The Value of Trademarks

Pranav Desai
Ekaterina Gavrilova
Rui Silva
Margarida Soares*

November 17, 2022

Abstract

We create a new measure of the value of an important, but previously understudied, type of intangible asset—trademarks. We quantify the stock market reaction to the publication of almost one million individual trademarks manually matched to their corporate owners. We find that trademarks possess substantial economic value for firms: the average individual trademark is worth $36.76 million, and the annual output of new trademarks represents approximately 2% of total assets. Firms that publish trademarks subsequently invest more in physical capital, hire more employees, increase production output, become more profitable, and increase their market share considerably. To establish the causal nature of these findings we exploit the quasi-random assignment of USPTO examiners to trademarks. Trademarks are complementary to patents and positively correlated with measures of knowledge capital, suggesting a strong association between trademarking and innovation. These results imply that trademarks are an important determinant of firm value and growth.

*All authors are at Nova School of Business and Economics, Portugal. Corresponding author: Rui Silva; email: rui.silva@novasbe.pt. We thank Fabio Bertoni (discussant), Rafael Rogo (discussant), Jiadi Xu (discussant), seminar participants at Cambridge-Nova Workshop, 6th Entrepreneurial Finance (ENTFIN) Annual Meeting, FMA 2022 Meeting, and Nova School of Business and Economics for insightful comments and discussions, and Orestis Exarchos for excellent research assistance. This work was funded by Fundação para a Ciência e a Tecnologia (UIDB/00124/2020, UIDP/00124/2020 and Social Sciences DataLab - PINFRA/22209/2016), POR Lisboa and POR Norte (Social Sciences DataLab, PINFRA/22209/2016).

1 Introduction

The economic importance of intangible assets has increased tremendously over the past decades. While a century ago firms' main source of competitive advantage was derived from their stock of physical capital, recent estimates suggest that most of the value of today's corporations is in the form of intangible assets (e.g., Falato et al. (2020)). Indeed, much of the value of modern firms "comes from things you can't see or count: algorithms and brands and lists" (Bloomberg 2020). Despite the rising economic importance of intangible capital, valuing these assets is fraught with complications. Existing literature has relied on accounting measures derived from costs of producing these assets, which do not take into account their future income streams (e.g., Eisfeldt and Papanikolaou (2013)). Since intangible assets may be long lived, this is a serious limitation. A second approach has relied on aggregate measures, which fail to distinguish between different forms of intangible capital (Ewens et al. (2019)). In absence of reliable measures of intangible assets' value, accurately quantifying their impact on firms, consumers, and the economy at large has remained a challenge.

In this paper, we construct a new forward-looking measure of the value of an important, yet previously understudied, intangible asset—trademarks. According to the United States Patent and Trademark Office (USPTO), a trademark is "a word, phrase, design, or a combination that identifies your goods or services, distinguishes them from the goods or services of others, and indicates the source of your goods or services."[1] Studying trademarks is economically relevant given that they differ from other intellectual property (IP) assets in important ways. First, they cover nearly all industries with a broad class of assets being trademarkable. In contrast, other types of IP tend to be concentrated in a few industries. For example, patents are heavily used in manufacturing but rarely used in finance. Second, trademarks have a potentially perpetual life, unlike other forms of IP.[2] Finally, trademarks are

[1] See 15 U.S.C. §1127.

[2] As long as the trademark owner applies for renewal and shows proof of commercializa-

valid while in-use and are thereby closely linked to product commercialization and the late stages of product innovation.

We begin by constructing a novel dataset through an extensive manual matching procedure linking 1.3 million trademarks to 21,800 unique publicly-held firms in the Compustat database. Leveraging these data, we measure the private value of each individual trademark using the stock market reaction to its publication. This forward-looking valuation approach is particularly well-suited to incorporate the present value of income streams from long-lived assets. Indeed, stock market reactions are often used to quantify the impact of a wide range of events, such as mergers and acquisitions (Andrade and Stafford (2004)), corporate unionization (Lee and Mas (2012)), or patent grants (Kogan et al. (2017)). Measuring the stock-market reaction to trademark publications permits us to quantify the dollar value of individual trademarks and explore the heterogeneity therein. To our knowledge, we are the first to do so.

Equipped with this new measure, we document that a broad set of firms in nearly all industries produce trademarks. To gain perspective, we contrast the prevalence of trademarks in the economy with that of patents—a type of intangible capital that has received much attention in the literature. We find that a greater proportion of firms hold trademarks than hold patents. Most notably, we find that firms trademark prolifically in industries where patenting is not common, such as consumer nondurables, wholesale and retail, and finance. These stylized facts suggest that studying trademarks may help uncover the effects of intellectual property in a wider set of industries than studying patents alone.

In addition to being ubiquitous, trademarks have significant value. According to our estimates, the average trademark is worth $36.76 million (in 2016 USD). Aggregating all annual trademarking activity by each firm, we estimate that the annual firm-level trademark output is worth $66.13 million. This corresponds to approximately 1.94% of total assets, on average.

tion, the trademark can continue to be registered.

We then use our new measure of trademark value to address the question of how trademarking output relates to firm performance. We find that a one-standard-deviation increase in trademark output results in a 1.66% increase in profitability and a 1.13% increase in production output one year later. For the median firm, this increase amounts to $1.71 million higher profits and $4.81 million higher production output. We also find consistently positive effects of trademarking on the firm's physical capital and employment. The competitive effects of trademarking are sizable with a one-standard-deviation increase in trademark output increasing the market share of the firm by 0.98% in the subsequent year and by 3.82% in the fifth year. These results confirm that trademarks' impact on firms is not confined to financial outcomes, but are consequential for a range of real outcomes.

We conduct a series of additional tests to ensure that we are capturing a causal effect of trademarks on firm value and firm growth. First, we contrast the evolution of the performance of firms that apply for a trademark but fail to register it with that of firms that successfully register their marks. We find that firms with failed attempts at registering a trademark do not experience an increase in profits, production inputs, output, or market share in the same way that firms that have trademarks approved do. Second, we exploit the fact that the USPTO assigns examiners to trademarks randomly. We use individual examiners' approval rate for past trademarks to create a measure of examiner leniency. We then test whether firms that face more lenient examiners, and consequently have a larger share of their trademark applications result in registration, subsequently perform better than firms that face stricter examiners. Because of the random nature of examiner assignment, these findings can be interpreted as the causal impact of trademark registration on firm performance. Our results confirm that trademark registration leads to an improvement in firm performance.

Having established that trademarks contribute to the creation of firm value and firm growth, we devote the last part of the paper to an investigation of the sources of trademark value. We focus on two potential sources of value:

innovation and reduction of search costs. The link between trademarks and innovation is ex-ante empirically ambiguous. On one hand, previous theoretical literature has emphasized that trademarks capture product-level innovation (Romer (1990); Grossman and Helpman (1991)). On the other hand, a competing set of theories have categorized trademarks more as a measure of firm branding (Economides (1988)). Our tests suggest that firms may rely on trademarks to protect their innovation. In particular, we find that firms with higher trademark output subsequently increase their patent output. In addition, firms with higher patent output subsequently increase their trademark output. This is consistent with the use of trademarks by firms following patenting breakthroughs. To further test whether trademark output is capturing innovative activity by firms, we use the market-based measure of intangible capital constructed by Ewens et al. (2019) to decompose firm-level aggregate intangible capital into its two main components: innovation-related knowledge capital and organizational capital. We find that a one standard deviation increase in a firm's trademark output results in an 0.98% and 0.88% increase in knowledge and organizational capital of the firm, respectively. Taken as a whole, our results suggest a strong association between trademarking and innovation.

We also document that trademark output is more valuable in industries where consumer search costs are larger. We proxy for consumer search costs with the Herfindahl-Hirschman Index of sales (HHI) and with the measure of product market fluidity of Hoberg et al. (2014). We hypothesize that industries with many competing firms (low HHI) and industries with many similar products (high product market fluidity) are those where consumers face a biggest burden of searching for the product attributes of their liking. In these industries, having a trademark may allow a firm to differentiate its products in the eyes of potential consumers. Consistent with this hypothesis, we find that the market reaction to the registration of a trademark is stronger in industries where customers have more options to choose from, i.e., industries with low HHI and high product market fluidity.

Our paper contributes to several strands of literature in economics and finance. At a broader level, our work relates to the literature on valuing intangible capital. One approach estimates the value of intangible capital using accounting-based measures which capture the costs of producing such capital. Eisfeldt and Papanikolaou (2013), for instance, measure the stock of organizational capital as the accumulated selling, general, and administrative (SG&A) expenses of a firm. Other accounting-based measures of intangible capital have relied on advertising expenses (Belo et al. (2014)), research and development (R&D) expenses, or a combination of the firm's R&D and SG&A expenses (Bernstein and Nadiri (1988); Chan et al. (2001); Hirshleifer et al. (2013)). This approach requires strong assumptions on the capital accumulation rates and does not account for the future value of long-lived intangible assets. To rectify the issues created by accounting based measures, Ewens et al. (2019) exploit the prices paid by M&A acquirers above the market value of the tangible assets of targets to construct a firm-level measure of intangible capital. We contribute to this literature by providing a novel measure of the value of individual trademarks—an important component of intangible capital—based on the stock market reaction to their publication. We document that this type of IP is more broadly employed by firms than other measures of intangible capital, such as patents.

Our approach differs from existing studies on intangible capital in taking a more granular view by focusing on one specific type of intangibles, namely trademarks. In doing so, we are able to contribute to the discussion on the optimality of design of trademarking law which is an important form of intellectual property protection used by firms. While a robust literature in economics (Jaffe and Lerner (2004); Lemley and Shapiro (2005); Boldrin and Levine (2013)), finance (Farre-Mensa et al. (2020)), and management (Hegde et al. (2022)) has studied the patenting system, trademarks, copyrights, and trade secrets have remained understudied. Our paper constitutes a first step towards understanding how firms might use other forms of IP as substitutes or complements to patents in protecting their products and securing their

competitive position.

In that respect, our paper addresses a major challenge in studying trademarks—the absence of an accurate measure of value. The limited existing literature in this area has either relied on using the number of trademarks filed by a firm to proxy for firm-level trademark value (Mauer et al. (2021); Hsu et al. (2022)) or has inferred this value using a firm production function (Sandner and Block (2011)). Our goal, by contrast, is to construct a direct measure of the dollar value of individual trademarks that covers nearly all publicly-held firms and that can be easily replicated using publicly-available data. To our knowledge, our study is the first to do so.

2 Institutional background

2.1 What are Trademarks?

A trademark is "any word, name, symbol, or device, or any combination thereof that identifies and distinguishes the goods and services of one party from those of others."[3] Originating with the Federal Trade Mark Act in 1870, the federal trademark registration law in the United States was formalized with the Lanham Act in 1946. Between 1884 and 2020, the United States Patent and Trademark Office (USPTO) received approximately 10.8 million applications, underlining the scale of the trademarking system.

Trademark law covers a wide range of assets across all industries. Symbols, shapes, logos, sounds, and colors are among the forms of creative output that can be trademarked. The four types of marks—trade, service, certification, and collective—together comprehensively protect a broad set of intellectual property.[4] While marks, commonly known as "trademarks," are used to identify

[3] See 15 U.S.C. §1127.

[4] While trademarks are technically used to refer to marks used to distinguish goods, for simplicity, we use the term "trademarks" to refer to all types of marks.

goods and are ubiquitous, service marks are also used extensively, accounting for 34% of all registrations. Services such as Google Search Engine, United Airlines, or FedEx all fall within the ambit of trademark law. Marks can also be used to certify quality in the form of certification marks and to identify associations through collective marks.

Trademark law creates a fundamental trade-off between the private profits to owners and the wider social benefits for consumers. Trademarks can benefit their owners by protecting valuable brands. However, unlike brands, registered trademarks provide extensive legal protections to deter unauthorized users from using their mark or confusingly similar marks (Graham et al. (2016)). In addition to pursuing legal action against infringers, owners can "recover profits, statutory damages, attorney fees, and treble damages for infringement."[5] Trademark owners may even prevent inflows of infringing products into the country by registering their mark with the U.S. Customs and Border Protection (CBP).[6]

While owners may use trademarks to boost product recognition and extract monopoly profits in highly saturated markets, consumers may also benefit, since to maintain these profits, owners may be incentivized to invest in product quality and innovation (Aghion and Howitt (1990)). Recognizable trademarks, thus, assure consumers of quality and improve their welfare through lower search costs (Economides (1988)). The Nike "swoosh," the Apple logo, and the Nokia "Grande Valse" ringtone are all examples of prominent trademarks that help consumers distinguish products.

In addition, trademarks may complement other IP assets, especially patents. Trademark protection requires commercial use of marks in product markets. On the other hand, patents primarily protect technological advances, not products, with two out of three products not being associated with any patent filings (Argente et al. (2020)). Patents and trademarks may, therefore, be used to protect intellectual property at different stages of the product inno-

[5]See 15 U.S.C. §1117.
[6]See 15 U.S.C. §1124.

vation process: patents representing the outcome of completed research and trademarks relating to commercialization. The value of a trademark may also come from the fact that, in contrast to the limited 20 year lifespan of granted patents, a mark has a perpetual life while used in commerce.

2.2 The Trademark Examination Process

A firm becomes a trademark owner when it starts using it with its goods and/or services. However, the rights of this trademark are limited unless the firm registers the trademark with the USPTO, thereby having a registered trademark. Federal protection of the trademark ensures the trademark cannot be registered by others. At the same time, trademark registration makes it easier to ward off other firms from using similar trademarks.

To register a trademark, a firm starts by filing an online application and paying a fee of $250 or $350 per mark and class, depending on the type of filing. Figure 1 presents the timeline of the trademark application process. At this time, if the basic information provided is correct, the application is given a USPTO serial number. According to the USPTO, it usually takes between 12 to 18 months from filing to registration, although there is no guarantee that the trademark will ever register, as it may be refused on several grounds. A trademark cannot be registered without a connection to specific goods and services. Thus, the applying firm should ensure that the trademark identifies the specific goods and services with which it will be used. When applying for a trademark, the firm can either file on the basis of "use in commerce" or "intent-to-use." In the first instance, the firm is already using the trademark in the commercialization of its goods and services. In the second instance, the applicant must file a declaration stating its bona fide intention to use the trademark in commerce in the near future.

About three months after the application is filed, the USPTO assigns an examiner who reviews the application, a process that takes about one month.

If the examiner does not find grounds for refusal, the USPTO approves the trademark and publishes it for opposition.[7] Within 30 days of publication, any person or company can file an "opposition" or objection, if they believe the new trademark registration would be detrimental to their business. A panel of administrative judges then reviews the opposition. If no opposition is filed or an opposition is found not to have any merit, then the trademark is registered.[8] In the case of "intent-to-use" applications, the USPTO initially issues a Notice of Allowance, which means that the applicant will be allowed to register after filing the Statement of Use.[9] In contrast, if the opposition against the trademark is allowed, then the trademark is non-registered.

After registration of the trademark, its owner will have to periodically file maintenance documents to keep the registration active. Specifically, within the first 6-year period after registration, the owner must file evidence that the trademark is in use in commerce.[10] Furthermore, the owner has to renew the trademark every ten years, whereby evidence that the trademark is in use in commerce along with a request for renewal must be filed.[11] Failure to file for maintenance or renewal will lead to the registration being cancelled or expired.

Strong trademarks are marks that can set the firm apart from competitors. A trademark is considered to be strong by the USPTO when it is "fanciful," "arbitrary," or "suggestive," meaning that it consists of words or expressions which are either invented for, have no association with, or are suggestive of some characteristic of the underlying goods and services of the firm. In other words, trademarks should not be generic descriptions of the goods and/or services being provided by the firm, since any firm would be using these terms

[7]The USPTO publishes the trademark in the weekly Trademark Official Gazette (TMOG), giving advance notice to the public that the USPTO plans to register the trademark.

[8]This can take about three months since publication, or more if an opposition is filed.

[9]Statement of Use is the written statement by the firm saying they are using the trademark, along with a specimen showing actual use in commerce of the trademark.

[10]The owner must file Section 8 declaration, which is called a "Declaration of Use or Excusable Nonuse".

[11]Owners file a Section 8 declaration and a Section 9 renewal. This is a Combined Declaration of Use or Excusable Nonuse/Application for Renewal.

frequently. Failure of the trademark to comply with these guidelines may lead to refusal of registration. The "likelihood of confusion" between the firm's mark and a mark that is registered or pending registration is the most common ground for refusal of registration. The examiner may consider the "likelihood of confusion" to be high if the mark is similar to other marks in either sound, meaning, or appearance, and if the goods and services are related.

In the population of trademarks, there are 9,640,208 applications for either use in commerce or intent-to-use trademarks, of which 5,487,892 end up being registered. This means that roughly 57% of trademark applications are eventually registered. The share of trademarks that end up being registered is much higher for use in commerce than for intent-to-use applications, with 71.3% of in commerce applications being registered versus 38.8% of intent-to-use applications. Furthermore, on average, trademarks have a long life-span. Graham et al. (2016) document that for the 1990 cohort of registrations, 63.9% of registrations are renewed after 10 years and 53.8% are renewed after 20 years. The fact that registered trademarks are maintained by their owners for long periods of time is a first piece of evidence suggesting that there is significant value in keeping a trademark.

3 Data

3.1 Data sources

We construct a novel dataset that matches individual trademarks to firms and track the trademark ownership over its lifespan by combining data from four data sources.

We obtain trademark data from the United States Patent and Trademark Office (USPTO) Trademark Case Files dataset. This dataset contains information on 10.8 million trademarks spanning the period from 1884 to 2020, out of which 9.6 million include information about their owner. For each trade-

mark, we collect data on title, description, owner's name, filing, publication, and registration dates.

Financial information on firms comes from Compustat North America (Compustat) and from the Center for Research and Security Prices (CRSP). Given that the USPTO dataset does not contain a CRSP or Compustat identifier, matching trademarks to U.S. public firms is challenging. We match trademarks to firms in Compustat and CRSP using fuzzy name matching and manual cross-checks. We proceed in multiple steps. We start by standardizing firms' names and trademark owners' names (assignees) by converting all strings into upper case, deleting non-string characters, and standardizing common words and legal entity types.[12] We then identify the exact matches between trademark owners and Compustat firms. Because exact name matches may be too stringent of a criteria and prevent us from finding true matches, we perform several manual checks. First, the data sets use different abbreviations and/or common names and contain misspelled names. To address this problem, we manually check the most frequent unmatched trademark owner names and those that have the highest similarity to Compustat firms. Ownership changes could make it difficult to match Compustat firms to trademarks. To address this possibility, we use the SDC Platinum M&A dataset to track firm ownership dynamics. Finally, for the remaining unmatched observations, we find the identity of the parent company using data on company subsidiaries from WRDS.

We are able to match around 13% of all trademarks to U.S. public firms. Our sample contains 1.3 million trademarks matched to 21,800 unique Compustat firms from 1886 to 2020. Out of these 1.3 million trademarks, 786,986 (or 62%) trademarks are registered. To the best of our knowledge, our sample provides the most comprehensive coverage of trademarks filed with the

[12]Examples of common words are: international, industry, or research. Examples of words describing legal entities are: corporation or limited liability company. For instance, the word "corporation" can be spelled in different ways: corporation, corp, corpor, coporation, crprtn, etc.

USPTO linked to U.S. public firms.[13] Since Compustat coverage is limited before 1961, we restrict the empirical analysis to the period of 1961–2021. In addition, to be included in the sample that measures the value of trademarks, US public firms must have information available on Compustat, outstanding stock that is actively traded, and non-missing data on the value of total assets, sales, and industry SIC codes. As it is common in the literature, in the analysis of the impact of trademarks on firm growth, we also exclude firms in the Utilities and Financial sectors.

Data on patents come from Kogan et al. (2017). This dataset includes information on patents linked to US public firms between 1926 and 2020. We combine this with the patent dataset from Stoffman et al. (2022), which has an increased coverage of patent-firm matches from 1976 onwards. We then compute the value of each patent for the combined data set using the approach proposed by Kogan et al. (2017).

3.2 Patterns in Trademarking Activity

Table 1 reports the evolution of registered and non-registered trademarks by decade between 1884 and 2020. Figure 1 depicts the evolution of the number of trademark applications (in thousands) between 1884 and 2020. The data show a spectacular growth in the number of trademarks between the late 19th century and the early 21st century, suggesting that this type of intellectual property has been increasing in importance over time.

To gain perspective, we compare the prevalence of trademarks with that of patents, the intangible asset to have received the most attention in past literature. Figure 2 plots the percentage of firms in our sample that hold trademarks, patents, or both trademarks and patents by year of registration. In Panel A, observations are equally-weighted, and in Panel B, observations are weighted by firm size. We document three stylized facts that show that

[13]For example, Mauer et al. (2021) are able to match 462,409 trademarks registered by 13,484 unique CRSP-Compustat firms between 1870 and 2018.

trademarks are ubiquitous. First, more firms obtain trademarks than patents. For example, in 2018 approximately 24.77% firms obtained only trademarks while 12.13% filed only for patents. Second, the usage of trademarks has grown rapidly with firms who rely only on trademarks increasing from 13.12% in 1975 to 32.26% in 2020. In stark contrast, patenting has remained fairly constant. Third, while trademarks are more common than patents, most firms in our sample obtain both, suggesting the existence of complementarities between the two.

Next, we shift the focus of our analysis to the variation in trademarking activity across industries. Unlike other forms of IP protection, trademark law covers a broad set of assets. Hence, we are particularly interested in investigating whether trademarks are prevalent in industries where firms do not or cannot patent. Figure 4 confirms that trademarking is not an industry-specific phenomenon with firms in nearly all industries obtaining trademarks. Still, there is considerable heterogeneity in patterns of firms filing for IP protection across industries. More specifically, firms in wholesale, retail, consumer nondurables, telecommunications, and finance predominantly produce trademarks. Additionally, these industries are characterized by diverging trends in patenting and trademarking.

Taken together, the above patterns highlight the widespread use of trademarks by firms, even in industries where patenting is uncommon. These stylized facts suggest that studying trademarks might help uncover the effects of intellectual property in a wider set of industries than examining patents alone.

3.3 Definitions of the main variables

The main explanatory variable in the analysis is $TMoutput_{f,t}$, which is the sum of the dollar value of all registered trademarks published by firm f in year t as a fraction of the concurrent total assets of the firm. To compute the trademark output of the firm, we first compute $TM\ value_i$, the dollar value of each indi-

vidual trademark i registered by the firm. We describe how we build $TM value_i$ in detail in section 4. We then aggregate the value of all registered trademarks published by the firm in a given year to obtain $Aggregate\, TM\ value_{f,t}$, the value, in millions of dollars deflated to 2020, of all trademarks registered by firm f published in year t:

$$Aggregate\, TM\ value_{f,t} = \sum_{i}^{I_{f,t}} TM\ value_i,$$

where $I_{f,t}$ is the total number of registered trademarks of firm f in year t. $TM\ output_{f,t}$ is obtained by scaling $Aggregate\, TM\ value_{f,t}$ by the concurrent total value of assets of the firm.

To examine whether trademarks have an effect on firm growth, we focus on the following measures of firm performance: *Profits*, *Production output*, *Physical capital*, *Market share*, and *Employment*. *Profits* are computed by subtracting cost of goods sold from sales by a firm in a given year. *Production output* is given by annual sales plus the change in inventories by firm and year. *Physical capital* is the measure of property, plant and equipment. *Profits*, *Production output*, and *Physical capital* are all in millions of dollars and deflated to 2020 dollars using the CPI. *Market share* is the share of firm's annual sales as a fraction of total industry sales, defined at the 3-digit SIC level. *Employment* is the total number of employees in a given firm and year, expressed in thousands.

When analyzing firm growth, it is important to control for a set of firm and industry characteristics. We follow the WRDS Financial Ratios Codebook to define the control variables. *Book-to-market equity* is end of year book value of equity over end of year market value of equity of the firm. *Leverage* is given by total liabilities divided by total book value of assets. *Return on assets* is operating income before depreciation divided by the average of the total value of assets for years t and $t-1$. *Idiosyncratic volatility* is the natural logarithm of the annual standard deviation of the difference between the firm's return and the total return value-weighted index.

In Section 6, we analyze possible mechanisms through which trademarks may affect firm growth. In the first instance, we start by analysing how trademarks and patents interact. We use *Patent output*, which is the aggregate value of all patents for a firm in a year based on stock market reaction to patent publication and scaled by the firm's total assets, following Kogan et al. (2017). In the second instance, we examine the relationship between trademarks and firm intangible capital. We employ Ewens et al. (2019)'s methodology to calculate two components of intangible capital: *Knowledge capital*, which is based on R&D expenses, and *Organizational capital*, which is based on SG&A expenses.

To test whether consumer search costs may help explain the cross-section of trademark value, we split the sample along two dimensions: product market concentration and product market fluidity. Product market concentration is measured using the Herfindahl-Hirshman Index (*HHI*) of sales for each 3-digit SIC industry. *Product market fluidity* is a measure of competition introduced by Hoberg et al. (2014), which captures the similarity of business descriptions of firms' 10-K filings.

4 Main results

4.1 The value of trademarks

We quantify the economic value of a trademark by looking at a firm's stock market reaction around the date of publication of the trademark. We base our measure on the approach put forth by Kogan et al. (2017) and focus on the reaction on the day of and the two subsequent days following publication of the trademark. For a firm with one trademark and one patent on the same day, the idiosyncratic return of the firm on the three day window around the

time trademark i is published, R_i, is:[14]

$$R_i = r_i^{TM} + r_i^P + u_i,$$

where, r_i^{TM} is the estimate of the component of return related to the value of the trademark as a fraction of market capitalization, r_i^P is the estimate of the component of return to the value of the patents as a fraction of market capitalization, and u_i is the component of the firm's return which is unrelated to both trademarks and patents.[15]

We denoted the economic value of trademark i by $TM\,value_i$ and compute it using the following equation:

$$TM\ value_i = \frac{1}{1-\pi}\frac{E[r_i^{TM}|R_i]}{N_i}M_i,$$

where, N_i is the number of registered trademarks and patents, if any, of the firm published on the same day, π the unconditional probability of successful registration, and M_i the market capitalization of the firm on the day before the trademark publication.[16] Notice that $E[r_i^{TM}|R_i]$ is the filtered value of the trademark return and that $TM\,value_i$ is the filtered dollar value of trademarks deflated to 2020 dollars using the CPI.[17]

In Panel A of Table 2, we report the distribution of $TM\ value$ together with those of $E[r_i^{TM}|R_i]$ and R_i. In column 1, we observe that the mean and median returns around the publication of 676,740 new trademarks are close to zero. However, the dollar value of an average trademark is \$36.76 million with trademarks at the 95th percentile being worth a whopping \$155.34 million.

[14] We subtract the market portfolio return from the firm's return on the three day window around trademark publication to obtain the idiosyncratic return.

[15] When only trademarks (patents) are published on a particular day, then r_i^P (r_i^{TM}) is zero.

[16] N_i includes all published trademarks on the same day, which can end up being registered or not. When patents are granted to the firm on the same day, they are also included in N_i.

[17] Following Kogan et al. (2017), we assume r_i^{TM} is distributed according to a normal distribution truncated at 0, $r^{TM} \sim \mathcal{N}^+(0, \sigma_{TM}^2)$, and similarly for r_i^P. Furthermore, the values are in millions of dollars.

Even the least valuable trademarks i.e., those at the 5th percentile are worth on average $460,000, with value increasing monotonically by percentile. This confirms that firms not only trademark prolifically, but also that these assets possess significant economic value.

In Panel B, we consider differences in value of trademarks across industries. The average value of trademarks at the industry level ranges from $15.91 million in consumer durables to $87.59 million in finance. The disparity in trademark values is larger at the right tail of the distribution with a trademark at the 95th percentile in the consumer durables industry being worth $59.72 million while those in oil, gas, and coal, and finance being worth $248.65 million and $391.47 million, respectively. Noticeably, trademarks seem to be particularly valuable in less patent-intensive industries as identified in Figure 3, such as wholesale, retail, consumer nondurables, and finance.

In Panel C, we aggregate the individual trademark values by firm and year. On average, firms produce about 2 trademarks per year. There is, however, substantial variation in the distribution of number of trademarks produced by firms every year. While up to the 50th percentile firms do not file for any trademarks, those at the 95th percentile obtain 11 trademarks annually. The value of the annual trademark output of firms is sizable with a mean of $66.13 million and a value of $256.65 million at the 95th percentile.

In Panel C of Table 2 we also report the value of new trademarks published by firms each year scaled by their respective total assets. Annual trademark output accounts for approximately 1.94% of total assets, on average. At the 95th percentile, trademarks are particularly valuable at 10.51% of total assets. It is worth noting that these statistics capture the annual trademarking output of firms and not the total value of the trademark portfolio held by firms, which is likely to be much higher given the perpetual life of trademarks. Panel D documents the heterogeneity in trademark output across industries. Firms with the largest annual trademark output operate in telecommunications, chemicals, and consumer nondurables. The average annual trademark output for telecommunications firms is worth about $164.44 million, which accounts for

1.66% of these firms' total assets. Business equipment is the industry where trademarks represent a larger share of corporate assets, with the annual trademark output of firms in this industry valued at about $61.99 million, which accounts for 3.71% of total assets, on average.

To understand the value of trademarks relative to other important intangible assets used by firms, we compare the value of trademarks with the value of patents by industry. Panel A of Figure 5 plots the average annual value of trademarks and patents produced by firms across industries, scaled by their total assets. Consistent with the findings in Panel D of Table 2, trademark output is heterogeneous across industries, as is patent output. Nevertheless, there are striking differences between industries, with the value of trademark output in industries such as wholesale, retail, consumer nondurables and, telecommunication being much higher than that of their respective patent output. Adjusting for firm size in Panel B, we can analyze whether smaller or larger firms produce higher value trademarks. We find that in the business equipment and healthcare, medical equipment industries, smaller firms publish more valuable trademarks. This indicates that the production of valuable trademarks is not concentrated among the largest firms.

Table 3 reports summary statistics on the variables used in the analysis.

4.2 Trademarks and firm growth

To understand the impact of trademark output on firms, we investigate whether firms performance is improved when it registers valuable trademarks. We do this by estimating the following equation:

$$logY_{f,t+\tau} - logY_{f,t} = \beta_{1\tau} TM\ output_{f,t} + \beta_2 X_{f,t} + u_{f,t+\tau}. \quad (1)$$

Where, $Y_{f,t+\tau}$ is a measure of firm performance of firm f in year $t+\tau$. The outcome variable $logY_{f,t+\tau} - logY_{f,t}$ captures the growth in Y between years t

and $t+\tau$. We employ the following measures of firm performance (Y): *Profits*, *Production output*, *Market share*, *Physical capital*, and *Employment*. The main explanatory variable of interest is $TM\ output_{f,t}$, the trademark output of firm f in year t. $X_{f,t}$ is a vector of controls, which includes the following variables: *Leverage*, *Return on assets*, *Book-to-market equity*, and *Idiosyncratic volatility*. Because firm size might affect both trademark output and performance (e.g., Greenhalgh et al. (2003); Greenhalgh et al. (2006)) the set of controls also includes the natural logarithm of *Physical capital*, and the natural logarithm of *Employment*. Finally, to ensure that the estimates are not influenced by time-varying industry-level factors, the vector of controls also includes year-by-three-digit-SIC-industry fixed effects.

The main coefficient of interest in these regressions is $\beta_{1\tau}$, which measures the association between a firm's trademark output and its subsequent growth. As we are interested in understanding the dynamic evolution of these outcome variables, we consider time horizons τ from one to five years after trademark registration.

Table 4 reports the results. In Panel A, the outcome variable is *Profits Growth*. We find that a one-standard-deviation increase in trademark output is linked with a sizable and statistically significant increase in firm profits of 1.66% one year later. This effect increases steadily to 2.65%, 3.47%, 4.24%, and 4.93% after two, three, four, and five years, respectively. To understand the economic magnitude of these effects, consider the median firm in our sample, which generates profits of \$103.03 million. For this firm, a one-standard-deviation increase in the value of trademark output is associated with higher profits of \$1.71 million (= 1.66% × \$103.03) one year later. After five years, the increase in profits is even more sizable amounting to \$5.08 million (= 4.93% × \$103.03).

Panel B shows a similar trend for production output. A one-standard-deviation increase in the value of trademarks output is linked to, respectively, 1.13%, 1.88%, 2.62%, 3.52%, and 4.29% higher production output over one through five years after registration. For the median firm with output of

$370.38 million, this equates to an additional $4.81 million (=1.13% × $370.38) in one year and $15.89 million (=4.29% × $370.38) after five years.

In Panel C, we replace the dependent variable in equation 1 with market share growth and study a firm's growth after trademarking *relative* to its product market competitors. We find that a one-standard-deviation increase in the value of trademark output results in an immediate and significant increase of 0.98% in the firm's market share. The competitive effect of trademarks grows considerably to 3.82% by the fifth year after trademark registration.

Finally, Panels D and E look at the link between trademarks and the firm's production inputs—capital and labor. The results show that a one-standard-deviation increase in a firm's trademark output is associated with a 1.06% increase in the use of physical capital and a 0.71% increase in the number of employees in the year after the trademark registration. Like in previous panels, the growth in capital and labor employed in production is larger as time goes by, with the estimates in year five after trademark registration being about twice as large as those in the year immediately after registration.

To explore the trends before trademark output is produced, we re-estimate equation 1 with time horizons τ = -1,..,-5 years and plot the standardized coefficients in Figure 6. Visual analysis of the graph confirms that there is a sizable and immediate rise in firm profits, production output, and market share upon trademark acquisition. However, there is no visible pre-trend in these variables before trademarking takes place. Consistent with the estimates in Table 4 this increase is persistent up to five years thereafter.

Panels D and E of Figure 6 depict the dynamic evolution of physical capital and employment around trademarking events. In contrast to the evidence in Panels A to C, we find some evidence that firms' inputs start to grow before trademark registration. One potential explanation for this pattern could be firms making labor and capital investments in the expectation of the publication of the trademarks they have filed, as a gradual adjustment in capital and labor may be less costly than a sudden adjustment in inputs upon trademark

registration.

Table 5 repeats the analysis in Table 4 but separates the main independent variable *TM output* by the legal basis under which each trademark was filed. We find that both *Intent-to-use TM output* and *In-commerce TM output* are positively associated with subsequent firm growth. This indicates that our results are driven by both types of trademarks.

The results in Table 4 and Figure 6 suggest that trademarks are consequential for a range of real corporate outcomes beyond simply possessing financial value. They also lend credence to the idea that our measure of trademark output is capturing real economic value. However, one concern with these correlations is that they may not represent causal relations. In the next section, we perform a series of additional tests that support the view that trademarking output does indeed *cause* subsequent firm growth.

5 Addressing endogeneity concerns

Our goal in this section is to establish the causal effect of trademarking output on firm activity.

5.1 Placebo test: non-registered trademarks

A potential concern about our results above is that trademark publication might coincide with other economically meaningful events. One possibility is that firms that apply for trademarks are those that would be expected to grow even in the absence of the trademark registration. In fact, it could be that only successful firms have the vision and resources to apply for trademarks. If that was the case, trademark application could be a proxy for firm quality, which in turn would also determine performance. Our baseline empirical approach directly accounts for the "noise" component of the stock market returns - the

portion of the returns which is unrelated to trademark publication, following Kogan et al. (2017). In this subsection, we further address this concern by studying non-registered trademarks. Non-registered marks are those which were published but ultimately not registered. This could be due to either the failure to provide appropriate paperwork proving their use in-commerce or because of successful opposition by competing firms. An important distinction between registered and non-registered trademarks is that while both are published, only the former are protected against infringement. Thus, non-registered trademarks provide an insightful placebo test, which allow us to isolate the link between trademark protection and firm performance. If our results were spurious, we should find little difference between the effects of registered and non-registered trademarks.

Figure 7 plots the evolution of the five firm outcome variables studied in Section 4 separately for registered and non-registered trademarks around their respective publication date. In stark contrast to registered trademarks, we find little evidence that non-registered trademarks are linked to firm performance in a statistically significant manner. Even in instances where the effect of these trademarks is non-zero, its size is much smaller than for registered trademarks. These findings confirms our intuition that trademarks without protection are less consequential for firm performance. It also reassures us that omitted variables that could determine trademark applications are unlike to be driving our results, as applications that do not result in registration appear to be immaterial.

5.2 Instrumental variables estimation: evidence from the random assignment of examiners

In this subsection, we use an identification strategy based on the identity of the examiners who examine the trademark applications of each firm. We exploit two institutional features of the trademark examination process. First, applications are quasi-randomly assigned to trademark examiners (Frakes and

Wasserman (2019)). Second, there is considerable variation in the propensity of examiners to grant trademarks. We use examiner leniency as an instrument for whether a firm's applications in a given year is approved. Given that variation in examiner leniency is as-good-as-random, we can interpret our estimates as causal effects of trademarks on firm performance.

We first measure leniency of examiner e for the focal application i in examination office a in application year t using equation 2:

$$\textit{Application-level leniency}_{i,e,a,t} = \frac{\sum_{j=i-J}^{i-1} \mathbb{1}\{\text{TM registered}_{j,e,a,t}\}}{J} \tag{2}$$

where we calculate leniency over the last $J = 50$ applications immediately preceding the focal application and $\mathbb{1}\{\text{TM registered}\}$ is a dummy variable equal to one if the TM has been registered and zero otherwise.[18]

We then construct a firm-year-level measure of examiner leniency for a given firm f with $n = 1, ..., N$ applications having received their first-action decision in the year τ as:

$$\textit{Examiner leniency}_{f,\tau} = \frac{\sum_{n=1}^{N} \textit{Application-level leniency}_{n,e,a,\tau}}{N} \tag{3}$$

Intuitively, our measure of firm-level examiner leniency captures the average leniency of the examiners who issued a first-action decision on the firm's trademark applications. Because our methodology relies on the quasi-random assignment of trademark applications to examiners, we normalize this measure for the corresponding examination office in the application year and of the same legal basis i.e., 'intent-to-use' vs. 'in-commerce'. Following Farre-Mensa et al. (2020), we examine the effect on firm's outcomes from the year of the first-action decision, as this is the earliest point when the uncertainty on the outcome of the application is resolved. Figure 8 shows that there is substantial variation in the approval rates of examiners.

[18] In unreported results, we also consider $J = 20, 100$, and I applications examined by the examiner e, where I = total number of applications examined by examiner e preceding the focal application. Our first- and second-stage results are robust to all three values of J.

We estimate the following first-stage regressions:

$$Success\ rate_{f,\tau} = \gamma Examiner\ leniency_{f,\tau} + \beta_2 X_{f,\tau} + u_{f,\tau}, \tag{4}$$

where the $Success\ rate_{f,\tau}$ is the ratio of number of trademarks registered by firm f to the number of trademarks which received their first-action date in year τ, *Examiner leniency* is defined as in equation 3. The vector of controls $X_{f,\tau}$ includes *Leverage*, *Return on assets*, *Book-to-market ratio*, *Idiosyncratic volatility*, the natural logarithm of *Physical capital*, the natural logarithm of *Employment*, and the normalized average experience in years of the examiners examining the firm's applications which received a first-action in year τ.[19]

Column (1) of Table 6 reports the results of the first-stage regression. We find that the coefficient on the instrument, *Examiner leniency*, is statistically significant and positive. This indicates that firm-level examiner leniency is positively associated with the firm's success in trademarking. The F-statistic is well above the rule-of-thumb of 10, which attests the strength of the instrument.

To further establish that examiner allocation is indeed random, in Table 6, we test whether firm-level examiner leniency correlates with firm- and examiner-level characteristics. Consistent with the notion that examiner allocation is random, we find that examiner leniency is not correlated with firm-level variables including *Leverage*, *Return on assets*, *Book-to-market equity*, *Physical capital*, and *Employment*. We do find that examiners who have a greater number of years of experience are more lenient. However, this should not bias our estimates as long as the applications are quasi-randomly assigned to senior examiners.

In Table 7, we present the results of our second-stage regressions. We find that randomly receiving a trademark significantly and positively affects all the measures of firm performance that we consider in our analysis. For instance, while the effect of receiving a trademark approval on firm profits

[19] A complete list of variable definitions is provided in Table A.1

is delayed, we find that the cumulative effect is 8.89% by the fifth year after receiving the first-action decision. Similarly, the effect on production gradually increases to 13.37% by the fifth year. In line with our previous results, firms not only increase their profits and sales but also their market share, with a cumulative increase of 21.75% in the firm's market share by the fifth year after receiving the trademark. Firms which quasi-randomly receive trademarks also invest 11.15% more in property, plant, and equipment and hire 15.31% more employees in the five years that follow the trademark registration.

In contrast to our baseline tests, these results do not consider trademark value, as the variable *Success rate* only accounts for whether a firm has received a trademark but not for its respective value. Therefore, they treat trademarks as homogeneous, which ignores important variation. Still, we find that receiving a trademark has strong and positive causal effect on firm performance.

Taken together the tests we conduct in this section provide evidence that trademarking causally affects firm performance.

6 Evidence on mechanisms

Trademarks may affect firm performance through several channels. In its essence a trademark is a way to make a firm's products and services more recognizable and easier to distinguish from those of competitors. Therefore, trademarks may lead to a reduction in consumer search costs. Trademarks may also be seen as a proxy for innovation, especially late-stage product innovation. However, it is also possible that trademarks are simply a way for incumbent firms to fend off competition. Firms may try to appropriate rents through the use of trademarks as barriers to entry.

While a full-fledged investigation of the driver of the value of trademarks deserves a paper in its own right, in this section we provide some preliminary evidence that trademarks may be proxying for late-stage product innovation

and associated with a reduction in consumer search costs.

6.1 Trademarks and innovation

To understand the extent to which trademarks may be capturing innovative activity by firms, we start by studying the relationship between trademarks and patents, which are a widely used measure of innovation. In particular, we test whether trademarks are complements or substitutes to patents. A visual inspection of Figure 3 suggests that these two forms of intellectual property might be complementary, as most firms that have a patent also have a trademark, and vice versa. To more formally test whether trademarking is positively correlated with patenting, in Table 8, we regress *Patent value growth* on *TM output*. We find that firms with higher trademarking output subsequently produce greater aggregate patent value. In Panel B, we regress the *TM value growth* on *Patent output*, to test whether trademarks follow patented innovation. Here, we find that innovative firms, as measured by patents, proceed to obtain highly valuable trademarks, especially in the four years immediately following patent grants.

Given the positive correlation between patent and trademark output, one may be concerned that our novel measure of intangible capital, *TM Output*, may be in fact capturing patent output. To test whether omitting patent output from our baseline specification is leading to bias and driving our results, in Table 9, we explicitly control for *Patent output* in our regressions. We follow Kogan et al. (2017) to construct the measure of patent output. Contrary to the view that trademarks are simply proxying for patents, we find that our estimates for the association between trademarks and firm outcomes, upon inclusion of patents as control, are quantitatively similar to those in our baseline specifications. This allays the concerns that the results in Table 4 are driven by the firm's patent output. We also find that the magnitude of the effect of trademarks is consistently much larger than that of patents across all outcomes. These results suggest that while trademarks have no requirement for

technological novelty, they could be associated with product innovation and used by firms to complement their patent portfolio.

To further test whether trademarking activity captures innovation activities by firms, we test whether trademark output is associated with knowledge capital. We follow Ewens et al. (2019) to decompose a firm's intangible capital into knowledge capital, which is related to innovation, and organizational capital. Since this measure does not rely on patent data, it provides us with an independent test for whether trademarks are associated with innovation.

The results are presented in Table 10. We find a positive and statistically significant association between trademark output and organizational capital, increasing from 0.98% in the first year to 4.66% in the fifth year. These findings suggest that trademarks might be related to process innovations, in line with the theoretical models of Romer (1990) and Grossman and Helpman (1991). In Panel B, we find that firms that obtain valuable trademarks experience persistently higher knowledge capital flows thereafter, as predicted by the innovation view and in contrast with the view that trademarks are simply a way to preserve monopoly rents. This effect is economically meaningful, increasing from 0.88% in the first year after trademarks are registered to 3.20% in the fifth year.

Overall, the results presented in this subsection are consistent with the view that trademarks incentivize firms to innovate more, highlighting one potential driver of their economic value.

6.2 Search costs

We also test whether trademarks may be valuable because they reduce consumer search costs. In markets where there are many goods to choose from, consumers may find it difficult to distinguish among the many suppliers. A distinctive trademark may be especially valuable in those cases. In Table 11, we investigate whether the value of trademarks is higher in industries where

consumers interact with many supplying firms. We split the sample into industries where product similarity is larger vs. lower, as measured by HHI, the Herfindahl-Hirshman Index of sales by 3-digit SIC. We then estimate the value of trademarks in each subsample. We hypothesize that trademarks would reduce search costs the most in industries where there is more available choice. Consistent with the view that a reduction in search costs may be a determinant of trademark value, we find that registering a new trademark is associated with a larger stock market reaction in less concentrated industries.

In Panel B of Table 11, we proxy for search costs with the measure of product market fluidity of Hoberg et al. (2014). This measure captures the extent of products and services available to consumers, which may be hard to differentiate among themselves in the absence of a recognizable mark. Consistent with the results in Panel A, we find that trademarks are especially valuable when product market fluidity is high.

Taken together, the findings in Table 11 offer suggestive evidence that trademarks may create value through a reduction in consumer search costs.

7 Conclusion

In this paper, we construct a new forward-looking measure of the value of an important, yet previously understudied, intangible asset—trademarks. We measure the private value of each individual trademark using the stock market reaction to its publication using data from 1.3 million trademarks manually matched to 21,800 unique publicly-held firms in the Compustat database.

We document several new facts about corporate trademarks. First, trademarks are used broadly in the economy. Most industries, including those where patenting is uncommon, feature intense trademarking activity by firms. Second, trademarks are highly valuable. The average trademark in our sample is worth $36.76 million. In contrast, the average patent is worth $26.66 million.

Third, firms' future performance is positively related to trademarking activity. In the five years following the publication of a trademark, firms experience increases in profitability, production output, market share, physical capital, and employment. Fourth, trademarking appears to be an important component of the innovation process of firms. Firms that trademark tend to subsequently increase their patenting activity, and vice-versa. In addition, trademarking activity correlates with measures of knowledge capital and organizational capital. Fifth, trademarks appear to reduce consumer search costs by making goods and services more easily recognizable.

Our paper opens a number of exciting avenues for future research. While in this paper we have showed that trademarks are highly valued by firms, the social value of a trademark may transcend the value appropriated by the shareholders of the firm that registers it. Employees, consumers, and competitors are important stakeholders who may also be affected by the stock of intangible capital detained by the firm. Therefore, shedding light on the welfare implications of trademarks by investigating its impact on other economically relevant stakeholders remains a fruitful areas of future research. In addition, while we have provided some preliminary evidence on the determinants of trademark value, future work could build on this analysis to shed further light on the specific determinants of trademark value.

References

Aghion, P. and Howitt, P. (1990). A model of growth through creative destruction.

Ambler, T. (1992). *Need-to-know marketing: An accessible AZ guide*. Century Business.

Andrade, G. and Stafford, E. (2004). Investigating the economic role of mergers. *Journal of Corporate Finance*, 10(1):1–36.

Argente, D., Baslandze, S., Hanley, D., and Moreira, S. (2020). Patents to products: Product innovation and firm dynamics.

Belo, F., Lin, X., and Vitorino, M. A. (2014). Brand capital and firm value. *Review of Economic Dynamics*, 17(1):150–169.

Bernstein, J. I. and Nadiri, M. I. (1988). Interindustry R&D spillovers, rates of return, and production in high-tech industries.

Boldrin, M. and Levine, D. K. (2013). The case against patents. *Journal of Economic Perspectives*, 27(1):3–22.

Chan, L. K., Lakonishok, J., and Sougiannis, T. (2001). The stock market valuation of research and development expenditures. *Journal of Finance*, 56(6):2431–2456.

Economides, N. S. (1988). The economics of trademarks. *Trademark Rep.*, 78:523.

Eisfeldt, A. L. and Papanikolaou, D. (2013). Organization capital and the cross-section of expected returns. *Journal of Finance*, 68(4):1365–1406.

Ewens, M., Peters, R. H., and Wang, S. (2019). Measuring intangible capital with market prices. Technical report, National Bureau of Economic Research.

Falato, A., Kadyrzhanova, D., Sim, J., and Steri, R. (2020). Rising intangible capital, shrinking debt capacity, and the US corporate savings glut. *Journal of Finance*.

Farre-Mensa, J., Hegde, D., and Ljungqvist, A. (2020). What is a patent worth? Evidence from the US patent "lottery". *Journal of Finance*, 75(2):639–682.

Frakes, M. D. and Wasserman, M. F. (2019). Are there as many trademark offices as trademark examiners? *Duke LJ*, 69:1807.

Graham, S., Hancock, G., Marco, A., and Myers, A. F. (2016). The USPTO Trademark Case Files Dataset: Descriptions, lessons, and insights.

Greenhalgh, C., Longland, M., and Bosworth, D. (2003). Trends and distribution of intellectual property: UK and European patents and UK trade and service marks 1986-2000. *Report to the UK Patent Office on a Research Project into The Extent and Value of Intellectual Property in United*

Kingdom Firms.

Greenhalgh, C., Rogers, M., et al. (2006). *Intellectual property activity by service sector and manufacturing firms in the UK, 1996-2000*. Citeseer.

Grossman, G. M. and Helpman, E. (1991). Quality ladders in the theory of growth. *The Review of Economic Studies*, 58(1):43–61.

Heath, D. and Mace, C. (2020). The strategic effects of trademark protection. *The Review of Financial Studies*, 33(4):1848–1877.

Hegde, D., Herkenhoff, K. F., and Zhu, C. (2022). Patent publication and innovation. Technical report, National Bureau of Economic Research.

Hirshleifer, D., Hsu, P.-H., and Li, D. (2013). Innovative efficiency and stock returns. *Journal of Financial Economics*, 107(3):632–654.

Hoberg, G., Phillips, G., and Prabhala, N. (2014). Product market threats, payouts, and financial flexibility. *Journal of Finance*, 69(1):293–324.

Hsu, P.-H., Li, D., Li, Q., Teoh, S. H., and Tseng, K. (2022). Valuation of new trademarks. *Management Science*, 68(1):257–279.

İmrohoroğlu, A. and Tüzel, Ş. (2014). Firm-level productivity, risk, and return. *Management Science*, 60(8):2073–2090.

Jaffe, A. B. and Lerner, J. (2004). Patent prescription: a radical cure for the ailing US patent policy. *IEEE Spectrum*, 41(12):38–43.

Kogan, L., Papanikolaou, D., Seru, A., and Stoffman, N. (2017). Technological innovation, resource allocation, and growth. *Quarterly Journal of Economics*, 132(2):665–712.

Lee, D. S. and Mas, A. (2012). Long-run impacts of unions on firms: New evidence from financial markets, 1961–1999. *Quarterly Journal of Economics*, 127(1):333–378.

Lemley, M. A. and Shapiro, C. (2005). Probabilistic patents. *Journal of Economic Perspectives*, 19(2):75–98.

Levy, S. J. and Rook, D. W. (1981). Brands, trademarks, and the law. *Review of Marketing*, 41:185–194.

Mauer, D. C., Villatoro, N., and Zhang, Y. (2021). Brand equity and corporate debt structure. *Journal of Business Finance & Accounting*.

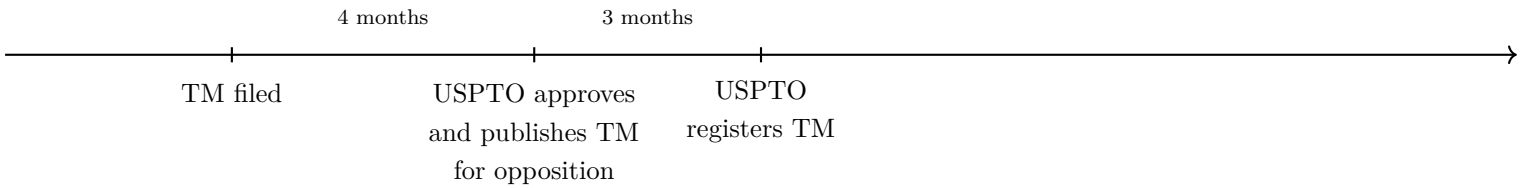
Romer, P. M. (1990). Endogenous technological change. *Journal of Political Economy*, 98(5, Part 2):S71–S102.

Sandner, P. and Block, J. (2011). The market value of R&D, patents, and trademarks.

Stoffman, N., Woeppel, M., and Yavuz, M. D. (2022). Small innovators: No risk, no return. *Journal of Accounting and Economics*, page 101492.

Figures and tables

A. In-commerce trademarks



B. Intent-to-use trademarks

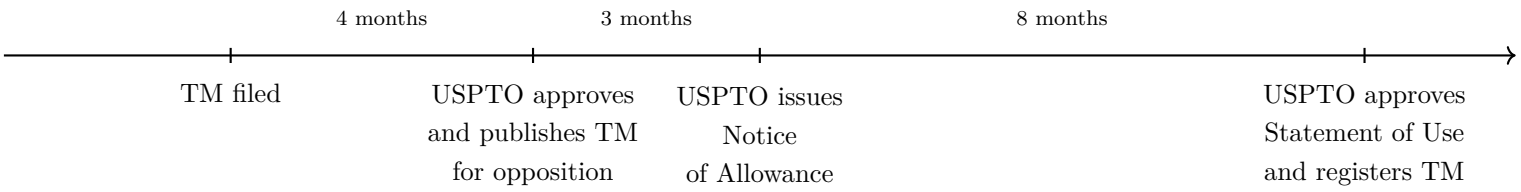


Figure 1. Trademark Application Timeline
This figure depicts the timeline of a trademark application to the United States Patent and Trademark Office (USPTO). Panels A and B present the prosecution process for applications filed using "in-commerce" and "intent-to-use" as legal basis, respectively.

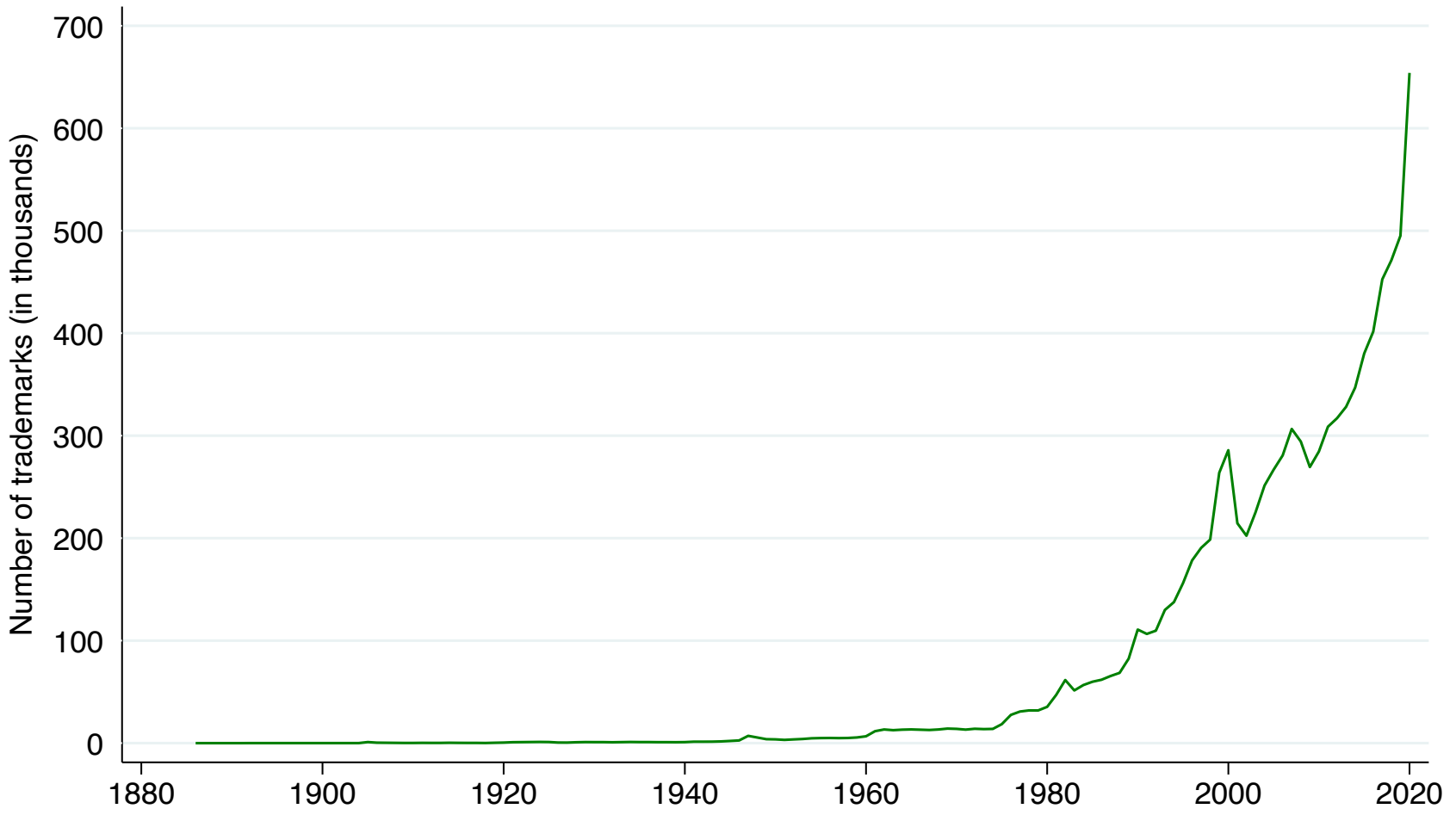


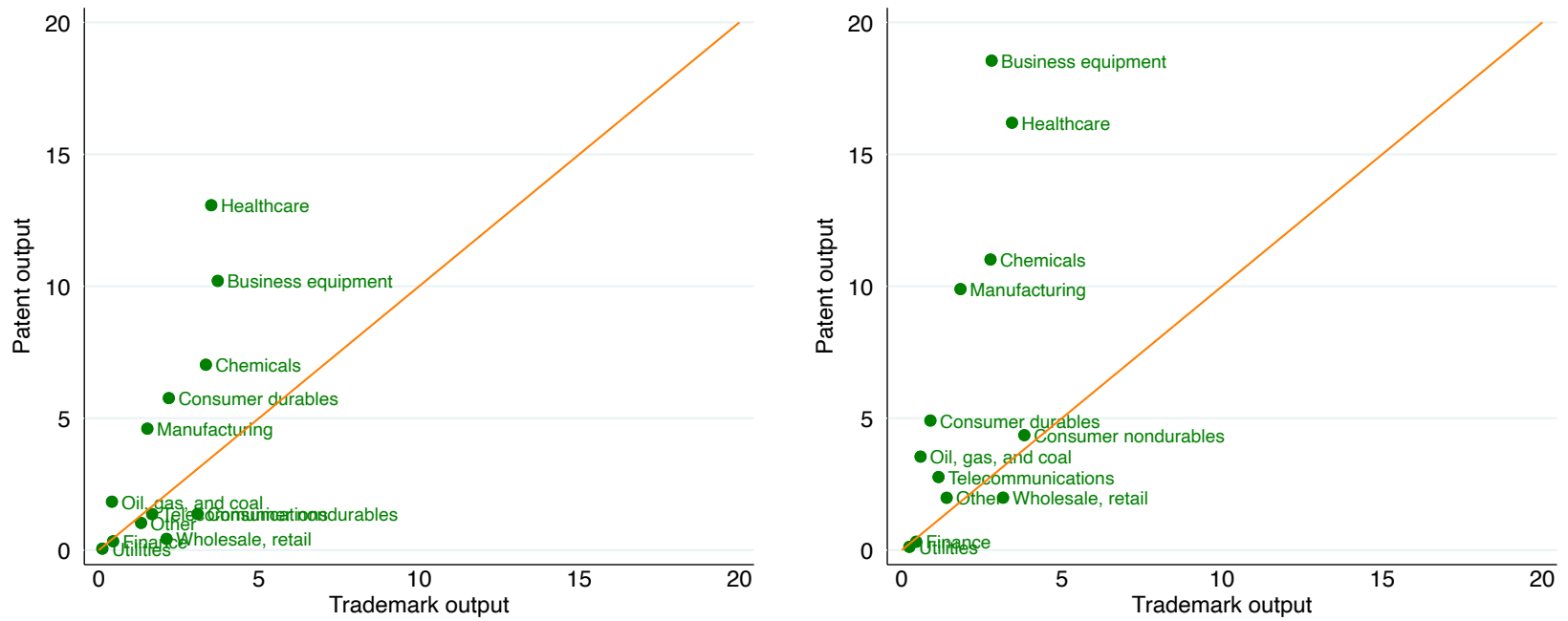
Figure 2. Number of Trademark Applications by Year
This figure plots the number of trademark applications to the United States Patent and Trademark Office (USPTO) by year from 1884 to 2020. We exclude trademarks with missing owner data.

Figure 3. Distribution of Corporate Intangible Capital over Time

This figure plots the percentage of U.S. public firms holding different types of intangible capital by year. Panel A weights firms equally; Panel B assigns weights proportional to firms' total assets. The sample consists of U.S. public firms that have active trading stock in all industries with the exception of Utilities and Financial sectors, have information available on Compustat, and have non-missing data on the value of total assets and sales.

Figure 4. Distribution of Corporate Intangible Capital over Time: By Industry

This figure plots the percentage of U.S. public firms holding different types of intangible capital over time, by industry. The graph weights all firms equally. An industry is defined using Fama-French 12 industry classification. The sample consists of U.S. public firms that have active trading stock, information available on Compustat, and non-missing data on the value of total assets, sales, and industry SIC codes.



A. Equally-weighted **B. Weighted by Total Assets**

Figure 5. Patent and Trademark Output: By Industry

This figure plots *TM output* and *Patent output* by industry. An industry is defined using Fama-French 12 industry classification. *TM output* is the *Aggregate TM value* expressed as a percentage of the concurrent total value of assets of firm f in year t. *Aggregate TM value* is the sum of dollar value of all registered trademarks filed by firm f and published in year t. The dollar value of a trademark, *TM value*, is calculated using the market-adjusted firm return on the 3-day window around trademark publication date. *Patent output* is defined as the sum of dollar value of all patents granted to firm f in year t expressed as a percentage of the concurrent total value of assets of firm f. The dollar value of patents is measured following Kogan et al. (2017). Panel A weights firms equally; Panel B assigns weights proportional to firms' total assets. The sample consists of U.S. public firms that have active trading stock, information available on Compustat, and non-missing data on the value of total assets, sales, and industry SIC codes.

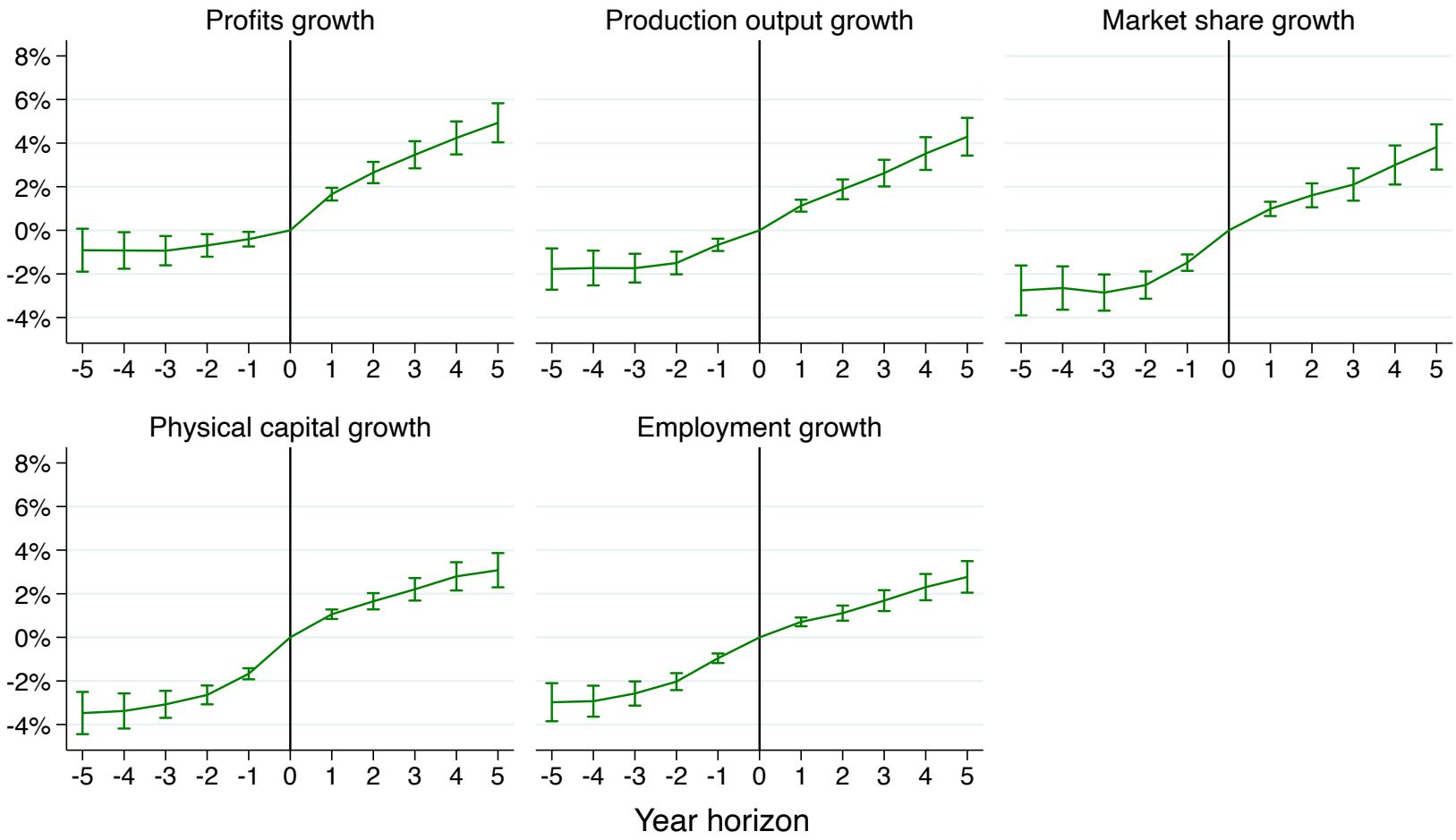


Figure 6. Trademarks and Firm Outcomes: Pre- and Post-Publication
This figure plots the effect of a one-standard-deviation increase of *TM output* on *Profits growth*, *Production output growth*, *Market share growth*, *Physical capital growth*, and *Employment growth*. All estimates are scaled to unit standard deviation. We control for the dependent variable lagged by one year, the natural logarithm of *Physical capital*, natural logarithm of *Employment*, *Idiosyncratic volatility*, *Book-to-market equity*, *Return on assets*, *Leverage*, and industry × year fixed effects in all specifications. All variables are winsorized at 1% level using annual breakpoints. 95% confidence intervals are reported for each estimated point. A complete list of variable definitions is provided in Table A.1.

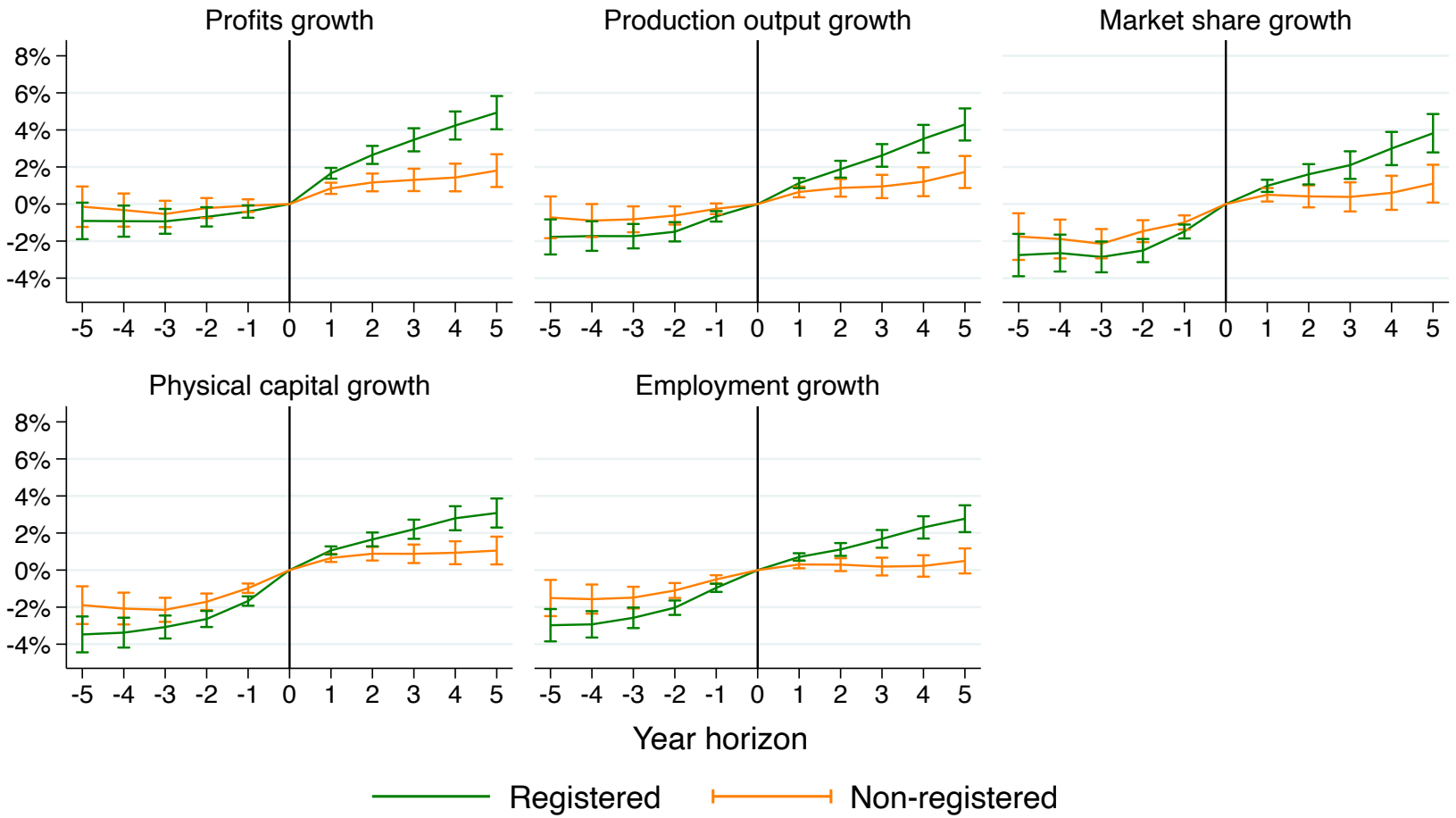


Figure 7. Trademarks and Firm Outcomes: Registered versus Non-Registered Trademarks
This figure plots the standardized point estimates of equation 1 for both registered and non-registered trademarks. All estimates are scaled to unit standard deviation. The graph depicts the effect of a one-standard-deviation increase of *TM output* on *Profits growth*, *Production output growth*, *Market share growth*, *Physical capital growth*, and *Employment growth*. We control for the dependent variable lagged by one year, the natural logarithm of *Physical capital*, natural logarithm of *Employment*, *Idiosyncratic volatility*, *Book-to-market equity*, *Return on assets*, *Leverage*, and industry × year fixed effects in all specifications. All variables are winsorized at 1% level using annual breakpoints. 95% confidence intervals are reported for each estimated point. A complete list of variable definitions is provided in Table A.1.

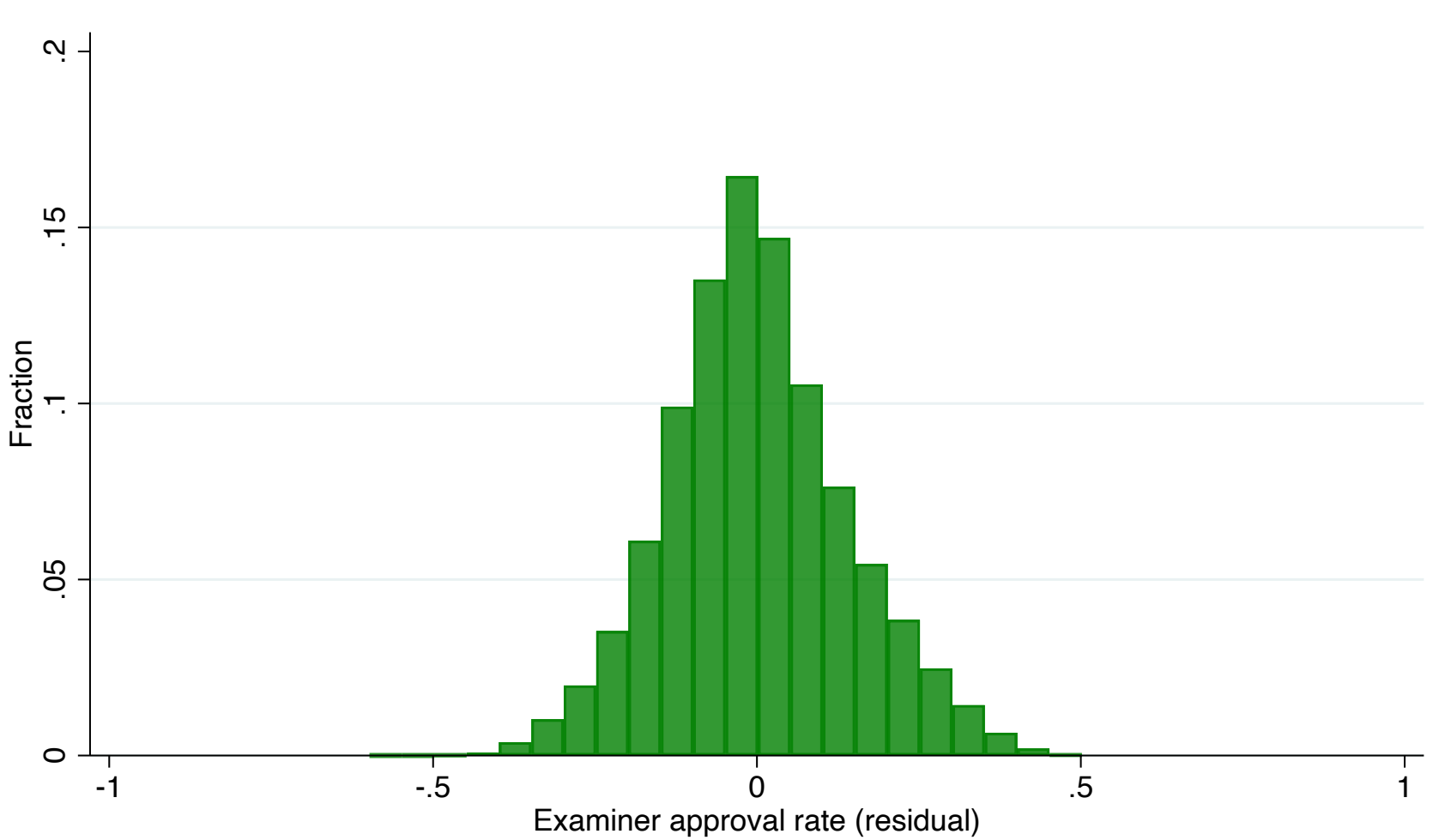


Figure 8. Distribution of Trademark Examiner Leniency
This figure shows the distribution of *Examiner leniency* estimated within industry and year using a regression of *Examiner leniency* on the full set of 3-digit SIC industry × year fixed effects. Our sample consists of all trademarks applications to the United States Patent and Trademark Office (USPTO). *Examiner leniency* is defined as the average of normalized *Application-level leniency* for all the examiners who have issued a first-action decision on firm f's applications in year t. *Application-level leniency* is defined as the ratio of the number of applications approved for registration by examiner e to the number of applications examined by her, before the focal application. *Application-level leniency* is normalized by dividing the leniency of examiner e by the average leniency of all the examiners who have examined applications in the same trademark office in the same year and of the same legal basis i.e., "intent-to-use" vs. "in-commerce".

Table 1. Trademark Applications by Decade

This table summarizes the trademark applications to the United States Patent and Trademark Office (USPTO) by decade. We also report the number of total filed trademarks that we are able to match with a U.S. public firm in the Compustat dataset. The sample consists of all trademarks, registered and non-registered, filed with the USPTO from 1884 to 2020. 'Number of matched' refers to the number of trademarks that we are able to assign to a U.S. public firm. '% of matched' expresses the number of matched trademarks in percentage terms. We exclude trademarks with missing owner data.

Years	All trademarks			Registered trademarks			Non-registered trademarks		
	Total	Number of matched	% of matched	Total	Number of matched	% of matched	Total	Number of matched	% of matched
1884 - 1890	36	11	30.56	36	11	30.56	0	0	.
1891 - 1900	335	66	19.70	334	66	19.76	1	0	0.00
1901 - 1910	2,537	449	17.70	2,533	449	17.73	4	0	0.00
1911 - 1920	2,766	685	24.77	2,765	685	24.77	1	0	0.00
1921 - 1930	9,216	1,599	17.35	9,207	1,599	17.37	9	0	0.00
1931 - 1940	9,740	2,242	23.02	9,736	2,242	23.03	4	0	0.00
1941 - 1950	30,746	4,857	15.80	30,707	4,857	15.82	39	0	0.00
1951 - 1960	47,615	9,740	20.46	47,574	9,740	20.47	41	0	0.00
1961 - 1970	131,457	28,905	21.99	131,308	28,905	22.01	149	0	0.00
1971 - 1980	230,911	47,617	20.62	223,614	46,887	20.97	7,297	730	10.00
1981 - 1990	665,842	98,872	14.85	493,254	81,138	16.45	172,588	17,734	10.28
1991 - 2000	1,757,323	347,064	19.75	946,320	198,358	20.96	811,003	148,706	18.34
2001 - 2010	2,595,904	416,091	16.03	1,441,886	242,393	16.81	1,154,018	173,698	15.05
2011 - 2020	4,155,780	314,369	7.56	2,148,618	173,254	8.06	2,007,162	141,115	7.03
Total sample	9,640,208	1,272,567	13.20	5,487,892	790,584	14.41	4,152,316	481,983	11.61

Table 2. Summary Statistics: Trademark Value

This table presents the summary statistics for our estimates of the value of trademarks. Our sample consists of all registered trademarks filed by U.S. public firms that have active trading stock and information available on Compustat from 1926 to 2020. Panel A reports descriptive statistics at the trademark level. R is the idiosyncratic return on the 3-day window around trademark publication date. The idiosyncratic firm return is defined as the difference between firm f's return and the total return value-weighted index. $\mathbb{E}[r^{TM}|R]$ is the filtered component of market returns that is related to trademark value. *TM value* is the dollar value of each individual trademark i published by the firm f. TM value is adjusted by CPI (CPIAUCNS) and is expressed in millions of 2016 USD. Panel B summarizes average TM value by industry. An industry is defined using Fama-French 12 industry classification. Panel C presents the descriptive statistics aggregated at the firm level. *Number of TMs* is defined as the number of registered trademarks filed by firm f and published in year t. *Aggregate TM value* is the sum of dollar value of all registered trademarks filed by firm f and published in year t, expressed in millions of 2016 USD. *TM output* is *Aggregate TM value* expressed as a percentage of the concurrent total value of assets of firm f. Panel D reports the firm-level averages for the *Number of TMs*, *Aggregate TM value*, and *TM output*, by industry. All values are winsorized at 1% level using annual breakpoints. A complete list of variable definitions is provided in Table A.1.

Panel A. Trademark Level

	Mean	Std. dev.	p5	p10	p25	p50	p75	p90	p95	N
R	0.04	3.97	-6.01	-3.99	-1.78	-0.08	1.71	4.15	6.44	675,132
$\mathbb{E}[r^{TM}\|R]$	0.38	0.26	0.15	0.17	0.22	0.31	0.45	0.68	0.89	675,132
TM value	36.76	85.48	0.46	0.94	3.15	10.76	33.25	87.33	155.34	675,132

Panel B. Trademark-Level: By Industry

Consumer nondurables	33.22	68.98	0.50	0.93	2.84	10.21	33.82	83.61	136.07	76,550
Consumer durables	15.91	30.97	0.31	0.57	1.78	6.90	18.44	39.58	59.72	28,775
Manufacturing	18.08	31.65	0.48	1.01	3.28	9.14	21.11	41.66	61.64	86,009
Oil, gas, and coal	64.49	98.67	2.01	3.66	10.43	29.13	77.41	163.16	248.65	11,289
Chemicals	24.37	36.68	0.75	1.57	4.54	11.63	29.60	60.48	88.43	45,237
Business equipment	38.43	104.78	0.35	0.81	2.95	10.49	31.87	87.27	162.86	81,224
Telecommunications	58.93	109.56	1.00	2.09	8.87	27.21	63.12	138.07	216.06	29,956
Utilities	45.91	66.06	1.87	3.73	8.18	20.33	53.54	124.62	197.95	4,326
Wholesale, retail	46.11	102.36	0.63	1.21	3.65	11.88	42.14	120.98	206.97	57,251
Healthcare	37.35	73.25	0.66	1.38	4.38	13.67	39.10	91.80	148.94	60,633
Finance	87.59	157.36	0.69	1.41	5.39	23.46	94.17	262.06	391.47	55,050
Other	35.79	70.87	0.56	1.16	3.60	12.13	36.78	88.63	147.65	51,841

(continued on next page)

(continued)

Panel C. Firm-Level

	Mean	Std. dev.	p5	p10	p25	p50	p75	p90	p95	N
Number of TMs	2.20	5.69	0.00	0.00	0.00	0.00	2.00	6.00	11.00	238,889
Aggregate TM value	66.13	345.36	0.00	0.00	0.00	0.00	7.48	77.74	256.65	238,889
TM output	1.94	5.75	0.00	0.00	0.00	0.00	1.21	5.38	10.51	238,889

Panel D. Firm-Level: By Industry

	Number of TMs	Aggregate TM value	TM output	N
Consumer nondurables	4.44	109.49	3.08	65,599
Consumer durables	3.76	60.30	2.18	25,444
Manufacturing	2.70	49.91	1.51	80,434
Oil, gas, and coal	0.99	55.98	0.41	10,997
Chemicals	5.99	125.07	3.34	37,438
Business equipment	2.07	61.99	3.71	77,931
Telecommunications	3.14	164.44	1.66	20,131
Utilities	0.46	21.63	0.11	4,266
Wholesale, retail	2.38	75.31	2.11	54,264
Healthcare	2.46	76.43	3.51	51,249
Finance	1.18	61.53	0.44	51,354
Other	1.55	43.70	1.32	45,977

Table 3. Summary Statistics: Firm and Industry Characteristics

This table presents summary statistics for firm and industry characteristics. All values are winsorized at 1% level using annual breakpoints. We exclude firms from 'Finance' and 'Utilities' industries. An industry is defined using Fama-French 12 industry classification. A complete list of variable definitions is provided in Table A.1.

Panel A. Key Variables

	Mean	Std. dev.	p5	p10	p25	p50	p75	p90	p95	N
Firm Performance										
Profits	870.41	2,913.24	0.03	4.54	23.76	103.03	445.05	1,711.43	3,991.45	185,410
Production output	2,900.04	8,981.25	8.64	21.98	86.37	370.38	1,594.38	6,203.94	13,726.05	168,673
Market share	7.23	16.04	0.00	0.01	0.09	0.86	5.71	21.09	39.77	185,596
Physical capital	1,993.33	7,462.71	2.95	6.36	24.47	127.20	744.35	3,523.46	9,006.70	184,449
Employment	9.29	24.17	0.04	0.08	0.30	1.37	6.00	22.90	47.04	179,094
Firm Characteristics										
Leverage	0.47	0.21	0.12	0.18	0.31	0.47	0.62	0.75	0.83	179,559
ROA	0.09	0.21	-0.33	-0.12	0.05	0.12	0.19	0.26	0.32	183,856
Book-to-market value	0.79	0.79	0.11	0.17	0.31	0.57	1.00	1.63	2.23	174,815
Idiosyncratic volatility	-3.54	0.55	-4.40	-4.24	-3.94	-3.56	-3.17	-2.80	-2.58	185,157
Product market fluidity	6.87	3.58	2.36	2.97	4.29	6.18	8.69	11.64	13.73	94,352
Innovation Measures										
Organizational capital	289.99	1,129.74	0.00	1.26	6.62	28.47	125.57	516.15	1,211.20	149,762
Knowledge capital	93.29	518.62	0.00	0.00	0.00	0.40	17.38	104.65	306.90	150,728
Industry Characteristics										
HHI	0.22	0.18	0.05	0.06	0.09	0.16	0.27	0.45	0.58	185,596

(continued on next page)

(continued)

Panel B. Firm Performance Growth

	Horizon (years)				
	1	2	3	4	5
Profits growth	5.435	10.40	15.16	19.57	23.85
	(34.06)	(48.19)	(57.70)	(65.57)	(72.18)
Production output growth	5.360	10.19	14.88	19.26	23.44
	(27.22)	(40.42)	(49.73)	(57.65)	(64.42)
Market share growth	2.051	3.640	5.132	6.488	7.795
	(39.92)	(59.13)	(72.59)	(83.44)	(92.65)
Physical capital growth	7.372	13.94	20.03	25.53	30.84
	(22.89)	(36.63)	(47.08)	(55.79)	(63.35)
Employment growth	4.027	8.032	11.77	15.16	18.40
	(23.46)	(36.11)	(45.75)	(53.75)	(60.52)
TM value growth	2.099	4.750	7.872	11.04	14.94
	(85.79)	(96.71)	(104.7)	(112.7)	(118.9)
Patent value growth	2.992	5.928	9.010	11.96	15.20
	(57.49)	(68.17)	(77.81)	(86.10)	(94.62)
Organizational capital growth	10.96	21.29	31.05	40.36	49.20
	(13.64)	(26.33)	(37.27)	(47.11)	(55.91)
Knowledge capital growth	4.120	8.354	12.63	16.93	21.16
	(14.28)	(26.13)	(36.71)	(46.28)	(54.92)

Table 4. Trademarks and Firm Growth

This table reports the results from estimating equation 1. The dependent variables are *Profits growth* (Panel A), *Production output growth* (Panel B), *Market share growth* (Panel C), *Physical capital growth* (Panel D), and *Employment growth* (Panel E). We define growth for the variables *Profits*, *Production output*, *Market share*, *Physical capital*, and *Employment* as the natural logarithm of the variable for firm f in year $t+\tau$ minus the natural logarithm of the variable in year t where $\tau = 1, ..., 5$ years, expressed as a percentage. *Profits* are defined as sales minus cost of golds sold of firm f in year t expressed in millions of 2016 USD. *Production output* is defined as annual sales plus the change in inventories of firm f in year t expressed in millions of 2016 USD. *Market share* is measured as firm f's annual sales as a fraction of total industry sales defined at the 3-digit SIC level, expressed as a percentage. *Physical capital* refers to firm f's property, plant, and equipment expressed in millions of 2016 USD. *Employment* is defined as total number of employees in firm f in year t expressed in thousands. Profits, production output, and physical capital are scaled by CPI (CPIAUCNS obtained from FRED). The key independent variable is *TM output*, defined as *Aggregate TM value* expressed as a percentage of the concurrent total value of assets of firm f. *Aggregate TM value* is the sum of dollar value of all registered trademarks filed by firm f and published in year t. The dollar value of a trademark is calculated using the market-adjusted firm return on the 3-day window around trademark publication date. We control for the dependent variable lagged by one year, natural logarithm of *Physical capital*, natural logarithm of *Employment*, *Idiosyncratic volatility*, *Book-to-market equity*, *Return on assets*, *Leverage*, and industry × year fixed effects in all specifications. We suppress control variables for brevity. All coefficients are scaled to unit standard deviation. All variables are winsorized at 1% level using annual breakpoints. Standard errors are clustered at the firm level. t-statistics are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% level (two-sided), respectively. A complete list of variable definitions is provided in Table A.1.

Panel A. Profits Growth

	Horizon (years)				
	1	2	3	4	5
TM output	1.659***	2.651***	3.466***	4.239***	4.932***
	(11.17)	(10.66)	(10.91)	(10.98)	(10.78)
Industry × Year FE	Yes	Yes	Yes	Yes	Yes
N	133,467	123,933	115,343	107,506	100,332
R^2	0.18	0.21	0.22	0.23	0.24

Panel B. Production Output Growth

TM output	1.129***	1.880***	2.623***	3.521***	4.294***
	(8.10)	(8.10)	(8.43)	(9.20)	(9.73)
Industry × Year FE	Yes	Yes	Yes	Yes	Yes
N	129,125	119,905	111,668	104,171	97,360
R^2	0.17	0.19	0.20	0.21	0.22

(continued on next page)

(continued)

Panel C. Market Share Growth

	Horizon (years)				
	1	2	3	4	5
TM output	0.983***	1.606***	2.101***	2.997***	3.822***
	(5.87)	(5.74)	(5.54)	(6.56)	(7.23)
Industry × Year FE	Yes	Yes	Yes	Yes	Yes
N	140,196	130,206	121,055	112,771	105,195
R^2	0.20	0.20	0.21	0.22	0.23

Panel D. Physical Capital Growth

TM output	1.061***	1.654***	2.203***	2.798***	3.080***
	(9.56)	(8.67)	(8.35)	(8.45)	(7.70)
Industry × Year FE	Yes	Yes	Yes	Yes	Yes
N	139,954	129,917	120,737	112,449	104,868
R^2	0.20	0.23	0.25	0.26	0.27

Panel E. Employment Growth

TM output	0.708***	1.112***	1.685***	2.304***	2.772***
	(6.89)	(6.28)	(6.89)	(7.50)	(7.50)
Industry × Year FE	Yes	Yes	Yes	Yes	Yes
N	138,772	128,614	119,514	111,351	103,891
R^2	0.16	0.18	0.19	0.20	0.21

Table 5. Trademarks and Firm Growth: By Legal Basis

This table repeats the analysis in table 4 but distinguishes the key independent variable *TM output* by the legal basis under which it was filed. *Intent-to-use TM output* (*In-commerce TM output*) is *Aggregate intent-to-use TM value* (*Aggregate in-commerce TM value*) expressed as a percentage of the concurrent total value of assets of firm f. *Aggregate intent-to-use TM value* (*Aggregate in-commerce TM value*) is the sum of dollar value of all registered trademarks filed by firm f and published in year t using "intent-to-use" ("in-commerce") as a legal basis. The dollar value of a trademark is calculated using the market-adjusted firm return on the 3-day window around trademark publication date. The dependent variables are *Profits growth* (Panel A), *Production output growth* (Panel B), *Market share growth* (Panel C), *Physical capital growth* (Panel D), and *Employment growth* (Panel E). We define growth for the variables *Profits*, *Production output*, *Market share*, *Physical capital*, and *Employment* as the natural logarithm of the variable for firm f in year $t + \tau$ minus the natural logarithm of the variable in year t where $\tau = 1, ..., 5$ years, expressed as a percentage. *Profits* are defined as sales minus cost of golds sold of firm f in year t expressed in millions of 2016 USD. *Production output* is defined as annual sales plus the change in inventories of firm f in year t expressed in millions of 2016 USD. *Market share* is measured as firm f's annual sales as a fraction of total industry sales defined at the 3-digit SIC level, expressed as a percentage. *Physical capital* refers to firm f's property, plant, and equipment expressed in millions of 2016 USD. *Employment* is defined as total number of employees in firm f in year t expressed in thousands. Profits, production output, and physical capital are scaled by CPI (CPIAUCNS obtained from FRED). We control for the dependent variable lagged by one year, natural logarithm of *Physical capital*, natural logarithm of *Employment*, *Idiosyncratic volatility*, *Book-to-market equity*, *Return on assets*, *Leverage*, and industry × year fixed effects in all specifications. We suppress control variables for brevity. All coefficients are scaled to unit standard deviation. All variables are winsorized at 1% level using annual breakpoints. Standard errors are clustered at the firm level. t-statistics are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% level (two-sided), respectively. A complete list of variable definitions is provided in Table A.1.

Panel A. Profits Growth

	Horizon (years)				
	1	2	3	4	5
Intent-to-use TM output	0.825***	1.282***	1.587***	1.886***	2.304***
	(5.44)	(5.27)	(5.32)	(5.28)	(5.58)
In-commerce TM output	1.155***	1.968***	2.665***	3.240***	3.668***
	(8.18)	(9.02)	(9.38)	(9.51)	(9.22)
Industry × Year FE	Yes	Yes	Yes	Yes	Yes
N	133,467	123,933	115,343	107,506	100,332
R^2	0.18	0.21	0.22	0.23	0.24

(continued on next page)

(continued)

Panel B. Production Output Growth

	Horizon (years)				
	1	2	3	4	5
Intent-to-use TM output	0.766***	1.235***	1.386***	1.779***	2.147***
	(5.46)	(5.43)	(4.68)	(4.91)	(5.22)
In-commerce TM output	0.613***	1.113***	1.866***	2.528***	3.083***
	(4.58)	(5.33)	(6.91)	(7.59)	(8.12)
Industry × Year FE	Yes	Yes	Yes	Yes	Yes
N	129,125	119,905	111,668	104,171	97,360
R^2	0.17	0.19	0.20	0.21	0.22

Panel C. Market Share Growth

Intent-to-use TM output	0.756***	1.305***	1.255***	1.668***	2.299***
	(4.49)	(4.68)	(3.37)	(3.71)	(4.57)
In-commerce TM output	0.371**	0.606**	1.292***	1.995***	2.333***
	(2.29)	(2.39)	(3.83)	(4.82)	(4.90)
Industry × Year FE	Yes	Yes	Yes	Yes	Yes
N	140,196	130,206	121,055	112,771	105,195
R^2	0.20	0.20	0.21	0.22	0.23

Panel D. Physical Capital Growth

Intent-to-use TM output	0.640***	1.013***	1.204***	1.475***	1.590***
	(5.85)	(5.58)	(4.84)	(4.81)	(4.37)
In-commerce TM output	0.571***	0.917***	1.381***	1.797***	2.064***
	(5.40)	(5.14)	(5.80)	(6.02)	(5.83)
Industry × Year FE	Yes	Yes	Yes	Yes	Yes
N	139,954	129,917	120,737	112,449	104,868
R^2	0.20	0.23	0.25	0.26	0.27

Panel E. Employment Growth

Intent-to-use TM output	0.438***	0.635***	0.833***	1.092***	1.253***
	(4.35)	(3.68)	(3.60)	(3.83)	(3.72)
In-commerce TM output	0.396***	0.739***	1.248***	1.737***	2.159***
	(3.91)	(4.41)	(5.50)	(6.15)	(6.55)
Industry × Year FE	Yes	Yes	Yes	Yes	Yes
N	138,772	128,614	119,514	111,351	103,891
R^2	0.16	0.18	0.19	0.20	0.21

Table 6. Instrumental Variables Estimation: First-Stage and Instrument Validity
This table reports the results from estimating equation 4 and from regressing the instrumental variable on firm and examiner characteristics. The dependent variable in column 1, *Success rate*, is defined as the ratio of number of trademarks registered by firm f to the number of trademarks applied for by the firm in year t. The instrumental variable and dependent variable in column 2, *Examiner leniency*, is defined as the average of normalized *Application-level leniency* for all the examiners who have issued a first-action decision on firm f's applications in year t. *Application-level leniency* is defined as the percentage of the last fifty applications examined by the examiner e before the focal application which were approved for registration. *Application-level leniency* is normalized by dividing the leniency of examiner e by the average leniency of all the examiners who have examined applications in the same trademark office in the same year and of the same legal basis i.e., "intent-to-use" vs. "in-commerce". We control for the natural logarithm of *Physical capital*, natural logarithm of *Employment*, *Idiosyncratic volatility*, *Book-to-market equity*, *Return on assets*, *Leverage*, *Years of experience*, and industry × year fixed effects in the first-stage regression of instrumental variables estimation. Our sample consists of all registered trademarks held by U.S. public firms. All variables are winsorized at 1% level using annual breakpoints. Standard errors are clustered at the firm level. t-statistics are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% level (two-sided), respectively. A complete list of variable definitions is provided in Table A.1.

	First-stage IV regression	Instrument validity		
Dependent variable	Success rate	Examiner leniency		
Examiner leniency	0.760***			
	(68.25)			
Leverage	-0.010	0.019***		0.017***
	(-1.06)	(4.38)		(4.26)
ROA	0.095***	0.052***		0.047***
	(8.51)	(10.42)		(10.04)
Book-to-market equity	-0.005*	0.009***		0.008***
	(-1.66)	(6.40)		(6.40)
ln(Physical capital)	-0.005**	-0.008***		-0.007***
	(-2.52)	(-7.79)		(-7.64)
ln(Employment)	-0.001	0.003**		0.003**
	(-0.39)	(2.47)		(2.41)
Idiosyncratic volatility	-0.030***	-0.008***		-0.007***
	(-6.02)	(-3.14)		(-3.07)
Years of experience	0.002***		0.007***	0.007***
	(6.11)		(61.35)	(59.20)
Industry × Year FE	Yes	Yes	Yes	Yes
N	61,681	61,681	66,081	61,681
R^2	0.24	0.29	0.34	0.34
F-test: IV = 0	4657.77	-	-	-

Table 7. Instrumental Variables Estimation: Second-Stage

This table reports the results from the second-stage of the instrumental variable regression with *Profits growth*, *Production output growth*, *Market share growth*, *Physical capital growth*, and *Employment growth* as dependent variables in Panels A, B, C, D, and E, respectively. We use the firm-level *Examiner leniency* as an instrument for the trademarking *Success rate*. The instrumental variable, firm-level *Examiner leniency*, is defined as the average of normalized *Application-level leniency* for all the examiners who have issued a first-action decision on firm f's applications in year t. *Application-level leniency* is defined as the percentage of the last fifty applications examined by the examiner e before the focal application which were approved for registration. *Application-level leniency* is normalized by dividing the leniency of examiner e by the average leniency of all the examiners who have examined applications in the same trademark office in the same year and of the same legal basis i.e., "intent-to-use" vs. "in-commerce". *Success rate* is defined as the ratio of number of trademarks registered by firm f to the number of trademarks applied for by the firm in year t. We define growth for the variables *Profits*, *Production output*, *Market share*, *Physical capital*, and *Employment* as the natural logarithm of the variable for firm f in year $t+\tau$ minus the natural logarithm of the variable in year t where $\tau = 1, ..., 5$ years. *Profits* are defined as sales minus cost of golds sold of firm f in year t expressed in millions of 2016 USD. *Production output* is defined as annual sales plus the change in inventories of firm f in year t expressed in millions of 2016 USD. *Market share* is measured as firm f's annual sales as a fraction of total industry sales defined at the 3-digit SIC level, expressed as a percentage. *Physical capital* refers to firm f's property, plant, and equipment expressed in millions of 2016 USD. *Employment* are defined as total number of employees in firm f in year t expressed in thousands. Profits, production output, and physical capital are scaled by CPI (CPIAUCNS obtained from FRED). We control for the dependent variable lagged by one year, natural logarithm of *Physical capital*, natural logarithm of *Employment*, *Idiosyncratic volatility*, *Book-to-market equity*, *Return on assets*, *Leverage*, *Years of experience*, and industry × year fixed effects in the first- and second-stage estimations of all specifications. We suppress control variables for brevity. Our sample consists of all registered trademarks held by U.S. public firms. All variables are winsorized at 1% level using annual breakpoints. Standard errors are clustered at the firm level. t-statistics are reported in parentheses. The F-statistic refers to the Kleibergen-Paap rk Wald F-statistic. ***, **, and * denote significance at the 1%, 5%, and 10% level (two-sided), respectively. A complete list of variable definitions is provided in Table A.1.

Panel A. Profits Growth

	Horizon (years)				
	1	2	3	4	5
Success rate	1.036	2.703	6.171**	8.510**	8.893**
	(0.73)	(1.25)	(2.27)	(2.54)	(2.26)
Industry × Year FE	Yes	Yes	Yes	Yes	Yes
N	54,075	50,475	47,243	44,255	41,559
R^2	0.06	0.07	0.08	0.08	0.08

(continued on next page)

(continued)

Panel B. Production Output Growth

	Horizon (years)				
	1	2	3	4	5
Success rate	0.019	1.581	7.840***	11.174***	13.373***
	(0.01)	(0.76)	(2.96)	(3.44)	(3.48)
Industry × Year FE	Yes	Yes	Yes	Yes	Yes
N	52,438	48,915	45,822	42,922	40,347
R^2	0.05	0.06	0.07	0.07	0.07

Panel C. Market Share Growth

Success rate	1.923	3.175	11.157***	17.028***	21.754***
	(1.10)	(1.12)	(3.11)	(3.92)	(4.28)
Industry × Year FE	Yes	Yes	Yes	Yes	Yes
N	56,301	52,498	49,065	45,911	43,034
R^2	0.05	0.06	0.06	0.07	0.08

Panel D. Physical Capital Growth

Success rate	0.568	1.803	4.240*	7.080**	11.154***
	(0.55)	(1.01)	(1.79)	(2.41)	(3.14)
Industry × Year FE	Yes	Yes	Yes	Yes	Yes
N	56,199	52,385	48,957	45,801	42,917
R^2	0.10	0.12	0.14	0.14	0.14

Panel E. Employment Growth

Success rate	2.326**	4.733***	7.696***	11.047***	15.311***
	(2.30)	(2.76)	(3.38)	(3.95)	(4.52)
Industry × Year FE	Yes	Yes	Yes	Yes	Yes
N	55,973	52,143	48,744	45,599	42,733
R^2	0.07	0.08	0.09	0.09	0.10

Table 8. Trademarks and Patents' Complementarity

This table reports the results from regressing *Patent value growth* on *TM output* in Panel A, and regressing *TM value growth* on *Patent output* in Panel B. *Patent value growth* (*TM value growth*) is defined as the natural logarithm of one plus *Aggregate patent value* (*Aggregate TM value*) of firm f in year $t+\tau$ minus the natural logarithm of one plus *Aggregate patent value* (*Aggregate TM value*) in year t where $\tau = 1, ..., 5$ years, expressed as a percentage. *Aggregate patent value* is the sum of dollar value of all patents granted to firm f in year t. *Patent output* is *Aggregate patent value* expressed as a percentage of the concurrent total value of assets of firm f. The dollar value of patents is measured following Kogan et al. (2017). *Aggregate TM value* is the sum of dollar value of all registered trademarks filed by firm f and published in year t. *TM output* is defined as *Aggregate TM value* expressed as a percentage of the concurrent total value of assets of firm f. The dollar value of a trademark is calculated using the market-adjusted firm return on the 3-day window around trademark publication date. *Aggregate patent value* and *Aggregate TM value* are scaled by CPI (CPIAUCNS obtained from FRED) and expressed in 2016 USD while calculating *Patent value growth* and *TM value growth* respectively. We control for the dependent variable lagged by one year, natural logarithm of *Physical capital*, natural logarithm of *Employment*, *Idiosyncratic volatility*, *Book-to-market equity*, *Return on assets*, *Leverage*, and industry × year fixed effects in all specifications. All coefficients are scaled to unit standard deviation. We suppress control variables for brevity. All variables are winsorized at 1% level using annual breakpoints. Standard errors are clustered at the firm level. t-statistics are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% level (two-sided), respectively. A complete list of variable definitions is provided in Table A.1.

Panel A. Patent Value Growth

	Horizon (years)				
	1	2	3	4	5
TM output	2.164***	3.333***	4.238***	5.335***	7.205***
	(7.35)	(8.05)	(8.07)	(8.34)	(9.57)
Industry × Year FE	Yes	Yes	Yes	Yes	Yes
N	140,196	130,206	121,055	112,771	105,195
R^2	0.11	0.13	0.14	0.15	0.23

Panel B. TM Value Growth

Patent output	5.394***	5.704***	4.913***	4.469***	3.931***
	(13.11)	(10.87)	(7.89)	(6.16)	(4.99)
Industry × Year FE	Yes	Yes	Yes	Yes	Yes
N	140,196	130,206	121,055	112,771	105,195
R^2	0.19	0.22	0.24	0.26	0.31

Table 9. Trademarks and Firm Growth: Controlling for Patent Value
This table repeats the analysis in Table 4 but additionally controls for the *Patent output* of a firm as an independent variable. *Patent output* is the sum of dollar value of all patents granted to firm f in year t expressed as a percentage of the concurrent total value of assets of firm f. The dollar value of patents is measured following Kogan et al. (2017). The dependent variables are *Profits growth* (Panel A), *Production output growth* (Panel B), *Market share growth* (Panel C), *Physical capital growth* (Panel D), and *Employment growth* (Panel E).We define growth for the variables *Profits*, *Production output*, *Market share*, *Physical capital*, and *Employment* as the natural logarithm of the variable for firm f in year $t+\tau$ minus the natural logarithm of the variable in year t where $\tau = 1, ..., 5$ years, expressed as a percentage. *Profits* are defined as sales minus cost of golds sold of firm f in year t expressed in millions of 2016 USD. *Production output* is defined as annual sales plus the change in inventories of firm f in year t expressed in millions of 2016 USD. *Market share* is measured as firm f's annual sales as a fraction of total industry sales defined at the 3-digit SIC level, expressed as a percentage. *Physical capital* refers to firm f's property, plant, and equipment expressed in millions of 2016 USD. *Employment* is defined as total number of employees in firm f in year t expressed in thousands. Profits, production output, and physical capital are scaled by CPI (CPIAUCNS obtained from FRED). The key independent variable is *TM output*, defined as *Aggregate TM value* expressed as a percentage of the concurrent total value of assets of firm f. *Aggregate TM value* is the sum of dollar value of all registered trademarks filed by firm f and published in year t. The dollar value of a trademark is calculated using the market-adjusted firm return on the 3-day window around trademark publication date. We control for the dependent variable lagged by one year, natural logarithm of *Physical capital*, natural logarithm of *Employment*, *Idiosyncratic volatility*, *Book-to-market equity*, *Return on assets*, *Leverage*, and industry × year fixed effects in all specifications. All coefficients are scaled to unit standard deviation. We suppress control variables for brevity. All variables are winsorized at 1% level using annual breakpoints. Standard errors are clustered at the firm level. t-statistics are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% level (two-sided), respectively. A complete list of variable definitions is provided in Table A.1.

Panel A. Profits Growth

	Horizon (years)				
	1	2	3	4	5
TM output	1.512***	2.353***	3.060***	3.776***	4.382***
	(9.95)	(9.32)	(9.55)	(9.74)	(9.56)
Patent output	0.725***	1.476***	2.032***	2.341***	2.725***
	(5.39)	(6.36)	(6.27)	(5.72)	(5.43)
Industry × Year FE	Yes	Yes	Yes	Yes	Yes
N	133,467	123,933	115,343	107,506	100,332
R^2	0.18	0.21	0.22	0.23	0.24

(continued on next page)

(continued)

Panel B. Production Output Growth

	Horizon (years)				
	1	2	3	4	5
TM output	1.104***	1.811***	2.507***	3.356***	4.054***
	(7.73)	(7.66)	(7.94)	(8.62)	(9.04)
Patent output	0.127	0.343	0.582*	0.830*	1.188**
	(0.92)	(1.41)	(1.67)	(1.81)	(2.15)
Industry × Year FE	Yes	Yes	Yes	Yes	Yes
N	129,125	119,905	111,668	104,171	97,360
R^2	0.17	0.19	0.20	0.21	0.22

Panel C. Market Share Growth

TM output	1.032***	1.676***	2.136***	3.011***	3.816***
	(5.98)	(5.81)	(5.46)	(6.42)	(7.05)
Patent output	-0.254	-0.358	-0.176	-0.070	0.031
	(-1.62)	(-1.28)	(-0.45)	(-0.14)	(0.05)
Industry × Year FE	Yes	Yes	Yes	Yes	Yes
N	140,196	130,206	121,055	112,771	105,195
R^2	0.20	0.20	0.21	0.22	0.23

Panel D. Physical Capital Growth

TM output	1.016***	1.516***	1.996***	2.549***	2.768***
	(9.00)	(7.83)	(7.45)	(7.58)	(6.82)
Patent output	0.230**	0.704***	1.037***	1.244***	1.532***
	(2.24)	(3.72)	(3.74)	(3.40)	(3.47)
Industry × Year FE	Yes	Yes	Yes	Yes	Yes
N	139,954	129,917	120,737	112,449	104,868
R^2	0.20	0.23	0.25	0.26	0.27

Panel E. Employment Growth

TM output	0.689***	1.044***	1.579***	2.173***	2.624***
	(6.55)	(5.78)	(6.34)	(6.94)	(6.99)
Patent output	0.097	0.343**	0.533**	0.656**	0.723*
	(1.07)	(1.99)	(2.13)	(2.00)	(1.80)
Industry × Year FE	Yes	Yes	Yes	Yes	Yes
N	138,772	128,614	119,514	111,351	103,891
R^2	0.16	0.18	0.19	0.20	0.21

Table 10. Trademarks and Innovation

This table reports the results from regressing *Knowledge capital growth* and *Organizational capital growth* on *TM output* in Panels A and B, respectively. *Organizational capital growth* (*Knowledge capital growth*) is defined as the natural logarithm of one plus *Organizational capital* (*Knowledge capital*) of firm f in year $t+\tau$ minus the natural logarithm of one plus *Organizational capital* (*Knowledge capital*) in year t where $\tau = 1, ..., 5$ years, expressed as a percentage. Following Ewens et al. (2019), *Organizational capital* is calculated using Selling, General, and Administrative (SG&A) expenses; and *Knowledge capital* is calculated using Research and Development (R&D) expenses. The key independent variable is *TM output*, defined as *Aggregate TM value* expressed as a percentage of the concurrent total value of assets of firm f. *Aggregate TM value* is the sum of dollar value of all registered trademarks filed by firm f and published in year t. The dollar value of a trademark is calculated using the market-adjusted firm return on the 3-day window around trademark publication date. We control for the dependent variable lagged by one year, natural logarithm of *Physical capital*, natural logarithm of *Employment*, *Idiosyncratic volatility*, *Book-to-market equity*, *Return on assets*, *Leverage*, and industry × year fixed effects in all specifications. All coefficients are scaled to unit standard deviation. We suppress control variables for brevity. All variables are winsorized at 1% level using annual breakpoints. Standard errors are clustered at the firm level. t-statistics are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% level (two-sided), respectively. A complete list of variable definitions is provided in Table A.1.

Panel A. Organizational Capital Growth

	Horizon (years)				
	1	2	3	4	5
TM output	0.980***	1.869***	2.778***	3.767***	4.656***
	(10.37)	(10.04)	(10.18)	(10.48)	(10.16)
Industry × Year FE	Yes	Yes	Yes	Yes	Yes
N	123,777	111,664	100,739	91,070	82,392
R^2	0.20	0.20	0.21	0.22	0.24

Panel B. Knowledge Capital Growth

TM output	0.883***	1.432***	2.015***	2.616***	3.203***
	(9.16)	(8.25)	(7.98)	(7.75)	(7.50)
Industry × Year FE	Yes	Yes	Yes	Yes	Yes
N	124,448	112,248	101,222	91,486	82,756
R^2	0.19	0.19	0.20	0.20	0.21

Table 11. Trademarks and Consumer Search Costs

This table reports estimates of TM output for different subsamples. We divide the sample of firms into those whose consumers face high search costs vs. those with low consumer search costs. To proxy for consumer search costs, we rely on HHI and product market fluidity. HHI is the Herfindahl-Hirschman Index calculated annually based on firms' sales within 3-digit SIC industry with $0 \leq \text{HHI} \leq 1$. Product market fluidity is defined as the cosine similarity between firm f's own word usage and its rivals' word usage. A firm's rivals are defined using FIC-300 classifications, following Hoberg (2014). We report the average for the Low subgroup i.e., the sample with below median HHI (product market fluidity) and for the High subgroup i.e., the sample with above median HHI (product market fluidity), and the t-statistic for the difference between the two subgroups. Reported t-statistics are clustered at the firm level. *TM output* is defined as the *Aggregate TM value* expressed as a percentage of the concurrent total value of assets of firm f. *Aggregate TM value* is the sum of dollar value of all registered trademarks filed by firm f and published in year t. The dollar value of a trademark is calculated using the market-adjusted firm return on the 3-day window around trademark publication date. All variables are winsorized at 1% level using annual breakpoints. ***, **, and * denote significance at the 1%, 5%, and 10% level (two-sided), respectively. A complete list of variable definitions is provided in Table A.1.

	Low	High	t-stats
By HHI			
TM output	3.024	2.412	-6.27***
By Product Market Fluidity			
TM output	3.424	4.415	6.79***

For online publication: Appendices

A Variable Definition Appendix

Table A.1. Variable appendix
This table defines the main variables used in the empirical analysis.

Variable	Description
Key Variables of Interest	
TM value	Dollar value of each individual trademark i published by the firm f. TM value is adjusted by CPI (CPIAUCNS) and is expressed in millions of 2016 USD. Source: Compustat, CRSP, FRED, USPTO Trademark Case Files Dataset, Trademark Assignment Dataset.
Aggregate TM value	Sum of dollar value of all registered trademarks filed by firm f and published in year t, expressed in millions of 2016 USD. The dollar value of a trademark is calculated using the market-adjusted firm return on the 3-day window around trademark publication date. Sources: Compustat, CRSP, USPTO Trademark Case Files Dataset, Trademark Assignment Dataset.
TM output	Aggregate TM value expressed as a percentage of the concurrent total value of assets of firm f. Sources: Compustat, CRSP, USPTO Trademark Case Files Dataset, Trademark Assignment Dataset.
Intent-to-use TM output	Aggregate intent-to-use TM value expressed as a percentage of the concurrent total value of assets of firm f. Aggregate intent-to-use TM value is the sum of dollar value of all registered trademarks filed by firm f and published in year t using "intent-to-use" as a legal basis, expressed in millions of 2016 USD. Sources: Compustat, CRSP, USPTO Trademark Case Files Dataset, Trademark Assignment Dataset.
In-commerce TM output	Aggregate in-commerce TM value expressed as a percentage of the concurrent total value of assets of firm f. Aggregate in-commerce TM value is the sum of dollar value of all registered trademarks filed by firm f and published in year t using "in-commerce" as a legal basis, expressed in millions of 2016 USD. Sources: Compustat, CRSP, USPTO Trademark Case Files Dataset, Trademark Assignment Dataset.

(continued on next page)

(continued)

TM value growth$_{f,t,t+\tau}$	Natural logarithm of one plus aggregate TM value of firm f in year $t+\tau$ minus the natural logarithm of one plus aggregate TM value in year t where $\tau = 1, ..., 5$ years, expressed as a percentage. Aggregate TM value is scaled by CPI (CPIAUCNS obtained from FRED) and expressed in 2016 USD while calculating TM value growth. Sources: Compustat, CRSP, USPTO Trademark Case Files Dataset, Trademark Assignment Dataset.
Firm Performance	
Profits	Sales minus cost of golds sold of firm f in year t adjusted by CPI (CPIAUCNS), expressed in millions of 2016 USD. Source: Compustat, FRED.
Production output	Annual sales plus the change in inventories of firm f in year t adjusted by CPI (CPIAUCNS), expressed in millions of 2016 USD. Source: Compustat, FRED.
Market share	Firm f's annual sales as a fraction of total industry sales defined at the 3-digit SIC level, expressed as a percentage. Source: Compustat.
Physical capital	Property, plant, and equipment adjusted by CPI (CPIAUCNS), expressed in millions of 2016 USD. Source: Compustat, FRED.
Employment	Total number of employees in firm f in year t, expressed in thousands. Source: Compustat.
Firm Performance Growth	
Profits growth$_{f,t,t+\tau}$	Natural logarithm of profits of firm f in year $t+\tau$ minus the natural logarithm of profits in year t where $\tau = 1, ..., 5$ years, expressed as a percentage. Source: Compustat, FRED.
Production output growth$_{f,t,t+\tau}$	Natural logarithm of production output of firm f in year $t+\tau$ minus the natural logarithm of production output in year t where $\tau = 1, ..., 5$ years, expressed as a percentage. Source: Compustat, FRED.
Market share growth$_{f,t,t+\tau}$	Natural logarithm of market share of firm f in year $t+\tau$ minus the natural logarithm of market share in year t where $\tau = 1, ..., 5$ years, expressed as a percentage. Source: Compustat.
Physical capital growth$_{f,t,t+\tau}$	Natural logarithm of physical capital of firm f in year $t+\tau$ minus the natural logarithm of physical capital in year t where $\tau = 1, ..., 5$ years, expressed as a percentage. Source: Compustat, FRED.
Employment growth$_{f,t,t+\tau}$	Natural logarithm of employment of firm f in year $t+\tau$ minus the natural logarithm of employment in year t where $\tau = 1, ..., 5$ years, expressed as a percentage. Source: Compustat.

(continued on next page)

(continued)

Firm Characteristics	
Book-to-market equity	Ratio of firm f's end of year t book value of equity to its end of year market value of equity. Source: Compustat.
ROA	Return on assets, measured as the ratio of operating income before depreciation in year t to the book value of assets. Book value of assets is calculated as the average of the total assets of years t and $t-1$, defined as per WRDS Financial Ratios Codebook. Source: Compustat.
Leverage	Ratio of firm f's total liabilities to its book value of assets in year t. Source: Compustat.
Idiosyncratic volatility	Natural logarithm of the annual standard deviation of the difference between firm f's return and the total return value-weighted index. Source: CRSP.
Industry Characteristics	
HHI	Herfindahl-Hirschman Index, calculated annually based on firms' sales within 3-digit SIC industry. $0 \leq \text{HHI} \leq 1$. Source: Compustat.
Product market fluidity	Cosine similarity between firm f's own word usage and its rivals' word usage. A firm's rivals are defined using FIC-300 classifications, following Hoberg (2014). Source: Hoberg et al. (2014).
Trademark Characteristics	
Number of TMs	Number of registered trademarks filed by firm f and published in year t. Source: USPTO Trademark Case Files Dataset, Trademark Assignment Dataset.
r^{TM}	Market-adjusted firm return on the 3-day window around trademark publication date. Market-adjusted firm return is defined as the difference between firm f's return and the total return value-weighted index. Source: Compustat, CRSP, USPTO Trademark Case Files Dataset, Trademark Assignment Dataset.
$\mathbb{E}[r^{TM}\|\epsilon]$	Filtered component of market returns that is related to trademark value. Source: Compustat, CRSP, USPTO Trademark Case Files Dataset, Trademark Assignment Dataset.
Success rate	Ratio of number of trademarks registered by firm f to the number of trademarks applied for by the firm in year t. Source: USPTO Trademark Case Files Dataset, Trademark Assignment Dataset.
Innovation Measures	
Aggregate patent value	Sum of dollar value of all patents granted to firm f in year t. The dollar value of patents is measured following Kogan et al. (2017). Source: CRSP, USPTO PatentsView Dataset, Kogan et al. (2017), Stoffman et al. (2022).

(continued on next page)

(continued)

Patent output	Sum of dollar value of all patents granted to firm f in year t expressed as a percentage of the concurrent total value of assets of firm f. The dollar value of patents is measured following Kogan et al. (2017). Source: CRSP, USPTO PatentsView Dataset, Kogan et al. (2017), Stoffman et al. (2022).
Patent value growth$_{f,t,t+\tau}$	Natural logarithm of one plus aggregate patent value of firm f in year $t+\tau$ minus the natural logarithm of one plus aggregate patent value in year t where $\tau = 1, ..., 5$ years, expressed as a percentage. Aggregate patent value is scaled by CPI (CPIAUCNS obtained from FRED) and expressed in 2016 USD while calculating patent value growth. Source: CRSP, USPTO PatentsView Dataset, Kogan et al. (2017), Stoffman et al. (2022).
Knowledge capital	Net knowledge capital calculated using Research and Development (R&D) expenses following Ewens et al. (2019). Source: Ewens et al. (2019).
Knowledge capital growth$_{f,t,t+\tau}$	Natural logarithm of one plus knowledge capital of firm f in year $t+\tau$ minus the natural logarithm of one plus knowledge capital in year t where $\tau = 1, ..., 5$ years, expressed as a percentage. Source: Ewens et al. (2019).
Organizational capital	Net organizational capital calculated using Selling, General, and Administrative (SG&A) expenses following Ewens et al. (2019). Source: Ewens et al. (2019).
Organizational capital growth$_{f,t,t+\tau}$	Natural logarithm of one plus organizational capital of firm f in year $t+\tau$ minus the natural logarithm of one plus organizational capital in year t where $\tau = 1, ..., 5$ years, expressed as a percentage. Source: Ewens et al. (2019).
Examiner Characteristics	
Examiner leniency	Average of normalized application-level examiner leniency for all the examiners who have issued a first-action decision on firm f's applications in year t. Application-level leniency is defined as the percentage of the last fifty applications examined by the examiner e before the focal application which were approved for registration. Application-level leniency is normalized by dividing the leniency of examiner e by the average leniency of all the examiners who have examined applications in the same trademark office in the same year and of the same legal basis i.e., "intent-to-use" vs. "in-commerce". Source: USPTO Trademark Case Files Dataset, Trademark Assignment Dataset.

(continued on next page)

(continued)

Years of experience	Average of normalized number of years of experience for all the examiners who have issued a first-action decision on firm f's applications in year t. Number of years of experience is defined as the number of years since the first trademark application examined by examiner e was filed. Number of years of experience is normalized by dividing the experience of examiner e by the number of years of experience of all the examiners who have examined applications in the same trademark office in the same year and of the same legal basis i.e., "intent-to-use" vs. "in-commerce". Source: USPTO Trademark Case Files Dataset, Trademark Assignment Dataset.