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Economic and Technological Importance of Innovations in Large Family and Founder Firms: An Analysis of Patent Data

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Abstract

Prior research has analyzed R&D spending in family and founder firms. Yet little is known about the economic and technological importance of innovations in these types of firms. Using patent citation data, we show that founder-managed firms, which we argue favor an entrepreneurial orientation, receive more patent citations when compared with other firms, even controlling for R&D spending. By contrast, family-managed firms, many of which, we argue, pursue socioemotional wealth for the family, receive fewer patent citations compared with other firms, again, controlling for R&D spending. Patent citations have been shown in the literature to reflect the economic and technological importance of innovations.

Keywords

innovation, patents, patent citations, technological importance, founder firms

Introduction

Family firms have been found to have lower research and development (R&D) intensity relative to other firms (Block, 2012; Chen & Hsu, 2009; Chrisman & Patel, 2012; Munari, Oriani, & Sobrero, 2010; Muñoz-Bullón & Sanchez-Bueno, 2011), whereas founder firms exhibit greater R&D intensity (Block, 2012). Our article contributes to this growing literature by addressing the following research questions: (a) How does the economic and technological importance of innovations produced in family firms compare with the economic and technological importance of innovations produced in nonfamily firms? (b) What differences exist between family and founder firms in this regard? (c) To what degree can differences in the economic and technological importance of innovations between family, founder, and other firms be attributed to ownership or management dimensions of these types of firms?

To date, there has been little research on the economic and technological importance of innovations produced in family and founder firms. Although R&D spending is related to the economic and technological importance of innovations, we believe that there is an important difference between R&D spending as an innovation input measure and the importance of innovations that a firm produces. First, R&D spending relates only to the resources used for innovative activity not to its output or importance. R&D can lead to new knowledge, but this knowledge must be brought to commercial use to become an innovation and have an impact on economic growth and firm performance (Aghion &

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Howitt, 1992; Hall, Jaffe, & Trajtenberg, 2005; He & Wang, 2008; Romer, 1990; Schumpeter, 1942). Second, prior research shows that innovations vary enormously in their significance for technological progress and economic importance (Dahlin & Behrens, 2005; Grabowsky & Vernon, 1990). The use of granted patents as a measure of innovation partially reflects the commercial usefulness of knowledge. Still, patents are only a crude proxy for economic and technological importance (Griliches, 1990) as they can differ enormously in their importance for technological progress and their financial value for the firm (Hall et al., 2005; Narin, Noma, & Perry, 1987; Trajtenberg, 1990). To differentiate between patents of low and high economic and technological importance, we study the number of patent citations. Patents that receive many citations from other patents tend to be more important for technological progress and are of higher economic value for the firm than those that receive only a few (Harhoff, Narin, Scherer, & Vopel, 1999).

According to the socioemotional wealth (SEW) perspective, families derive affective value from their businesses. Gomez-Mejia, Haynes, Nunez-Nickel, Jacobson, and Moyano-Fuentes (2007) coined the term *socioemotional wealth* to broadly encompass affective benefits from social status, reputation, personal satisfaction, continued firm control, and careers for current and future generations. Family firms are averse to losing these sources of wealth, even if to prevent that they must act in a way that is costly to their organizations (Berrone, Cruz, & Gomez-Mejia, 2012; Gomez-Mejia, Cruz, Berrone, & De Castro, 2011; Gomez-Mejia et al., 2007; Wiseman & Gomez-Mejia, 1998).

We shall argue that the preservation of SEW in family firms may curtail a firm's innovation behavior for a variety of reasons. For example, a family's desire to retain control of their firm may limit a business's access to the investment capital that may dilute such control, thereby reducing the ability to fund very significant innovation projects (Gomez-Mejia, Cruz, et al., 2011; Gomez-Mejia, Hoskisson, Makri, Sirmon, & Campbell, 2011; Mishra & McConaughy, 1999). Similarly, the desire to provide careers for family members may limit the managerial competency required to undertake ambitious innovation projects (Bennedsen, Nielsen, Pérez-González, & Wolfenzon, 2007; Bloom & Van Reenen, 2007; Gomez-Mejia et al., 2007; Pérez-González, 2006). These projects might even reveal the incompetency of family members and hence call into question the family's right to manage their firm—a legitimacy that may be crucial to transgenerational control (Berrone, Cruz, Gomez-Mejia, & Larraza-Kintana, 2010).

In summary, some family firms may confront a dilemma. Whereas more investment in significant innovations might enhance competitiveness and sustainable performance, it could also reduce a family's ability to preserve its socioemotional endowments by reducing family control. We thus expect that family firms not only invest less in R&D, but more importantly, chose only those modest innovation projects less likely to challenge family financial and managerial control. In short, family firms likely focus on incremental innovation projects. Such projects are associated with low levels of economic and technical uncertainty and more suited to the capability of a business-owning family. Prior research also shows that more ambitious innovation projects have high levels of uncertainty (Dahlin & Behrens, 2005). We will argue that modest innovations in family firms have lower economic and technological importance relative to innovations in other firms, even controlling for the level of R&D spending.

For founder firms, we shall argue the opposite: founders, specifically, those who have already built *very large* companies, have demonstrated a proven entrepreneurial orientation and a fine track record for growing their businesses (Langlois, 2007; Miller, Le Breton-Miller, & Lester, 2011). Therefore, they have been shown to be more willing and capable of undertaking uncertain and challenging innovation projects. Moreover, founders have been shown to be willing to seek outside investment and reduce their control if such behavior enables their firm to grow and prosper (Wasserman, 2006). Founder firms also have the advantage of not having family members clamoring for resources that could otherwise fund fruitful projects of innovation (Miller et al., 2011; Morck & Yeung, 2003). Accordingly, founder firm innovations should be of greater economic and technological importance than innovations at family firms. We shall use patent citations as a proxy for the economic and technological importance of innovation output (Coombs & Bierly, 2006; Hall et al., 2005; Harhoff et al., 1999; Harhoff, Scherer, & Vopel, 2003; Trajtenberg, 1990) in family, founder, and other firms. Our study will be of publicly traded firms in the Standard & Poor's 500 index (S&P 500).

Our analyses show that, when controlling for R&D spending, the presence of a family member in top management leads to innovations with lower economic and technological importance whereas the presence of a

founder in top management leads to innovations with higher economic and technological importance. With these results, our article contributes to the growing literature on innovations in family and founder firms (Block, 2012; Chang, Wu, & Wong, 2010; Chen & Hsu, 2009; Chrisman & Patel, 2012; De Massis, Frattini, & Lichtenthaler, 2012; Gomez-Mejia, Hoskisson, et al., 2011; Munari et al., 2010; Muñoz-Bullón & Sanchez-Bueno, 2011; Spriggs, Yu, Deeds, & Sorenson, 2012). First, by distinguishing between innovations with low and high economic and technological importance while controlling for R&D spending, we show that the preservation of SEW in family firms has a direct negative impact on the quality of innovation output in terms of its economic and technological importance. Family firms not only spend less on innovations but also focus on those innovations with low potential impact. Family firms thus run the danger of producing only incremental rather than radical innovations, which can lead to negative consequences in dynamic and competitive industries and market environments. Second, our analyses reveal that the family firm effect is mainly driven by family management and less by family ownership. Most prior research neglects this distinction, which we show is an important one. Family firms should therefore consider hiring nonfamily managers, at least for positions that are critical for the innovation process. Finally, our analyses reveal a strong positive effect of founder management on the economic and technological importance of the innovations produced. Founders as top managers appear to have a strong entrepreneurial orientation that influences the type of innovation projects pursued. However, as with family firms, our results show that founders seem to have this influence mainly through their position as managers and not as owners.

Family Firms, Socioemotional Wealth, and Innovation

As noted, Gomez-Mejia et al. (2007; Gomez-Mejia, Cruz, et al., 2011) coined the term *socioemotional wealth* to call attention to the affective values that families derive from firm control: reputation, status, family employment, family harmony, and altruism toward offspring. Prospect theorists and behavioral agency scholars laid the foundation for research on SEW in family firms in pointing to different risk preferences in different situations (Kahneman & Tversky, 1979; Wiseman & Gomez-Mejia, 1998). They argue that framing decisions with reference to potential gains or losses can shape behavior. Specifically, because families value SEW endowments from firm control, they are averse to losing these and willing to expend organizational resources to prevent that loss (Berrone et al., 2010; Gomez-Mejia, Cruz, et al., 2011; Gomez-Mejia et al., 2007). For example, family-controlled Spanish olive mills were reluctant to join cooperatives despite their economic benefits as that would jeopardize family control of the business (Gomez-Mejia et al., 2007).

We shall distinguish between the ownership and management dimension of family firms (Block, 2010). Our first hypothesis concerns the family ownership dimension; our second hypothesis concerns the family management dimension. Although family ownership and family management effects are expected to be consistent, the major distinction between the two are that the latter are expected to show an even more direct and therefore stronger impact of a family on a firm than the former, and are therefore more apt to reflect a family's SEW agenda and its consequences (Gomez-Mejia, Cruz, et al., 2011). In particular, family-managed firms are subject to nepotism, entrenchment, and a dearth of CEO talent that limits the human capital available to administer complex innovations (Bertrand & Schoar, 2006; Bloom & Van Reenen, 2007; Pérez-González, 2006). That is less apt to be the case with firms that are family owned but whose management is drawn from a far larger pool of nonfamily members.

Family Ownership Effects

As noted, family-owned firms are especially concerned with the SEW priorities of family members, often at the expense of the financial performance of the business (Berrone et al., 2010; Gomez-Mejia et al., 2007). Families prioritize keeping the business within their control (Gomez-Mejia et al., 2007), providing careers and financial security for family members (Bertrand & Schoar, 2006; Schulze, Lubatkin, Dino, & Buchholtz, 2001) and preserving family status in the local community (Berrone et al., 2010; Block, 2010). Many family owners are also loss averse: They have an aversion to losing control of the business and to losing money, and so avoid making risky investments in R&D (Gomez-Mejia, Cruz, et al., 2011; Gomez-Mejia, Hoskisson, et al., 2011; Lim, Lubatkin, & Wiseman, 2010). These priorities often take precedence over economic returns to the business itself, and in many cases lead to behavior that

restricts firm resources and capabilities. For example, the desire to keep the business in the family can limit access to capital (Gomez-Mejia et al., 2007). The desire for community status may divert resources from economic to social purposes (Berrone et al., 2010). Moreover, the insistence of family members on regular and reliable financial returns may invoke conservative strategies that eschew risk-taking projects, among them, radical innovation initiatives (Bloom & Van Reenen, 2007; Gomez-Mejia, Hoskisson, et al., 2011). However, all these SEW priorities may restrict the resources required for investments in R&D. Prior research has found a negative relationship between family ownership and R&D spending (Block, 2012; Gomez-Mejia, Hoskisson, et al., 2011; Chrisman & Patel, 2012).

We expect the pursuit of SEW to affect the *choice* of innovation projects. The uncertainty associated with challenging innovation projects may threaten family control and therefore SEW (Gomez-Mejia et al., 2007). Family owners wishing to preserve their affective endowment, and hence wishing to control their firms despite related costs, are apt to favor conservative projects that avoid SEW losses. Family owners might choose projects that do not interrupt the flow of dividends, afford stable returns, and are unlikely to provoke criticism from shareholders. Indeed, Berrone et al. (2010) found that families are willing to incur significant costs to protect their SEW—even if this pursuit is detrimental to firm performance. Family owners might also use corporate resources to provide benefits to family members to resolve family conflicts or display altruism to offspring (Schulze et al., 2001). Therefore, we expect family-owned firms to pursue incremental rather than risky innovation projects. In a similar vein, Gomez-Mejia et al. (2007) proposed that because preserving family control is more salient to family owners than meeting a performance target, family owners avoid high-variance investments. However, it is such investments that are often required for research efforts that produce patent-worthy inventions. Routine innovation that often is not very risky is far less likely to constitute the type of pioneering discovery that leads to new and influential patents (Hall et al., 2005; Harhoff et al., 2003; Lanjouw & Schankerman, 2004; Suzuki, 2011; Trajtenberg, 1990). However, family security needs, risk avoidance, and lack of risk capital might direct R&D spending into less radical projects that are likely to lead to routine innovations. The more ownership a family has, the more power it has to pursue more modest innovation projects. Thus, to protect their SEW endowment, families might invest just enough in R&D to secure the legitimacy to control a firm.

> *Hypothesis 1*: Given a firm's level of R&D spending, the percentage of family ownership will be negatively associated with the economic and technological importance of the firm's innovations (proxied by the number of patent citations the firm receives).

Family Management Effects

The aforementioned family priorities will be *particularly* detrimental to innovation if family members are *actively running the firm as top executives.* Indeed, having a family member run the company is, as noted, a common source of SEW for a family (Gomez-Mejia, Cruz, et al., 2011; Gomez-Mejia et al., 2007). Such an appointment can further constrain effective corporate innovation. First, when family members run a firm they have a more immediate and direct influence on its strategy and can thereby invoke more forcefully a resource-constraining SEW agenda. Second, because of nepotism and entrenchment, family-run firms operating in dynamic and competitive industries may lack the executive talent to be effective innovators (especially vis-à-vis executives chosen from a much larger nonfamily talent pool; Mehrotra, Morck, Shim, & Wiwattanakantang, 2011; Miller, Minichilli, & Corbetta, 2012). Whereas nonfamily enterprises may choose their top teams from among a very large number of applicants, family executives come from a far smaller, and hence less promising, pool (Mehrotra et al., 2011; Pérez-González, 2006). Thus, innovation constraints regarding financial and talent resources can be significant in family-managed firms.

Innovation requires both talent and risk taking. But, where family managers are in charge of a firm, their expertise may be inadequate to ensure a high level and quality of innovation (Gomez-Mejia, Nunez-Nickel, & Gutierrez, 2001; Pérez-González, 2006). Nepotism, entrenchment of mediocre family executives, and altruism toward undeserving family members using business resources, all come to the fore (Bertrand & Schoar, 2006; Bloom & Van Reenen, 2007; Schulze, Lubatkin, & Dino, 2003). This can lead to incompetent firm management, which hampers innovative efforts and calls into question the legitimacy of family management

(Miller et al., 2012). So might the conservatism typical of family managers because of loss aversion and the tendency of such individuals to appropriate funds from the business to divert to parochial family purposes (Gomez-Mejia et al., 2007). Another SEW priority, the desire to keep the firm for later generations to manage tends to compound loss aversion—which restricts risky innovation projects (Bertrand & Schoar, 2006). Indeed, such conservatism and a dearth of capital may constrain investment in significant innovation projects.

Moreover, conservatism, coupled with a scarcity of knowledge or talent, may limit the ability to implement innovation projects and constrain their scope and impact (Morck, Wolfenzon, & Yeung, 2005; Morck & Yeung, 2003). In short, we expect the limited executive human resource pool and the loss aversion of family managers to result in incremental rather than major innovations. The narrow scope and limited impact of incremental innovations is expected to result in fewer patent citations.

Hypothesis 2: Given the firm's level of R&D spending, family management will be negatively associated with the economic and technological importance of the firm's innovations (proxied by the number of patent citations the firm receives).

Founder Firms, Entrepreneurial Orientation, and Innovation

Our arguments regarding the importance of SEW are far less apt to apply to founder firms—those in which a founder still plays a major role as principal owner or top executive and in which family members play little if any significant role in the business. Unlike family owners and managers, founders of S&P 500 firms have proven themselves capable of pursuing significantly rewarding projects of innovation (Kirzner, 1979; Langlois, 2007; Le Breton-Miller, Miller, & Lester, 2010). Indeed, researchers have discovered that patents provide credibility to prospective investors, making it easier to raise capital (Blind, Edler, Frietsch, & Schmoch, 2006; De Rassenfosse, 2012; Hall, 2002). Such capital is often required to fund growth in founder-owned and managed companies (Kirzner, 1979). Therefore, founder firms are likely to conduct large R&D investments (Block, 2012) and generate more significant innovation outcomes.

Founder Ownership Effects

Founders have built up their enterprises from scratch. In the case of large publicly traded businesses in which a founder remains a major owner, there is likely to be a significant legacy of managerial competency and innovation success. No large business, particularly among those operating in a dynamic environment, is able to have reached its present scale without considerable innovation. Such growth, particularly in industries characterized by high levels of R&D and new product introductions requires high levels of innovation—and not just investments in research but actual, productive innovations. And it is the founding entrepreneur who typically has overseen such innovation. Where they are still present as major owners of their enterprises, they are unlikely to want to see that strategy abandoned.

Founders of large firms tend to be unusual individuals—people aptly characterized in the literature as significant "entrepreneurs." Previous research has found these individuals to have an internal locus of control—a sense that they control their own destiny (Boone, de Brabander, & van Witteloostuijn, 2007). They also demonstrate a high need for achievement (McClelland, 1961) and are shown to be persistent, confident, and creative (Kirzner, 1979; Langlois, 2007). Indeed, the very notion of an "entrepreneurial orientation" contains within it the core element of innovation (Covin & Slevin, 1989; Lumpkin & Dess, 1996; Miller, 1983). Many founders see themselves as "entrepreneurs"—as risk takers who prize growth and innovation (Langlois, 2007; Lumpkin & Dess, 1996; Miller, 1983; Miller, Le Breton-Miller, & Lester, 2010, 2011). Identification of founders with the social group of entrepreneurs may reinforce their propensity to engage in significant projects of innovation that spur growth—the kind of innovation that leads to economically and technologically valuable patents.

It is not investments in R&D, but the wish to see consequential innovation projects through to fruition that distinguishes entrepreneurs (Kirzner, 1979) and results in what Schumpeter (1942) called "creative destruction." Only successful and consistent innovation can translate into the kind of growth and performance that founding firm stakeholders most value (Hall et al., 2005). This involves not so much R&D spending per se but the economic and technological importance of the innovations that the firm produces.

Firms needing new investment to fund their growth avidly pursue patents as these have been shown to

facilitate the procurement of capital from investors. Thus, patents constitute an important resource for many founder-led firms that tend to be rapidly growing (Kirzner, 1979). It is patents that establish credibility for a growing organization that wishes to raise capital (Blind et al., 2006; De Rassenfosse, 2012; Hall, 2002; Mann & Sager, 2007; Wagner & Cockburn, 2010). In particular, citations of patents provide important legitimacy and make firms more attractive to outside investors (Häussler, Harhoff, & Müller, 2009).

Hypothesis 3: Given the firm's level of R&D spending, founder ownership will be positively associated with the economic and technological importance of the firm's innovations (proxied by the number of patent citations the firm receives).

Founder Management Effects

Just as we argued family management to be especially likely to have an impact on innovations, we expect the same to be true for founder-managed enterprises because of the direct influence of the founder in running the company. Where a founder also *serves as top executive*, the opportunities for innovation may be even greater than when the founder is merely an owner. Presence in the top management of a firm puts a founder in direct communication with those who must collaborate to produce important inventions and commercialize them. Nelson (2003) explains that founder executives are often focal points in organizations: they are deeply committed to firms, provide their extensive knowledge and experience, actively shape the firm's future. Kroll, Walters, and Le (2007) support the view that incumbent founder executives continue to be valuable to firms after IPOs (initial public offerings). The authors explain that founding team executives maintain the entrepreneurial vision and necessary oversight of firms that provide stability and direction in uncertain environments. There is thus an immediacy in which the energy, motivation, and expertise of the founder are brought to bear day-to-day in innovative endeavors. In particular, the gain-seeking focus of founders can spur the magnitude and scope of innovation activities in firms. The founder's involvement in top management also avoids many owner-manager agency costs that might otherwise draw resources away from the innovative effort (Hall, 2002; Narayanan, 1985; Zenger, 1994).

Hypothesis 4: Given the firm's level of R&D spending, founder management will be positively associated with the technological importance and economic value of its innovations (proxied by the number of patent citations which the firm receives).

Data and Method

Sample and Data Sources

Our sample includes firms in the S&P 500 as of July 31, 2003.[1] For those firms, we collected accounting, patent, and ownership data for the years 1994-2003.

Patent data were obtained from the patent data project of the National Bureau of Economic Research (NBER; Hall, Jaffe, & Trajtenberg, 2001),[2] which builds on information from the U.S. Patent and Trademark Office (USPTO). The NBER data set includes all granted patents in the United States in the years from 1976 to 2006. This data set takes into account that a patent might have been applied for by a mother company or any of its subsidiaries. Mergers and acquisitions were also taken into account to accumulate patents appropriately. To construct a patent citations variable, we employed two sources. For a measure of patent citations where self-citations are excluded, we use data from the NBER data set (Hall et al., 2001), including the correction for truncation bias. For a measure of patent citations that includes self-citations, we employed the European Patent Office (EPO) Worldwide Patent Statistical Database (PATSTAT).[3] PATSTAT was created by EPO on behalf of the OECD Taskforce on Patent Statistics and provides comprehensive information on patent applications in 80 countries (including the United States, Japan, and countries from Europe).

Data on a firm's *ownership and management* were collected manually from corporate proxy statements submitted to the U.S. Securities and Exchange Commissions (SEC). In most cases, we used the SEC Form DEF 14A, in which a company provides information about officers, directors, and 5% owners. The Securities Exchange Act of 1934 requires firms to provide this information annually. Proxy statements are the most accurate source of such ownership information (Anderson & Lee, 1997; Dlugosz, Fahlenbrach, Gompers, & Metrick, 2006). To resolve any ambiguous information, we complemented data from the Proxy statements with data from Hoover's Handbook of American Business and company websites (see the note in the appendix table for a list of used sources).

Accounting and financial data were obtained from the COMPUSTAT North America and CRSP databases (Center for Research on Security Prices, University of Chicago). After excluding observations with missing values, we were left with an unbalanced panel data set consisting of 1,659 observations from 248 firms.

Variables

Dependent Variables

Patent citations. The purpose of our research was to assess the economic and technological importance of innovations in family and founder firms. To this end, we rely on patent citation data. In the field of innovation, there exists a large body of research on the use of patents and patent citations as indicators of technological and economic value (Hall et al., 2005; Harhoff et al., 2003; Lanjouw & Schankerman, 2004; Suzuki, 2011; Trajtenberg, 1990). The stream of research began with Griliches (1990), who noted that little correlation exists between simple patent indices and the stock market valuation of a company. Although in principle the number of patents can be thought of as an indicator of the successful outcome of R&D, there exists significant "noise" in this relationship. To address this limitation, researchers have undertaken empirical research to find better indicators to measure the value of patents. The most recognized indicator of patent value is the number of its (forward) citations (Hall et al., 2005; Trajtenberg, 1990), that is, the number of citations a patent receives from other patents.[4] In the United States, these citations are proffered by the patent assignee and checked by the patent examiner. Truly novel inventions or patents are almost by definition crude and imperfect, which is why they generate several patents further down-the-line that cite the breakthrough patent. In another study, Hall et al. (2005) showed that forward citations are associated with the market values of firms. Using a large database of company market value, patents, and citations from the late 1970s to the early 1990s, the authors were able to show that, holding R&D constant, an additional forward citation is worth 3% of a firm's market value. Interestingly, this finding holds for both self-citations and external citations, perhaps because many self-citations suggest a promising research program.

Our *patent citations* variable measures the number of citations a firm receives for its patents by application year. Self-citations are not included in this variable, but as we show in the robustness section, including these does not influence our results.

Market-to-book value. To analyze the effect of patents and patent citations on firm performance, we calculate the firm's market-to-book value. This measure is calculated as the market value of equity at the end of the year plus the book value of debt divided by the book value of total assets (Chung & Pruitt, 1994). The market-to-book value is superior to accounting measures that are subject to accounting anomalies and earnings manipulations. In addition, it captures the long-term performance effects of innovation, which accounting-based performance measures do not. As this variable is highly skewed (skewness is 9.47), we use its natural logarithm.

Independent Variables. Our main independent variables are those of family and founder management or ownership. The involvement of families and founders in a firm is assessed by their share of ownership and their presence in top management. The variable *ownership share founder* refers to the founder's or the founding team's percentage of common equity above 5%; in these firms, no relatives of the founder(s) are involved as major shareholders.[5] The variable *ownership share family* constitutes the percentage of common equity of founding family members where relatives of a founder act as major (>5%) owners. The *ownership share family* and *ownership share founder* variables are mutually exclusive. That is, a family-owned firm is not a founder-owned firm and vice versa. Our management variables are constructed similarly: The variable *founder management* indicates a founder being active as CEO and/or chairman. The variable *family management* indicates that a member of the founding family other than the founder serves as CEO and/or chairman. Note that founder variables refer exclusively to first-generation firms whereas family variables include both first- and later-generation family-owned or family-managed firms. Unfortunately, we have too few first-generation family-owned or family-managed firms to run separate analyses on this group.

The variable *CEO duality* indicates if a CEO also holds the position as a chairman of the board, which, as prior research shows, can have an influence on innovation (Zahra, Neubaum, & Huse, 2000).

To distinguish the effects of family and founder ownership from those of institutional investors (Baysinger, Kosnik, & Turk, 1991; Hansen & Hill, 1991; Kochhar &

David, 1996; Lee & O'Neill, 2003; Tribo, Berrone, & Surroca, 2007), we include the ownership shares of pension funds, mutual funds, insurance firms, banks, investment advisors, and private equity firms/hedge funds as separate variables (Brickley, Lease, & Smith, 1988; Kochhar & David, 1996; Zahra et al., 2000). Prior research shows that ownership by institutional investors can have a decisive effect on firms' levels of innovation expenditures (Bushee, 1998; Kochhar & David, 1996; Lee & O'Neill, 2003). To ensure that the effects of family and founder ownership/ management are not due to the age of the firm, we include the variable *firm age* (Hansen, 1992).

We include a number of other control variables that are found to have an effect on innovation. Previous research has shown that a positive relationship exists between innovation expenses and innovation output (Hagedoorn & Cloodt, 2003). There may exist substantial economies of scale in the innovation process (Acs & Audretsch, 1988; Hansen, 1992), which is why it is necessary to correct for firm size. As a proxy for firm size, we employ *sales*. As this variable is highly skewed (skewness is 73.77), we use its natural logarithm. Prior research has also suggested a negative relationship between debt levels and innovation (Czarnitzki & Kraft, 2009). Thus, debt to assets (*debt/assets*) taken as a control, again logged to reduce skewness. To take into account differences in investment opportunities, we incorporate the variable *market-to-book value* in year $t - 1$. To control for market specifics, we included a measure for market risk, which is calculated as the firm's daily return regressed against the returns of the S&P 500 Index (*market risk*). To take into account industry effects we used two-digit SIC industry dummies. However, because of their low variation over time, these variables are only included in the random-effects models that we estimated as robustness checks. Finally, to control for business cycle effects on innovation, we include year dummies (Geroski & Walters, 1995). Tables 1 and 2 display descriptive statistics and correlations for our data. The table in the appendix provides a detailed description of our variables.

Method: Count Data Regressions

Because the dependent variable *patent citations* is a count variable, we estimate count data models using Poisson and negative binomial regressions (Verbeek, 2004). Negative binomial regressions are used whenever the sample variance of the dependent variable exceeds its sample mean ("overdispersion"). Given the large spread in the number of patent citations (standard deviation/mean = 2.96, Table 1), the respective count distribution is clearly overdispersed.[6] The Schwartz's Bayesian information criterion (Schwarz, 1978) for our data also favors negative binomial regression over Poisson regression. Zero inflation (see notes in Table 1) and zero truncation (Hall et al., 2001) issues do not apply. For the latter, we carried out a manual check in the PATSTAT database to find out whether all zero observations did indeed refer to firms that did not successfully apply for any patents in that particular year and thus were not zeros due to missing data. Finally, to account for the panel structure of our data, we estimate panel data fixed-effects models.[7] Our use of fixed-effects models reduces the possibility of omitted variables bias and endogeneity.

Results

Innovation Regressions

Table 3 shows fixed-effects negative binomial regressions. Model I shows the effect of family and founder ownership share variables on patent citations; Model II shows the effect of family and founder management variables on patent citations; Model III incorporates both management and ownership share variables. Because of the high correlation between the ownership share and management variables ($r = 0.40$ in case of founder firms or $r = 0.38$ in case of family firms, Table 2), the latter models might exhibit multicollinearity, which lowers the significance levels of the respective coefficients.

We find support for most of our hypotheses. Model I in Table 3 shows a negative effect of the variable *ownership share family* on patent citations (Hypothesis 1: $\beta = -0.55$, $p < .1$). Also *family management* shows a negative effect (Hypothesis 2, $\beta = -0.39$, $p < .01$) in Model II. Thus, Hypotheses 1 and 2 do receive support. With respect to founders, *founder management* shows a positive effect (Hypothesis 4, $\beta = 0.20$, $p < .01$) in Model II, whereas we do not find a significant effect of founder ownership in Model I. Hypothesis 4 is thus supported whereas Hypothesis 3 is not supported. Based on incidence rate ratios calculated from our regression coefficients (Model II, Table 3), we find that a family-managed firm has 32% *fewer* patent citations than other firms. By contrast, a founder-managed firm has on average 22% *more* patent citations than other firms.

Table 1. Descriptive Statistics.

	Mean	*SD*	Median	Minimum	Maximum	Skewness	Kurtosis
Patent count	105.53	248.46	24	1	2,738	5.03	34.92
Patent citations[a]	1,679.74	4,978.48	239	0	74,546	6.54	62.74
Ownership share founder	0.02	0.07	0	0	0.84	6.46	57.11
Ownership share family	0.03	0.10	0	0	0.86	4.40	23.60
Founder management	0.17	0.38	0	0	1	1.74	4.03
Family management	0.07	0.25	0	0	1	3.43	12.75
CEO duality	0.81	0.40	1	0	1	−1.54	3.38
Ownership share pension funds	0.001	0.01	0	0	0.26	18.67	377.81
Ownership share mutual fund	0.07	0.08	0.05	0	0.43	1.25	4.30
Ownership share insurance firms	0.02	0.05	0	0	0.46	3.77	21.48
Ownership share banks	0.01	0.03	0	0	0.18	2.34	7.47
Ownership share investment advisors	0.03	0.05	0	0	0.37	2.25	8.86
Ownership share private equity or hedge funds	0.004	0.02	0	0	0.59	8.86	252.01
Log(R&D/sales)	0.06	0.08	0.03	0	0.94	3.62	26.14
Log(sales)	8.31	1.26	8.32	4.21	12.41	−0.02	3.01
Log(debt/assets)	2.68	1.20	3.15	0	4.40	−1.19	3.20
Log(market-to-book value)$_{t-1}$	0.54	0.79	0.45	−2.33	4.34	0.51	3.74
Log(firm age)	3.90	0.93	4.28	0	5.33	−0.80	2.91
Market risk	1.05	0.58	0.92	−0.02	3.67	1.21	4.80

Note. N = 1,659 observations.
a. Number of observations with patent citations of zero: 115.

The control variables show expected effects in all models. R&D spending, market risk, and firm size show positive effects on patent citations (Baysinger et al., 1991, Hansen, 1992; Trajtenberg, 1990). Finally, time effects are significant (Geroski & Walters, 1995). An F test for the joint significance of the time dummies is significant at the 1% level (Table 3).

Performance Regressions

Our research has been driven by the assumption that patent citations are economically valuable. To test this assumption, we relate the variable log(*patent citations*) to firm performance. Table 4 shows an innovation performance regression using log(*market-to-book value*) as dependent variable. We estimate a random-effects model as the Hausman test cannot be rejected (Hausman, 1978; Verbeek, 2004). Hence, there exist no systematic difference between the coefficients of the random-effects model and the fixed-effects model in which case the random-effects model can be used. The results of the performance regression is clear: the variable log(*patent citations*) is associated positively with the firm's market-to-book value (Table 4) supporting our assumption and prior research (Hall et al., 2005; Harhoff et al., 2003; Lanjouw & Schankerman, 2004; Sandner & Block, 2011; Suzuki, 2011; Trajtenberg, 1990) regarding the economic value of innovations.

Robustness Checks and Further Analyses

Robustness checks. We conducted several robustness checks to examine the sensitivity of the results obtained[8]: (a) We estimated our patent citations regressions using a self-citation corrected citation measure (Hall et al., 2001). We found similar results. (b) We also estimated our regression using a smaller sample of firms from research-intensive industries of the S&P 500. Based on average R&D intensity per firm and prior findings (Hansen & Hill, 1991; Himmelberg & Petersen, 1994), we limited our data set to the following industries: "chemicals and allied products" (SIC 28), "industrial machinery and equipment" (SIC 35), "electronic and

Table 2. Correlations.

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	VIF
(1)	Patent count																			
(2)	Patent citations	0.85																		
(3)	Ownership share founder	0.02	0.05																	1.28
(4)	Ownership share family	−0.01	−0.02	−0.07																1.22
(5)	Founder management	0.07	0.10	0.40	−0.06															1.49
(6)	Family management	−0.03	−0.03	−0.07	0.38	−0.12														1.25
(7)	CEO duality	−0.03	−0.03	−0.06	−0.03	−0.14	−0.15													1.10
(8)	Ownership share pension funds	−0.02	−0.02	−0.02	−0.02	−0.03	−0.02	0.03												1.01
(9)	Ownership share mutual fund	−0.10	−0.07	−0.10	−0.12	0.06	−0.06	0.03	−0.05											1.15
(10)	Ownership share insurance firms	−0.03	−0.04	0.01	−0.04	−0.07	−0.08	0.05	−0.02	−0.10										1.04
(11)	Ownership share banks	−0.09	−0.08	−0.05	−0.08	−0.03	−0.06	−0.01	−0.03	−0.03	−0.01									1.04
(12)	Ownership share investment advisors	−0.08	−0.07	−0.09	−0.02	−0.10	0.04	0.04	−0.02	0.06	−0.02	−0.05								1.08
(13)	Ownership share private equity or hedge funds	−0.04	−0.04	−0.03	−0.02	−0.03	−0.04	0.03	−0.01	−0.01	−0.02	−0.01	−0.01							1.03
(14)	Log(R&D/sales)	0.15	0.13	0.20	−0.08	0.28	−0.11	−0.13	−0.04	0.09	−0.03	−0.12	−0.01	−0.03						1.66
(15)	Log(sales)	0.33	0.22	−0.07	−0.01	−0.24	0.04	0.08	0.05	−0.27	0.01	0.01	−0.06	−0.05	−0.43					1.60
(16)	Log(debt/assets)	−0.03	−0.06	−0.25	0.02	−0.38	0.09	0.15	0.02	−0.12	0.07	0.03	0.06	0.02	−0.46	0.43				1.80
(17)	Log(market-to-book value)$_{t-1}$	0.03	0.07	0.20	0.03	0.31	−0.06	−0.19	0.01	−0.01	−0.01	−0.06	−0.20	−0.05	0.34	−0.33	−0.42			1.45
(18)	Log(firm age)	−0.01	−0.06	−0.30	0.05	−0.45	0.12	0.19	−0.01	−0.12	0.06	0.03	0.08	−0.06	−0.47	0.47	0.53	−0.43		1.98
(19)	Market risk	0.18	0.18	0.25	−0.08	0.39	−0.09	−0.08	−0.03	0.09	−0.09	−0.01	−0.06	−0.02	0.50	−0.28	−0.51	0.28	−0.50	1.71

Note. VIF = variance inflation factor. N = 1,659 observations; Correlations with an absolute value greater than .05 are significant at $p \leq .05$; the VIFs are calculated based on Model VI in Table 3.

Table 3. Fixed-Effects Negative Binomial Regressions on Patent Citations.

	Model I		Model II		Model III	
Independent variables	Coefficient	*SE*	Coefficient	*SE*	Coefficient	*SE*
Ownership and management variables						
Ownership share founder	0.35	(0.51)			0.15	(0.52)
Ownership share family	−0.55	(0.31)*			−0.24	(0.33)
Founder management			0.20	0.10***	0.19	(0.10)*
Family management			−0.39	0.12***	−0.35	(0.13)***
CEO duality	0.03	(0.05)	0.03	0.05	0.03	(0.05)
Ownership share pension funds	3.34	(2.19)	3.31	2.21	3.33	(2.21)
Ownership share mutual funds	0.01	(0.29)	−0.03	0.29	−0.04	(0.29)
Ownership share insurance firms	−0.25	(0.48)	−0.29	0.47	−0.29	(0.47)
Ownership share bank	0.11	(0.73)	0.02	0.73	0.02	(0.73)
Ownership share investment advisors	−0.12	(0.45)	−0.03	0.44	−0.03	(0.44)
Ownership share private equity or hedge funds	1.30	(0.67)*	1.28	0.67*	1.28	(0.67)*
Firm variables and controls						
Log(R&D/sales)	1.34	(0.30)***	1.33	0.30***	1.32	(0.30)***
Log(sales)	0.30	(0.03)***	0.29	0.03***	0.29	(0.03)***
Log(debt/assets)	−0.02	(0.03)	-0.01	0.03	−0.01	(0.03)
Log(market-to-book value)$_{t-1}$	0.08	(0.04)**	0.07	0.04*	0.07	(0.04)*
Log(firm age)	−0.02	(0.06)	0.01	0.06	0.01	(0.06)
Market risk	0.13	(0.05)***	0.13	0.05***	0.12	(0.05)**
Year dummies[a]	$p < .01$		$p < .01$		$p < .01$	
Constant	−2.61	(0.31)***	−2.70	0.31***	−2.69	(0.31)***
N observations (firms)	1,659 (248)		1,659 (248)		1,659 (248)	
Loglikelihood value	−8,873.38		−8,867.82		−8,867.47	
Wald χ^2	837.30		853.63		855.55	
Observations per firm: minimum, mean, maximum	2, 6.7, 11		2, 6.7, 11		2, 6.7, 11	

Note. Coefficient = regression coefficient; *SE* = standard error.
a. Reference category: Year 2002.
*$p < .1$. **$p < .05$. ***$p < .01$ (two-sided tests).

other electrical equipment" (SIC 36), "transportation equipment" (SIC 37), "instruments and related products" (SIC 38), and "communications" (SIC 48).[9] Again, the results are similar. Founder-managed firms show a higher degree of innovativeness relative to other firms in our sample, whereas family-managed firms show a lower degree of innovativeness relative to other firms. (c) As another robustness check, we estimated random-effects models that allow for cross-sectional comparisons between firms. The results mirror those of the fixed-effects models. (d) To control for self-selection issues associated with family- or founder-managed firms, we estimated a two-step treatment effects model where the dependent variable of the first stage is *family management* or *founder management* and the dependent variable of the second stage is *patent citations*. The amount of cash dividends is used as an instrument to identify family- or founder-managed firms. The results show that self-selection is an issue for family-managed firms, whereas no such effect was found for founder-managed firms. Nevertheless, when controlling for self-selection, we continue to find a negative effect of family management on *patent citations*. (e) When using *patent count* as an alternative dependent variable (the correlation between *patent count* and *patent citations* is $r = 0.80$), we also find similar results. For example, we find

Table 4. Random-Effects Linear Regressions on Log(Market-to-Book Value).

Independent variables	Coefficient	*SE*
Innovation variable		
Log(patent citations)	0.02	(0.01)**
Firm variables		
Log (assets)	−0.14	(0.03)***
Log (debt/ assets)	−0.13	(0.02)***
Log (firm age)	−0.11	(0.04)***
Market risk	0.09	(0.03)***
Industry dummies[a]	$p < .01$	
Year dummies[b]	$p < .01$	
Constant	2.33	(0.56)***
N observations (firms)	1,659 (248)	
Observations per firm: minimum, mean, maximum	2, 6.7, 11	
R^2 within, between, overall	.23, .55, .44	
Wald test of model significance	$p < .01$	
Breusch–Pagan test of random effects	$p < .01$	
Hausman test (fixed vs. random effects)	$p = .18$	

Note. Coefficient = regression coefficient; *SE* = robust standard error.
a. Reference category: SIC 38.
b. Reference category: Year 2002.
*$p < .1$. **$p < .05$. ***$p < .01$ (two-tailed tests).

a positive effect of *founder management* ($\beta = 0.30$, $p < .01$) and a negative effect of *family management* ($\beta = -0.40$, $p < .01$) on the number of successful patent applications. The *ownership share family* variable and *ownership share founder* variable do not show any significant results in the patent count regressions. (f) Finally, we investigated whether the variable log(*patent count*) is correlated with log(*market-to-book value*). We find a positive effect. Yet the coefficient is lower in size and less statistically significant when compared with the coefficient of the variable log(*patent citations*; Table 4).

Further analyses. We also ran several regressions to investigate in more detail the link between family or founder firms and innovation. These regressions show among others that the innovation-reducing effect of family management can be found for both family members serving as CEO and family members serving as Chairman. However, because of multicollinearity (the correlation between the variable *family CEO* and the variable *family Chairman* is $r = 0.71$), it is not possible to determine which effect is stronger. In another regression, we combined the management and ownership dimensions of family or founder firms into dummy variables indicating family or founder firms. We find a negative effect of family firms ($p < .01$) and a positive effect of founder firms ($p < .1$) on patent citations. We also ran several regressions where we looked for moderation effects of institutional ownership with regard to the relationship between family or founder firms and innovation. We find evidence that bank ownership reduces the positive effect of founder management on patent citations.

Limitations

As with all research, our study has limitations that offer promise for future research. For instance, our results may suffer from survival bias. Founders may take more risks than families, which is associated with a higher chance of failure. Our sample only includes those firms that have survived until July 2003. We are not able to include those firms in our sample that have perished over the period 1994-2003. That is why our results may be skewed. Even though we cannot rule out completely the possibility of survival bias, it should be noted that our results are based on fixed-effects regressions, which does reduce that possibility.

Discussion

Innovations are critical to firm performance and economic prosperity (Aghion & Howitt, 1992; Schumpeter, 1942). Unfortunately, innovation research to date has neglected the effects of governance on the economic and technological value of innovations. Most studies have merely provided evidence that ownership concentration influences R&D expenses, which mirrors innovation input (Block, 2012; Chrisman & Patel, 2012; Hill & Snell, 1988; Lee & O'Neill, 2003; Munari et al., 2010). Little research has been conducted, however, on how major owners or executives influence the economic and technological importance of innovations. This study has attempted to fill that gap. We use the number of patent citations and the firm's market-to-book value to measure the economic and technological importance of innovations.

We have argued that not all types of major owners or executives have the same motivations, and hence might approach innovations differently. We drew in part on

SEW research to understand how major founder and family owners and executives might either enhance or diminish the economic and technological value of innovations. Whereas founder owners and managers were expected to innovate and grow their firms because of their gain-seeking entrepreneurial orientation, family owners and managers were expected to see themselves as family nurturers, pursuing risk-averse strategies to avoid loss and protect SEW (Gomez-Mejia et al., 2007; Miller et al., 2011). We substantiated these notions in the context of the propensity of these different owners and managers to create significant innovations. Our results show that, when controlling for R&D spending, founder-managed firms produce innovations with high economic and technological importance. By contrast, family-managed firms produce innovations with low economic and technological importance, even when controlling for R&D spending. Collectively, these findings surfaced an important distinction between founder and family firms: family-managed firms are less likely to produce innovations of a radical and exploratory nature whereas for founder-managed firms, the opposite seems to be true.

The number of patent citations that a patent portfolio receives is not only a measure of the economic and technological importance (Hall et al., 2005; Harhoff et al., 2003; Lanjouw & Schankerman, 2004; Sandner & Block, 2011; Suzuki, 2011; Trajtenberg, 1990) but also a measure of the radicalness of innovations (Dahlin & Behrens, 2005). It can also be interpreted as relating to "invention resonance" (Makri, Lane, & Gomez-Mejia, 2006)—that is, the extent to which the inventions of a firm inspire other researchers or firms to invent on their own or build on the invention. Some inventions only have few applications and constitute dead ends while others have numerous applications and stimulate waves of new inventions (Dahlin & Behrens, 2005; Podolny & Stuart, 1995; Sahal, 1985). The higher the number of patent citations, the more likely it is that the inventions of a firm have been adopted by other firms or researchers in their research programs. Our findings suggest that family management creates inventions with low levels of resonance, while founders as managers stimulate inventions that have a broad range of applications and stimulate new research and inventions by other firms.

Our results contribute to the SEW literature (Berrone et al., 2012; Gomez-Mejia, Cruz, et al., 2011; Gomez-Mejia et al., 2007). Families as managers appear to choose less challenging and less significant innovation projects, perhaps because of their aversion to losing SEW. In contrast, founders as managers appear to be gain seeking rather than loss averse. Their goals seem not to be primarily related to a firm's survival but to its growth and performance. This motivational difference between family and founder managers might explain why the goals of founders as managers are more aligned with those of public shareholders and why as a result, founder firms achieve better financial performance than family firms (Miller et al., 2007). These differences could also contribute to principal–principal agency conflicts in family firms (Villalonga & Amit, 2006) and help explain the many challenges that family firms face in research intensive sectors. A desire to support a family and its needs over the generations can draw away resources required for innovation. Moreover, the "patient capital" of family owners might promote a tolerance of below average firm returns, and hence an indifference toward an insufficient or ineffective innovation policy (Bloom & Van Reenen, 2007; Sirmon & Hitt, 2003). Another contribution to the SEW literature in family firms refers to our distinction between family ownership and family management (Block, 2010). Most studies so far use only family ownership as a proxy for the pursuit of SEW. Our findings suggest that the SEW effect of family ownership can also be attributed to family management. It seems that family firms are very heterogeneous in the emphasis they place on SEW (Chrisman & Patel, 2012). The preservation of SEW seems to be particularly high among those family firms that are family managed. Our analyses also surfaced an important distinction between founder management and founder ownership. Founder ownership did not have a significant effect on the economic and technological importance of innovations produced whereas founder management had a strong positive effect. Founders, who are still in charge of firms that have become major (S&P 500) corporations, are typically exceptionally talented people. Where those of proven talent run a company, their abilities and their incentives to perform well may prove to be a significant advantage. By contrast, where the founder is only an owner and has handed off the management task to another person, both talent and motivation may be lost. A hired CEO may be less endowed than the founder of a great enterprise. Moreover, the latter may be subject to significant agency problems—as now the perquisites of career may come before the success of the firm. One well-known agency problem comes in the form of an aversion to risks that might jeopardize position, compensation, and reputation (Narayanan, 1985). Risk aversion

can be especially costly to innovation—especially innovation that is pathbreaking (Hall, 2002; Holmstrom, 1989; Zenger, 1994). Finally, our results contribute to the discussion of how SEW evolves over generations (Berrone et al., 2012). Unlike with economic wealth, which often disappears as generations evolve, SEW seems to increase over generations. When a firm changes status from founder to family, it tends to value more SEW aspects even if that comes at the expense of economic or technological benefits.

The disadvantage of family firms might be further aggravated by issues of human capital. Research shows that in innovative industries, firm performance depends on retaining highly skilled workers (Thornhill, 2006). However, family businesses tolerate suboptimal human capital because of altruistic family behavior and goals related to family executive succession (Bloom & Van Reenen, 2007; Pérez-González, 2006; Schulze et al., 2003). Since job requirements in research-intensive industries may be especially demanding, direct family management of firm resources and strategic decisions might be detrimental. Families might also harm firm innovations because innovativeness and performance benefit from alliances, joint ventures, acquisitions, and the support of venture capitalists, all of which are anathema to the many family owners and managers who wish to retain control of their enterprises (Keil, Maula, Schildt, & Zahra, 2008).

The lack of outsider influence on many family business boards also limits effective monitoring of managerial conduct. Le, Walters, and Kroll (2006) find that influential *external* monitors had a positive impact on R&D efforts and firm performance. In a study of family firms, Chang et al. (2010) found that unchecked family control reduces the performance expected from innovations. Morck and Yeung (2003) argue that some family business groups are reluctant to adopt innovations that might cannibalize products of divisions led by family members, even when the overall financial benefits to shareholders would be positive. All these findings suggest the perniciousness of a family's SEW agenda.

Finally, our results contribute to the literature on firm governance and performance. Previous research has shown above average performance for founder firms and mixed performance results for family firms (Miller et al., 2007; Villalonga & Amit, 2006). Our study suggests a reason for the superior performance findings for founder firms while questioning the research that finds superior family firm performance (Anderson & Reeb, 2003). We believe that family firms are more apt to underperform in research intensive sectors. It appears that SEW priorities restrict significant innovations in family firms. Certainly, these results have economic significance as prior research shows that innovations are a driver for firm and economic performance (Combs, 2010; Geroski, Machin, & Van Reenen, 1993; Romer, 1990; Schumpeter, 1942; Trajtenberg, 1990).

Our results also have an important practical implication for family firms. SEW concerns may bias family firms toward incremental rather than radical innovation projects. In some industries, however, a constant flow of radical innovations is needed to stay competitive. Family firms should be aware of this bias to ensure the quality of their portfolio of innovation projects. More than other firms, family firms face a constant need to benchmark their innovation portfolios against those of their competitors. In this context, it might be a good idea to appoint industry or academic experts from outside the family to review the family firm's innovation portfolio.

Further research using patent data might investigate the degree of science harvesting by family and founder firms. Some firms conduct basic research not for particular results or inventions but to exploit knowledge created by universities or research institutes (science harvesting). Such a strategy would manifest itself in a higher number of references in the firm's patents to scientific papers in peer-reviewed journals (Breitzman, Thomas, & Cheney, 2002). Such research would also help to determine whether family or founder firms are more likely to use an explorative or exploitive innovation strategy (Jansen, Van Den Bosch, & Volberda, 2006). Another interesting research question concerns the role of intellectual property as a protection mechanism in family and founder firms. In some industries, however, where patents can be circumvented by competitors, patents tend to be ineffective as a protection mechanism (Arundel & Kabla, 1998). Secrecy or long lead times may be more effective mechanisms for appropriating the rents from innovation (Arundel, 2001; Harabi, 1995; Levin, Klevorick, Nelson, & Winter, 1987). Furthermore, over the past 20 years, a rapid growth in the number of patents has been observed (Hall & Ziedonis, 2001; Kim & Marschke, 2004). Part of this growth is not due to an increase in inventive activity but rather to strategic reasons, such as increasing one's power in technology negotiations and avoiding trials (Duguet & Kabla, 1998; Reitzig, Henkel, & Heath, 2007). SEW concerns may influence family firms with regard to their use of intellectual property as a protection mechanism.

Appendix

Description of Variables.

Variables	Description
Innovation variables	
Patent count	Number of granted patents on basis of the application year; source: own calculation from the patent data in the NBER data set (Hall, Jaffe, & Trajtenberg, 2001)
Patent citations	Number of (forward) citations of granted patents corrected for truncation bias, including self-citations; source: (Hall et al., 2001)
Ownership and management variables	
Ownership share founder	Percentage of common stock owned by founder. Main source: company's proxy statements (mostly DEF 14A)[a]
Ownership share family	Percentage of common stock owned by family. Main source: company's proxy statements (mostly DEF 14A) [a]
Management by founder	Dummy = 1 if founder is CEO or chairman. Main source: company's proxy statements (mostly DEF 14A)[a]
Management by family	Dummy = 1 if a member of the founding family is CEO or chairman. Main source: company's proxy statements (mostly DEF 14A)[a]
Ownership share pension funds	Percentage of common stock owned by pension funds. Main source: company's proxy statements (mostly DEF 14A)[a]
Ownership share mutual funds	Percentage of common stock owned by mutual funds. Main source: company's proxy statements (mostly DEF 14A)[a]
Ownership share insurance firms	Percentage of common stock owned by insurance firms. Main source: company's proxy statements (mostly DEF 14A)[a]
Ownership share banks	Percentage of common stock owned by banks. Main source: company's proxy statements (mostly DEF 14A)[a]
Ownership share investment advisors	Percentage of common stock owned by investment advisors. Main source: company's proxy statements (mostly DEF 14A)[a]
Ownership share private equity or hedge fund	Percentage of common stock owned by private equity firms or hedge funds. Main source: company's proxy statements (mostly DEF 14A)[a]
Firm variables and controls	
Log(sales)	Natural logarithm of sales (in million $). Source: Compustat; data item: AT
Log(R&D/sales)	Zero skewness log transformation of R&D expenditures (in mn $) divided by sales (in mn $). Log(R&D/sales −k) with k = −0.0047473. Source: Compustat, data items: AT, XRD
Log(market-to-book value)$_{t-1}$	Calculated as natural logarithm of market value of equity + book value of total debt + convertible debt and preferred stock + current liabilities – current assets divided by book value of total assets, lagged by 1 year. Source: Compustat, data items: MKVALF, DT, DCPSTK, CL, CA, AT
Log(firm age)	Natural logarithm of number of years since the firm was founded
Log(debt/assets)	Natural logarithm of (book value of debt divided by total assets). Source: Compustat; data items: D, AT
Market risk	The firm's beta calculated as the firm's daily return regressed against the returns of the S&P 500 Index. Source: CRSP
Year dummies	Ten indicator variables for the years 1994-2003
Industry dummies	Six industry indicator variables: chemicals and allied products (SIC 28); industrial machinery and equipment (SIC 35); electronic and other electrical equipment (SIC 36); transportation equipment (SIC 37); instruments and related products (SIC 38); communications (SIC 48). Source: Compustat

Note. CRSP = Center for Research on Security Prices.

a. To resolve unclear cases, we checked the ownership and management information with information from Hoover's Handbook of American Business, Gale Business Resources, the Twentieth-Century American Business Leaders Database at Harvard Business School, Forbes Lists of the 400 Richest Americans, Marquis Who's Who in America, and information available on the firms' website.

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Notes

1. We choose the year 2003 and not a more recent year as a starting point since we use patent citation data. Patent citations only occur some years *after* the firm has successfully applied for a patent.
2. We used Bronwyn Hall's update of the patent data files from December 29, 2008, which runs through 2006.
3. See http://www.epo.org/patents/patent-information/raw-data/test/product-14-24.html (accessed March 10, 2010).
4. We use the two terms forward citations and patent citations interchangeably.
5. Proxy statements do not report shareholders with less than 5% of firm ownership unless they are also members of the board of directors.
6. The likelihood ratio tests for overdispersion are significant at the 1% level.
7. The Hausman test (Hausman, 1978) could not be calculated in some cases since the asymptotic assumptions were not met and provided an inconclusive result ($p < .10$), which is why we also estimated random-effects models in the robustness checks section. However, we base our conclusions mainly on the fixed-effects models, since unlike random-effects models they do not make an assumption about the firm-specific error term.
8. The results of the robustness checks are available from the corresponding author.
9. We excluded software firms falling into the SIC 48 category, since patents are not a meaningful indicator for software firms (Bessen & Hunt, 2007).

References

Acs, Z., & Audretsch, D. (1988). Innovation in large and small firms: An empirical analysis. *American Economic Review*, *78*, 678-690.

Aghion, P., & Howitt, P. (1992). A model of growth through creative destruction. *Econometrica*, *60*, 323-351.

Anderson, R. C., & Lee, D. S. (1997). Ownership studies: The data source does matter. *Journal of Financial and Quantitative Analysis*, *32*, 311-329.

Anderson, R. C., & Reeb, D. M. (2003). Founding family ownership and firm performance: Evidence from the S&P 500. *Journal of Finance*, *58*, 1301-1328.

Arundel, A. (2001). The relative effectiveness of patents and secrecy for appropriation. *Research Policy*, 30, 611-624.

Arundel, A., & Kabla, I. (1998). What percentage of innovations are patented? Empirical estimates for European firms. *Research Policy*, 27, 127-141.

Baysinger, B. D., Kosnik, R. D., & Turk, T. A. (1991). Effects of board and ownership structure on corporate R&D strategy. *Academy of Management Journal*, *34*, 206-214.

Bennedsen, M.K., Nielsen, M.K., Pérez-González, F., & Wolfenzon, D. (2007). Inside the family firm: The role of families in succession decisions and performance. *Quarterly Journal of Economics*, *122*, 647-691.

Berrone, P., Cruz, C., & Gomez-Mejia, L. R. (2012). Socioemotional wealth in family firms: Theoretical dimensions, assessment approaches, and agenda for future research. *Family Business Review*, *25*, 258-279.

Berrone, P., Cruz, C., Gomez-Mejia, L. R., & Larraza-Kintana, M. (2010). Socioemotional wealth and corporate responses to institutional pressures: Do family-controlled firms pollute less? *Administrative Science Quarterly*, *55*, 82-113.

Bertrand, M., & Schoar, A. (2006). The role of family in family firms. *Journal of Economic Perspectives*, *20*(2), 73-96.

Bessen, J., & Hunt, R.M. (2007). An empirical look at software patents. *Journal of Economics & Management Strategy*, 16, 157-189.

Blind, K., Edler, J., Frietsch, R., & Schmoch, U. (2006). Motives to patent: Empirical evidence from Germany. *Research Policy*, *35*, 655-672.

Block, J. (2010). Family management, family ownership, and downsizing: Evidence from S&P 500 firms. *Family Business Review*, *23*, 109-130.

Block, J. (2012). R&D investments in family and lone founder firms: An agency perspective. *Journal of Business Venturing*, *27*, 248-265.

Bloom, N., & Van Reenen, J. (2007). Measuring and explaining management practices across firms and countries. *Quarterly Journal of Economics*, *122*, 1351-1408.

Breitzman, A., Thomas, P., & Cheney, M. (2002). Technological powerhouse or diluted competence: Techniques for

assessing mergers via patent analysis. *R&D Management*, 32, 1-10.

Brickley, J. A., Lease, R. C., & Smith, C. W. Jr. (1988). Ownership structure and voting on antitakeover amendments. *Journal of Financial Economics*, *20*, 267-291.

Bushee, B. J. (1998). The influence of institutional investors on myopic R&D investment behavior. *Accounting Review*, *73*, 305-333.

Boone, C., de Brabander, B., & van Witteloostuijn, A. (2007). CEO locus of control and small firm performance. *Journal of Management Studies*, *33*, 667-700.

Chang, S. C., Wu, W. Y., & Wong, Y. J. (2010). Family control and stock market reactions to innovation announcements. *British Journal of Management*, *21*, 152-170.

Chen, H. L., & Hsu, W. T. (2009). Family ownership, board independence, and R&D investment. *Family Business Review*, *22*, 347-362.

Chrisman, J. J., & Patel, P. C. (2012). Variations in R&D investments of family and non-family firms: Behavioral agency and myopic loss aversion perspectives. *Academy of Management Journal*, *55*, 976-997.

Chung, K. H. & Pruitt, S. W. (1994). A simple approximation of Tobin's q. *Financial Management*, *23*(3), 70-74.

Combs, J. G. (2010). Big samples and small effects: Let's not trade relevance and rigor for power. *Academy of Management Journal*, *53*, 9-13.

Coombs, J. E., & Bierly, P. E. (2006). Measuring technological capability and performance. *R&D Management*, *36*, 421-438.

Covin, J. G., & Slevin, D. P. (1989). Strategic management of small firms in hostile and benign environments. *Strategic Management Journal*, *10*, 75-87.

Czarnitzki, D., & Kraft, C. (2009). Capital control, debt financing and innovative activity. *Journal of Economic Behavior & Organization*, *71*, 372-383.

Dahlin, K. B., & Behrens, D. B. (2005). When is an invention really radical?: Defining and measuring technological radicalness. *Research Policy*, *34*, 717-737.

De Massis, A., Frattini, F., & Lichtenthaler, U. (2012). Research on technological innovation in family firms: Present debates and future directions. *Family Business Review*. Advance online publication. doi:10.1177/0894486512466258

De Rassenfosse, G. (2012). How SMEs exploit their intellectual property assets: Evidence from survey data. *Small Business Economics*, *39*, 437-452.

Dlugosz, J., Fahlenbrach, R., Gompers, P., & Metrick, A. (2006). Large blocks of stock: prevalence, size and measurement. *Journal of Corporate Finance*, *12*, 594-618.

Duguet, E., & Kabla, I. (1998). Appropriation strategy and the motivations to use the patent system: an econometric analysis at the firm level in French manufacturing. *Annales d'Économie et de Statistique*, 49/50, 289-327.

Geroski, P., Machin, S., & Van Reenen, J. (1993). The profitability of innovating firms. *RAND Journal of Economics*, *24*, 198-211.

Geroski, P., & Walters, C. F. (1995). Innovative activity over the business cycle. *Economic Journal*, *105*, 916-928.

Gomez-Mejia, L. R., Nunez-Nickel, M., & Gutierrez, I. (2001). The role of family ties in agency contracts. *Academy of Management Journal*, *44*, 81-95.

Gomez-Mejia, L. R., Haynes, K. T., Nunez-Nickel, M., Jacobson, K. J. L., & Moyano-Fuentes, J. (2007). Socioemotional wealth and business risks in family-controlled firms: Evidence from Spanish olive oil mills. *Administrative Science Quarterly*, *52*, 106-137.

Gomez-Mejia, L. R., Cruz, C., Berrone, P., & De Castro J. (2011). The bind that ties: Socioemotional wealth preservation in family firms. *Academy of Management Annals*, *5*, 653-707.

Gomez-Mejia, L. R., Hoskisson, R. E., Makri, M., Sirmon, D. G., & Campbell, J. T. (2011). *Innovation and the preservation of socioemotional wealth: The paradox of R&D investment in family controlled high technology firms* (Working Paper). College Station: Texas A&M University, Mays Business School.

Grabowsky, H., & Vernon, J. (1990). A new look at the returns and risks to pharmaceutical R&D. *Management Science*, *36*, 804-821.

Griliches, Z. (1990). Patent statistics as economic indicators: a survey. *Journal of Economic Literature*, 28, 1661-1707.

Hagedoorn, J., & Cloodt, M. (2003). Measuring innovative performance: Is there an advantage in using multiple indicators? *Research Policy*, *32*, 1365-1379.

Hall, B. H. (2002). The financing of research and development. *Oxford Review of Economic Policy*, *18*, 35-51.

Hall, B. H., Jaffe, A. B., & Trajtenberg, M. (2001). *The NBER patent citations data file: Lessons, insights and methodological tools* (NBER working paper no. 8498). Cambridge, MA: National Bureau of Economic Research.

Hall, B. H., Jaffe, A. B., & Trajtenberg, M. (2005). Market value and patent citations. *RAND Journal of Economics*, 36, 16-38.

Hall, B. H., & Ziedonis, R. H. (2001). The patent paradox revisited: an empirical study of patenting in the U.S. semiconductor industry, 1979-1995. *RAND Journal of Economics*, 32, 101-128.

Hansen, J. A. (1992). Innovation, firm size, and firm age. *Small Business Economics*, *4*, 37-44.

Hansen, G. S., & Hill, C. W. L. (1991). Are institutional investors myopic? A time-series study of four technology-driven industries. *Strategic Management Journal*, *12*, 1-16.

Harabi, N. (1995). Appropriability of technical innovations. An empirical analysis. *Research Policy*, *24*, 981-992.

Harhoff, D., Narin, F., Scherer, F. M., & Vopel, K. (1999). Citation frequency and the value of patented inventions. *Review of Economics and Statistics*, 81, 511-515.

Harhoff, D., Scherer, F. M., & Vopel, K. (2003). Citations, family size, opposition and the value of patent rights. *Research Policy*, 32, 1343-1363.

Häussler, C., Harhoff, D., & Müller, E. (2009). *To be financed or not: The role of patents for venture capital financing* (ZEW–Centre for European Economic Research Discussion Paper No. 09-003).

Hausman, J. A. (1978). Specification tests in econometrics. *Econometrica*, *46*, 1251-1271.

He, J., & Wang, H. C. (2008). Innovative knowledge assets and economic performance: The asymmetric roles of incentives and monitoring. *Academy of Management Journal*, *52*, 919-938.

Hill, C. M. L., & Snell, S. A. (1988). External control, corporate strategy and firm performance in research intensive industries. *Strategic Management Journal*, *9*, 577-590.

Himmelberg, C. P., & Petersen, B. C. (1994). R&D and internal finance: A panel study of small firms in high-tech industries. *Review of Economics and Statistics*, *76*, 38-51.

Holmstrom, B. (1989). Agency costs and innovation. *Journal of Economic Behavior & Organization*, *12*, 305-327.

Jansen, J. J. P., Van Den Bosch, F. A. J., & Volberda, H. W. (2006). Exploratory innovation, exploitative innovation, and performance effects of organizational antecedents and environmental moderators. *Management Science*, *52*, 1661-1674.

Kahneman, D., & Tversky, A. (1979). Prospect theory: An analysis of decision under risk. *Econometrica*, *47*, 263-292.

Keil, T., Maula, M., Schildt, H., & Zahra, S.A. (2008). The effect of governance modes and relatedness of external business development activities on innovative performance. *Strategic Management Journal*, *29*, 895-907.

Kim, J., & Marschke, G. (2004). Accounting for the recent surge in U.S. patenting: Changes in R&D expenditures, patent yields, and the high-tech sector. *Economics of New Innovation and New Technology*, 13, 543-558.

Kirzner, I. (1979). *Perception, opportunity, and profit: Studies in the theory of entrepreneurship*. Chicago, IL: University of Chicago Press.

Kochhar, R., & David, P. (1996). Institutional investors and firm innovation: A test of competing hypotheses. *Strategic Management Journal*, *17*, 73-84.

Kroll, M., Walters, B. A., & Le, S. A. (2007). The impact of board composition and top management team ownership structure on post-IPO performance in young entrepreneurial firms. *Academy of Management Journal*, *50*, 1198-1216.

Langlois, R. (2007). The entrepreneurial theory of the firm and the theory of the entrepreneurial firm. *Journal of Management Studies*, *44*, 1107-1124.

Lanjouw, J. M., & Schankerman, M. (2004). Patent quality and research productivity: measuring innovation with multiple indicators. *Economic Journal, 114*(April), 441-465.

Le, S. A., Walters, B., & Kroll, M. (2006). The moderating effects of external monitors on the relationship between R&D spending and firm performance. *Journal of Business Research*, *59*, 278-287.

Le Breton-Miller, I., Miller, D., & Lester, R. (2010). Stewardship or agency: a social embeddedness reconciliation of conduct and performance in public family businesses. *Organization Science*, *22*, 704-721.

Lee, P. M., & O'Neill, H. M. (2003). Ownership structures and R&D investments of U.S. and Japanese firms: Agency and stewardship perspectives. *Academy of Management Journal*, *46*, 212-225.

Levin, R. C., Klevorick, A. K., Nelson, R. R., & Winter, S. (1987). Appropriating the returns from industrial research and development. *Brookings Papers on Economic Activity*, *3*, 783-831.

Lim, E. N. K., Lubatkin, M. H., & Wiseman, R. M. (2010). A family firm variant of the behavioral agency theory. *Strategic Entrepreneurship Journal*, *4*, 197-211.

Lumpkin, G. T., & Dess, G. (1996). Clarifying the entrepreneurial orientation construct and linking it to performance. *Academy of Management Review*, *21*, 135-172.

Makri, M., Lane, P. J., & Gomez-Mejia, L. R. (2006). CEO incentives, innovation, and performance in technology-intensive firms: A reconciliation of outcome and behavior-based incentive schemes. *Strategic Management Journal*, *27*, 1057-1080.

Mann, R. J., & Sager, T. W. (2007). Patents, venture capital, and software start-ups. *Research Policy*, 36, 193-208.

McClelland, D. C. (1961). *The achieving society*. Princeton, NJ: Van Nostrandt.

Mehrotra, V., Morck, R., Shim, J., & Wiwattanakantang, Y. (2011). Must love kill the family firm? Some exploratory evidence. *Entrepreneurship Theory and Practice*, *35*, 1121-1148.

Miller, D. (1983). The correlates of entrepreneurship in three types of firms. *Management Science*, *29*, 770-792.

Miller, D., Le Breton-Miller, I., & Lester, R. (2010). Family ownership and acquisition behavior in publicly traded companies. *Strategic Management Journal*, *31*, 201-223.

Miller, D., Le Breton-Miller, I., & Lester, R. (2011). Family and lone founder ownership and strategic behavior. *Journal of Management Studies*, *48*, 1-25.

Miller, D., Le Breton-Miller, I., Lester, R., & Cannella Jr., A. (2007). Are family firms really superior performers? *Journal of Corporate Finance*, *13*, 829-858.

Miller, D., Minichilli, A., & Corbetta, G. (2012). Is family leadership always beneficial? *Strategic Management Journal*. Advance online publication. doi:10.1002/smj.2024

Mishra, C. S., & McConaughy, D. L. (1999). Founding family control and capital structure: The risk of loss of control and the aversion to debt. *Entrepreneurship Theory and Practice*, *23*(4), 53-64.

Morck, R., Wolfenzon, D., & Yeung, B. (2005). Corporate governance, economic entrenchment, and growth. *Journal of Economic Literature*, *43*, 655-720.

Morck, R., & Yeung, B. (2003). Agency problems in large family business groups. *Entrepreneurship Theory and Practice*, *27*, 367-382.

Munari, F., Oriani, R., & Sobrero, M. (2010). The effects of owner identity and external governance systems on R&D investments: a study of Western European firms. *Research Policy*, *39*, 1093-1104.

Muñoz-Bullón, F., & Sanchez-Bueno, M. J. (2011). The impact of family involvement on the R&D intensity of publicly traded firms. *Family Business Review*, *24*, 62-70.

Narayanan, M. P. (1985). Managerial incentives for short-term results. *Journal of Finance*, *40*, 1469-1484.

Narin, F., Noma, E., & Perry, R. (1987). Patents as indicators of corporate technological strength. *Research Policy*, 16(2-4), 143-155.

Nelson, T. (2003). The persistence of founder influence: Management, ownership, and performance effects at Initial Public Offering. *Strategic Management Journal*, *24*, 707-724.

Pérez-González, F. (2006). Inherited control and firm performance. *American Economic Review*, *96*, 1559-1588.

Podolny, J. M., & Stuart, T. E. (1995). A role based ecology of technological change. *American Journal of Sociology*, *100*, 1224-1260.

Reitzig, M., Henkel, J., & Heath, C. (2007). On sharks, trolls, and their patent prey–unrealistic damage awards and firms' strategies of being infringed. *Research Policy*, 36, 134-154.

Romer, P. M. (1990). Endogenous technological-change. *Journal of Political Economy*, *98*(5), 71-102.

Sahal, D. (1985). Technological guideposts and innovation avenues. *Research Policy*, *14*(2), 61-82.

Sandner, P., & Block, J. (2011). The market value of R&D, patents and trademarks. *Research Policy*, 40, 969-985.

Schulze, W. S., Lubatkin, M., & Dino, R. N. (2003). Exploring the agency consequences of ownership dispersion among the directors of private family firms. *Academy of Management Journal*, *46*, 179-194.

Schulze, W. S., Lubatkin, M. H., Dino, R. N., & Buchholtz, A. K. (2001). Agency relationships in family firms: Theory and evidence. *Organization Science*, *12*, 99-116.

Schumpeter, J. A. (1942). *Capitalism, socialism and democracy*. New York, NY: Harper & Row.

Schwarz, G. (1978). Estimating the dimension of a model. *Annals of Statistics*, *6*, 461-464.

Sirmon, D. G., & Hitt, M. A. (2003). Managing resources: Linking unique resources, management and wealth creation in family firms. *Entrepreneurship Theory and Practice*, *27*, 339-358.

Spriggs, M., Yu, A., Deeds, D., & Sorenson, R. L. (2012). Too many cooks in the kitchen: Innovative capacity, collaborative network orientation, and performance in small family businesses. *Family Business Review*. Advance online publication. doi:10.1177/0894486512468600

Suzuki, J. (2011). Structural modeling of the value of patent. *Research Policy*, 40, 986-1000.

Thornhill, S. (2006). Knowledge, innovation and firm performance in high- and low-technology regimes. *Journal of Business Venturing*, *21*, 687-703.

Trajtenberg, M. (1990). A penny for your quotes: Patent citations and the value of innovations. *RAND Journal of Economics*, 21, 172-187.

Tribo, J. A., Berrone, P., & Surroca, J. (2007). Do the type and number of blockholders influence R&D investments? New evidence from Spain. *Corporate Governance: An International Review*, *15*, 828-842.

Verbeek, M. (2004). *A guide to modern econometrics*. Chicester, England: Wiley.

Villalonga, B., & Amit, R. (2006). How do family ownership, control and management affect firm value? *Journal of Financial Economics*, *80*, 385-417.

Wagner, S., & Cockburn, I. (2010). Patents and the survival of Internet-related IPOs. *Research Policy*, 39, 214-228.

Wasserman, N. (2006). Stewards, agents, and the founder discount: Executive compensation in new ventures. *Academy of Management Journal*, *49*, 960-976.

Wiseman, R. M., & Gomez-Mejia, L. R. (1998). A behavioral agency model of managerial risk taking. *Academy of Management Journal*, *23*, 133-153.

Zahra, S. A., Neubaum, D. O., & Huse, M. (2000). Entrepreneurship in medium-size companies: Exploring the effects of ownership and governance systems. *Journal of Management*, *26*, 947-976.

Zenger, T. R. (1994). Explaining organizational diseconomies of scale in R&D: Agency problems and the allocation of engineering talent, ideas, and effort by firm size. *Management Science*, *40*, 708-729.

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