	-0.10	0.04	0.02	0.07	-0.06	0.02	0.11	-0.04	0.00	0.05	1														
(17) Founder's Work Ex	0.01	0.02	0.00	0.03	0.00	-0.04	0.01	0.01	0.04	-0.04	0.02	0.05	0.01	0.02	0.04	0.18	1													
(18) Founder's Age	0.01	0.03	0.00	0.00	-0.03	0.04	-0.01	-0.06	0.02	0.00	0.02	-0.08	0.05	-0.05	0.09	-0.02	0.38	1												
(19) Hours Per Week	0.05	0.02	0.08	0.02	0.04	-0.10	0.04	0.13	-0.02	-0.04	-0.01	0.34	-0.30	0.18	-0.07	0.10	0.07	-0.11	1											
(20) Founder's Race	0.00	0.00	0.01	-0.01	0.01	-0.03	-0.04	0.03	0.02	-0.01	0.02	-0.02	0.00	0.02	-0.03	0.03	0.06	0.11	-0.02	1										
(21) Credit Risk	-0.01	-0.02	-0.01	0.00	-0.01	0.11	0.00	-0.08	-0.06	0.04	0.00	-0.11	0.07	0.03	-0.08	-0.01	-0.06	-0.08	-0.03	-0.09	1									
(22) Provide Service	-0.14	-0.17	-0.14	-0.04	-0.03	0.02	-0.08	0.03	0.00	0.00	0.01	0.01	0.06	0.00	-0.01	0.05	0.10	-0.05	0.05	-0.03	-0.01	1								
(23) Provide Product	0.20	0.15	0.17	0.13	0.06	0.01	0.07	0.01	-0.05	0.00	-0.01	0.10	-0.16	0.13	-0.05	0.00	-0.08	0.00	0.09	0.04	0.00	-0.41	1							
(24) Has Land or Building	-0.04	-0.02	-0.02	-0.04	-0.02	-0.03	-0.01	-0.04	0.07	0.00	0.01	0.08	-0.07	-0.03	-0.10	0.03	-0.04	0.04	0.02	0.03	-0.06	0.00	0.03	1						
(25) Has Equipment	0.05	0.01	0.06	0.03	0.02	-0.04	0.01	0.05	-0.01	0.00	0.00	0.19	-0.14	0.10	-0.04	0.02	0.01	-0.05	0.23	0.06	-0.04	0.06	0.09	0.07	1					
(26) # Owners	0.15	0.26	0.15	0.07	0.07	-0.13	0.21	0.00	0.01	0.01	0.03	0.19	-0.12	0.05	0.06	0.04	0.00	0.01	0.01	0.01	-0.03	-0.11	0.08	0.02	0.02	1				
(27) # Operators	0.14	0.18	0.13	0.06	0.05	-0.30	0.19	0.08	0.07	0.11	0.07	0.30	-0.20	0.08	0.01	-0.01	-0.05	-0.03	-0.01	0.02	-0.09	-0.07	0.08	0.08	0.05	0.43	1			
(28) GDP per capita (ln)	0.05	0.04	0.04	0.04	0.01	-0.09	0.03	0.05	0.03	-0.04	0.02	0.02	0.03	-0.01	0.22	0.02	0.07	0.04	0.01	-0.04	-0.07	-0.01	-0.07	-0.14	-0.08	0.05	-0.01	1		
(29) Competitive Density	0.01	-0.02	-0.01	0.05	0.02	0.01	-0.01	0.02	-0.02	0.01	-0.01	0.00	0.07	0.02	0.13	0.01	0.02	-0.03	0.01	-0.12	-0.03	0.09	-0.11	-0.09	-0.05	-0.01	-0.04	0.25	1	
(30) High Tech	0.12	0.15	0.08	0.10	0.04	-0.11	0.07	0.07	0.03	-0.04	-0.04	0.07	-0.01	0.06	0.14	0.12	0.09	-0.03	0.01	-0.03	-0.06	0.00	0.05	-0.11	0.02	0.06	0.10	0.08	0.12	1

Notes: Correlations above |0.017| are statistically significant $p < 0.05$.

Table 3: Regression Estimates

Panel:	Panel A: Logit Regression [a]				Panel B: Tobit Regression [b]			
Dependent Variable:	Have IP	Have Patent	Have Trademark	Have Copyright	Number IP	Number Patents	Number Trademarks	Number Copyrights
Model:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Focal Variable [c]								
Incorporated	1.623***	1.448*	2.246***	1.223*	2.429***	0.589*	1.109***	1.181
	(0.098)	(0.211)	(0.169)	(0.097)	(0.399)	(0.235)	(0.106)	(0.645)
Firm Characteristics								
Employees (ln)	1.058	0.953	1.153***	0.999	0.472*	0.0853	0.240***	0.0202
	(0.035)	(0.065)	(0.042)	(0.046)	(0.233)	(0.114)	(0.053)	(0.370)
Home Based	1.098	0.711**	0.913	1.344***	1.590***	-0.455*	-0.126	3.469***
	(0.064)	(0.092)	(0.062)	(0.107)	(0.421)	(0.216)	(0.098)	(0.657)
Comp Advantage	2.393***	3.634***	2.275***	2.500***	6.059***	2.245***	1.213***	7.339***
	(0.136)	(0.522)	(0.153)	(0.202)	(0.406)	(0.243)	(0.096)	(0.659)
Provide Service	0.562***	0.481***	0.602***	0.683***	-3.957***	-1.363***	-0.794***	-3.187***
	(0.041)	(0.060)	(0.048)	(0.068)	(0.533)	(0.227)	(0.121)	(0.848)
Provide Product	2.290***	3.694***	2.080***	2.848***	6.091***	1.977***	1.098***	8.334***
	(0.139)	(0.603)	(0.149)	(0.227)	(0.440)	(0.259)	(0.104)	(0.682)
Has Land or Building	0.817*	0.693	0.798*	0.971	-1.432*	-0.490	-0.303*	-0.471
	(0.074)	(0.151)	(0.082)	(0.125)	(0.638)	(0.350)	(0.146)	(1.042)
Has Equipment	1.048	0.783*	1.028	1.058	0.598	-0.566**	0.00799	1.166
	(0.059)	(0.094)	(0.067)	(0.079)	(0.401)	(0.201)	(0.094)	(0.621)
# Owners	1.075***	1.067***	1.031***	1.007	0.215***	0.0700***	0.0348***	0.0446
	(0.014)	(0.012)	(0.007)	(0.005)	(0.031)	(0.009)	(0.007)	(0.048)
# Owner-Operators	1.120**	1.148**	1.051	1.135**	1.081***	0.257**	0.124*	1.004**
	(0.041)	(0.055)	(0.036)	(0.044)	(0.223)	(0.082)	(0.051)	(0.340)
High Tech	1.203*	1.338*	1.301**	1.159	1.010	0.592*	0.481***	1.014
	(0.088)	(0.175)	(0.110)	(0.105)	(0.530)	(0.231)	(0.125)	(0.778)
Founder Characteristics								
Founder's Education	1.448***	1.437**	1.312***	1.709***	2.796***	0.633**	0.409***	4.138***
	(0.079)	(0.173)	(0.082)	(0.130)	(0.392)	(0.202)	(0.091)	(0.622)
Founder's Gender	1.251**	1.702**	1.256**	1.131	1.393**	0.805**	0.362**	1.185
	(0.085)	(0.291)	(0.102)	(0.102)	(0.481)	(0.274)	(0.115)	(0.738)
Founder's Work Exp.	0.996	0.991	0.992*	1.003	-0.0149	-0.0145	-0.0132**	0.0136
	(0.003)	(0.006)	(0.003)	(0.004)	(0.020)	(0.010)	(0.005)	(0.032)
Founder's Age	1.002	1.015*	1.005	0.998	-0.0242	0.0245*	0.00509	-0.0505
	(0.003)	(0.006)	(0.003)	(0.004)	(0.019)	(0.010)	(0.005)	(0.030)
Hours Per Week	1.003*	0.994	1.005***	1.004*	0.0428***	-0.00717	0.00892***	0.0576***
	(0.001)	(0.003)	(0.002)	(0.002)	(0.009)	(0.005)	(0.002)	(0.014)
Founder's Race	0.961	0.888	1.055	1.049	0.571	-0.121	0.0445	1.238
	(0.073)	(0.150)	(0.095)	(0.108)	(0.551)	(0.285)	(0.129)	(0.862)
Credit Risk	1.052	1.062	1.057	1.019	0.407*	0.0877	0.0989*	0.231
	(0.029)	(0.060)	(0.033)	(0.039)	(0.203)	(0.098)	(0.046)	(0.323)
Regional Characteristics								
GDP per capita (ln)	1.079	1.204	1.246*	0.796	-0.0643	0.112	0.386*	-1.799
	(0.105)	(0.259)	(0.138)	(0.106)	(0.707)	(0.368)	(0.163)	(1.110)
Competitive Density	1.006	0.943*	1.002	1.019*	0.0553	-0.0782	-0.00194	0.158*
	(0.008)	(0.026)	(0.010)	(0.009)	(0.057)	(0.040)	(0.015)	(0.076)
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes. N=13,398. Standard errors in parentheses. [a]Logit regression where dependent variable is dummy coded. Coefficients reported as odds ratios (OR). OR > 1 represent a positive relationship and OR < 1 indicate a negative relationship. [b]Tobit regression is used to account for the "corner solution" (i.e., many zeros and also non-zeros in the dependent variable). Zero is coded as the lower bound. [c] Incorporated includes LLC, S-Corp, and C-Corp. Reference categories include sole-proprietorship and partnership. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 4: Regression Estimates, by Legal Form of Organization

Panel:	Panel A: Logit Regression [a]				Panel B: Tobit Regression [b]			
Dependent Variable:	Have IP	Have Patent	Have Trademark	Have Copyright	Number IP	Number Patents	Number Trademarks	Number Copyrights
Model:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Legal Form Organization [c]								
LLC	1.565***	1.194	2.312***	1.197*	2.140***	0.273	1.123***	0.979
	(0.108)	(0.194)	(0.197)	(0.107)	(0.453)	(0.257)	(0.120)	(0.731)
S-Corporation	1.603***	1.305	2.305***	1.234*	2.351***	0.289	1.148***	1.160
	(0.120)	(0.226)	(0.210)	(0.123)	(0.499)	(0.279)	(0.129)	(0.820)
C-Corporation	2.096***	2.581***	2.599***	1.611***	4.252***	1.731***	1.284***	3.022*
	(0.217)	(0.497)	(0.312)	(0.222)	(0.706)	(0.330)	(0.177)	(1.176)
General Partnership	0.887	0.516	0.855	1.300	-1.099	-1.175	-0.272	1.099
	(0.176)	(0.316)	(0.233)	(0.301)	(1.295)	(0.940)	(0.363)	(1.953)
Limited Partnership	1.207	0.659	2.137**	0.998	1.181	-1.403	0.903*	-0.129
	(0.281)	(0.499)	(0.544)	(0.347)	(1.543)	(1.337)	(0.375)	(2.752)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: N= 13,398. Standard errors in parentheses. [a] Logit regression where dependent variable is dummy coded. Coefficients reported as odds ratios (OR). OR > 1 represent a positive relationship and OR < 1 indicate a negative relationship. [b] Tobit regression is used to account for the "corner solution" (i.e., many zeros and also non-zeros in the dependent variable). Zero is coded as the lower bound. [c] Reference category includes sole-proprietorship. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 5A: Additional Robustness Checks, Dependent Variable = Have IP

	Panel A: "Non-Life Style Firms"						Panel B: Endogeneity & Self- Selection Concerns				
	Model 1: Firms with international sales[2]	Model 2: Firms from lower innovation industries[3]	Model 3: Firms from higher innovation industries[4]	Model 4: No Zero Employee Firms[5]	Model 5: Non-Home Based Firms[6]	Model 6: Excluding firms that switched LFO[7]	Model 7: IV Probit using instrument 1[8]	Model 8: IV Probit using instrument 2[9]	Model 9: CEM Matching[10]	Model 10: Entropy Matching[11]	Model 11: Heckman Selection[12]
Focal Variable: Incorporated[1]	0.358***	0.321***	0.152***	0.362***	0.389***	0.256***	0.672*	0.478*	0.221***	0.302***	0.058***
	(0.123)	(0.045)	(0.048)	(0.055)	(0.055)	(0.034)	(0.263)	(0.259)	(0.046)	(0.058)	(0.013)
Control variables	All included	All included	All included	All included	All included	All included	All included	All included	All included	All included	All included
Observations	1107	7978	5420	5854	6223	12276	12668	12668	13398	12606	13398

Notes. Models estimated using Probit regression in Panel A. Regression coefficients for the incorporation variable (1=LLC, S-Corp, or C-Corp; 0= sole-proprietorship, partnership). Full results are available upon request. Standard errors are in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

[1] DV=Have IP (1=yes, 0=no).

[2] Excludes firms that do not have any international sales.

[3] Below average IP industries (NAICS): 11, 22, 23, 31, 32, 33, 44, 45, 48, 49, 52, 53, 55, 56, 62, 81.

[4] Above average IP industries (NAICS): 21, 42, 51, 54, 61, 71, 72, 92.

[5] Excludes firms that do not have employees.

[6] Excludes Home Based firms.

[7] Excludes firms that switched LFO. Only 8.4% of firms switch LFO in the sample.

[8] Instrument 1 = Incorporation rate for the focal firm's industry. First-stage T-Statistic = -13.81***, First-stage F-Statistic = 190.78***. Wald test of endogeneity: p=0.123.

[9] Instrument 2 = % sales to other business and % sales to individuals. First-stage T-Statistic = 5.18*** and -7.10***, respectively. First-stage F-Statistic = 97.01***. Wald test of endogeneity: p=0.387. The main benefit of including both instruments in the same model is that it becomes an over-identified model, which allows us to perform the over-identification test (p=.907). DWH test of endogeneity, p=0.456, indicates the model is not endogenous and can be treated as exogenous.

[10] Matching weights applied using Coarsened Exact Matching (Blackwell et al., 2009; Iacus et al, 2012).

[11] Matching weights applied using Entropy Matching.

[12] Two-step Heckman selection model. Exclusion restrictions = Sales to businesses (%) and Sales to individuals (%). Mills Ratio = -0.077***; se=.025. Incorporated is used for the selection equation, and the dependent variable in the outcome equation is coded 1 if C-Corp and 0 if S-Corp or LLC.

Table 5B: Additional Robustness Checks, Dependent Variable = Number of IP

	Panel A: "Non-Life Style Firms"						Panel B: Endogeneity & Self- Selection Concerns				
	Model 1: Firms with international sales[2]	Model 2: Firms from lower innovation industries[3]	Model 3: Firms from higher innovation industries[4]	Model 4: Without Solo Owned Firms[5]	Model 5: Non-Home Based Firms[6]	Model 6: Excluding firms that switched LFO[7]	Model 7: IV Tobit using instrument 1[8]	Model 8: IV Tobit using instrument 2[9]	Model 9: CEM Matching[10]	Model 10: Entropy Matching[11]	Model 11: Heckman Selection[12]
Focal Variable: Incorporated[1]	4.687***	2.774***	1.453**	3.807***	2.965***	2.328***	7.05**	11.04***	2.291***	2.988***	0.625***
	(1.487)	(0.477)	(0.658)	(0.632)	(0.549)	(0.399)	(3.44)	(3.26)	(0.498)	(0.747)	(0.163)
Control variables	All included	All included	All included	All included	All included	All included	All included	All included	All included	All included	All included
Observations	1117	7978	5420	5854	6225	12276	13395	13365	13398	12606	13398

Notes. Models estimated using Tobit regression in Panel A. Regression coefficients for the incorporation variable (1=LLC, S-Corp, or C-Corp; 0=sole-proprietorship, partnership) Full results are available upon request. Standard errors are in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

[1] DV=Number of IP.

[2] Excludes firms that do not have any international sales.

[3] Below average IP industries (NAICS): 11, 22, 23, 31, 32, 33, 44, 45, 48, 49, 52, 53, 55, 56, 62, 81.

[4] Above average IP industries (NAICS): 21, 42, 51, 54, 61, 71, 72, 92.

[5] Excludes firms that do not have employees.

[6] Excludes Home Based firms.

[7] Excludes firms that switched LFO. Only 8.4% of firms switch LFO in the sample.

[8] Instrument 1= Incorporation rate for the focal firm's industry. First-stage T-Statistic = -13.81***. First-stage F-Statistic = 190.78***. Wald test of endogeneity: p=0.173.

[9] Instrument 2= % sales to other business and % sales to individuals. First-stage T-Statistic = 5.44*** and -6.99***, respectively. First-stage F-Statistic = 97.01***. Wald test of endogeneity: p=0.006. The main benefit of including both instruments in the same model is that it becomes an over-identified model, which allows us to perform the over-identification test (p=.213). DWH test of endogeneity, p=0.001, indicates the model is endogenous and cannot be treated as exogenous.

[10] Matching weights applied using Coarsened Exact Matching (Blackwell et al., 2009; Iacus et al, 2012).

[11] Matching weights applied using Entropy Matching.

[12] Two-step Heckman selection model. Exclusion restrictions = Sales to businesses (%) and Sales to individuals (%). Mills Ratio = 0.067; se=.293. Incorporated is used for the selection equation, and the dependent variable in the outcome equation is coded 1 if C-Corp and 0 if S-Corp or LLC.

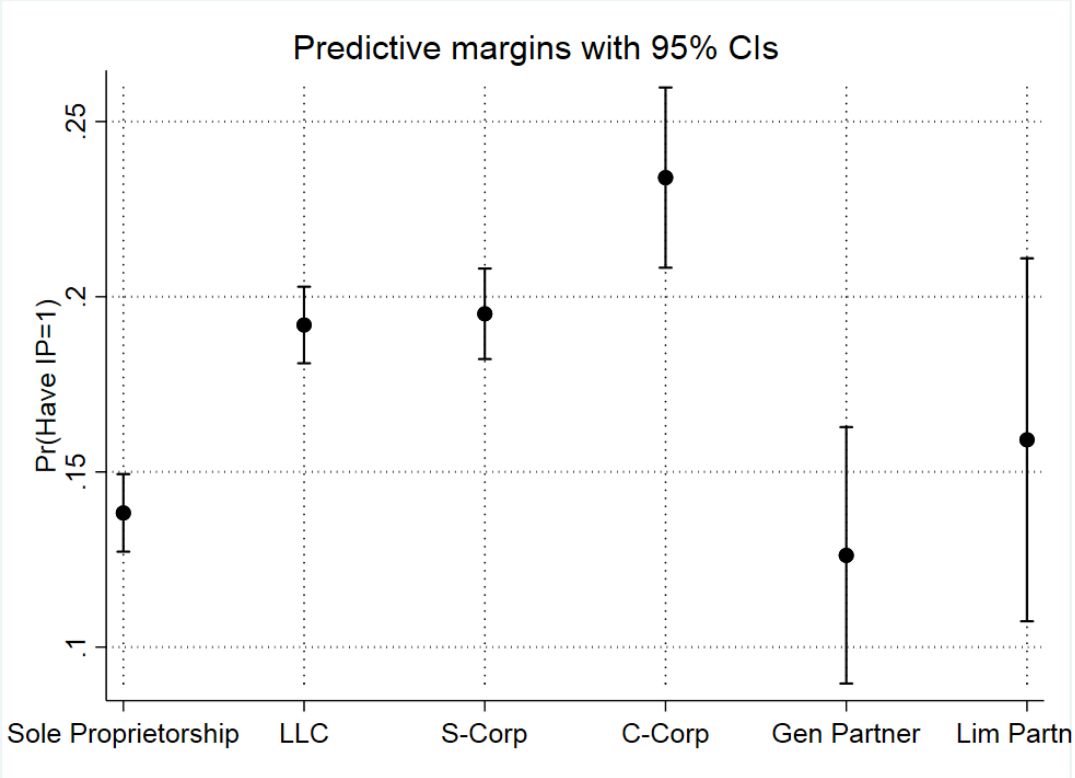

Figure 1. Predicted IP by LFO

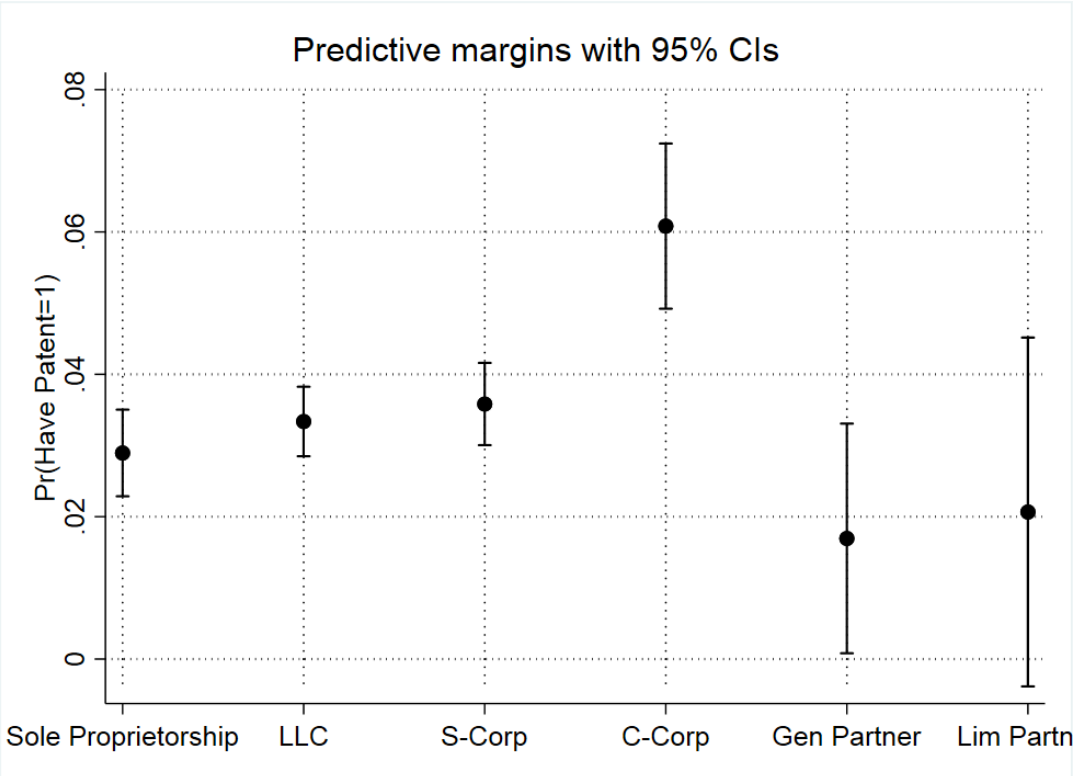

Figure 2. Predicted Patent by LFO

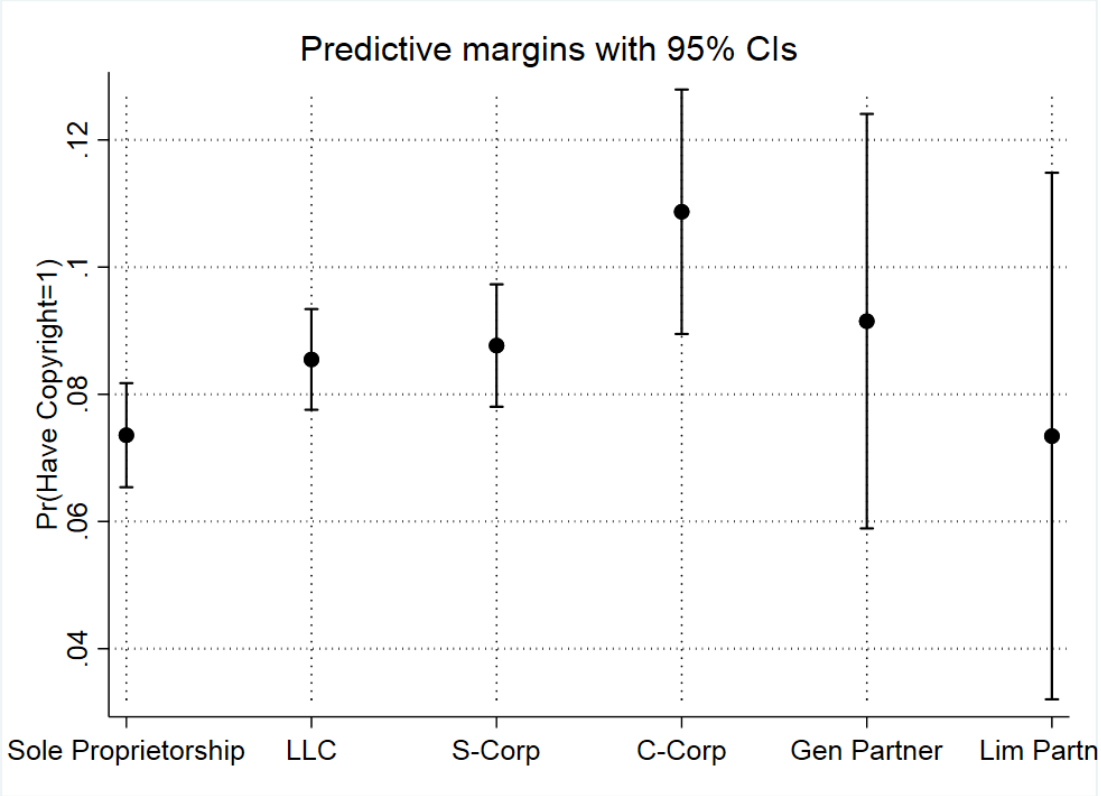

Figure 3. Predicted Copyright by LFO

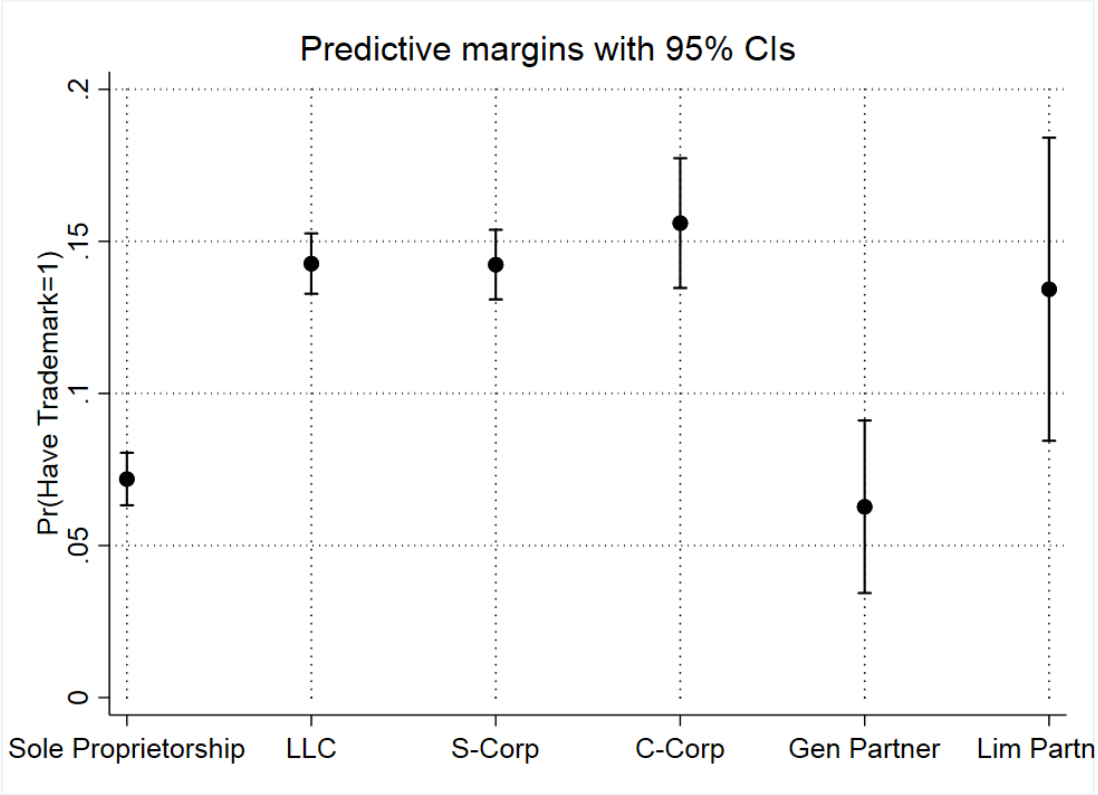

Figure 4. Predicted Trademark by LFO