The USPTO Patent Assignment Dataset:
Descriptions and Analysis

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Abstract

Recorded patent assignments have been maintained by the USPTO for over 40 years but have not been extensively utilized by scholars. One explanation is that they have not been in a form amenable for use in research. To help remedy this deficiency and foster research in the area of intellectual property, the Office of Chief Economist of the United States Patent and Trademark Office (USPTO) is releasing a series of datasets in formats convenient for researchers. This paper describes the USPTO *Patent Assignment Dataset*, a database of roughly 6 million assignments and other transactions recorded during the 1970-2014 period and affecting about 10 million patents or patent applications. Since these data have not been commonly used, we provide a comprehensive description and present stylized facts to facilitate understanding and to motivate future research. Despite some limitations inherent in the data, release of the *Patent Assignment Dataset* opens multiple avenues for original research, particularly in the areas of intellectual property collateralization and the markets for technology and innovation.

Keywords: Intellectual Property, Patents
JEL Classification Numbers: O3, L1, L2, G2, G3

Table of Contents

1 Introduction

Numerous studies have relied upon patent data as a valuable resource for analyzing technological innovation (Hall and Harhoff 2012). While patent-related metrics have been used in published research since the 1950s (Schmookler 1954; 1957), the linking of patented inventions to the organizations that own them has proved particularly vexing for researchers (Thoma et al. 2010). While researchers using US data have commonly relied upon the patent assignment listed on the front page of the patent grant document (Hall et al. 2001), recently another USPTO source of assignment information – "recordings" – has been identified (Chesbrough, 2006). Recorded patent assignments, executed (optionally) by an interested party and reflecting transactions in patents both prior to and after patent grant, have been maintained by the USPTO for over 40 years but have not yet been extensively used by scholars.

Despite a marked increase in the business and economics scholarship examining markets for technology (Arora et al. 2005), these data have heretofore been used sparingly in research. One explanation for the paucity of scholarship is that these data have not been in a format amenable for use by researchers. To help resolve this deficiency and foster research on the role of intellectual property in the economy, the Office of Chief Economist of the United States Patent and Trademark Office (USPTO) is releasing both patent and trademark assignment datasets in formats more convenient for comprehensive statistical analysis than has been previously available.[1] This paper describes the variables in the *USPTO Patent Assignment Dataset* (hereafter *Dataset*), an organized relational database of assignments and other transactions associated with US patent documents (both applications and grants), available for download at: www.uspto.gov/economics.

These *Dataset* is derived from the recording of patent transfers by parties with the USPTO. Legally, the "original applicant is presumed to be the owner of an application for an original patent, and any patent that may issue therefrom, unless there is an assignment."[2] A legally valid assignment (generally a legal agreement) transfers all or part of the right, title, and interest in a patent or application from an existing owner (an assignor) to a recipient (an assignee).[3] The USPTO allows parties to record assignments of patents and patent applications in order to, as much as possible, maintain a complete history of claimed interests in a patent. The USPTO also permits recording of other documents that affect title (such as certificates of name change and mergers of businesses) or are relevant to patent ownership (such as licensing agreements, security interests, mortgages, and liens).[4] Such recording serves to give third parties

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[1] The release of these datasets is in accordance with the agency's responsibility under 35 USC § 2 to make patent information available to the public. Providing these research datasets to advance study of the economics of patents is also an element in the USPTO economics research agenda. *See generally* http://www.uspto.gov/news/pr/2010/10_63.jsp. The USPTO Trademark Assignment Dataset is available at http://www.uspto.gov/learning-and-resources/electronic-data-products/trademark-assignment-dataset. *See* Graham et al. (2014) for a detailed description.

[2] 37 CFR 3.73(a) (2015).

[3] 37 C.F.R. § 3.1. See also USPTO Manual of Patent Examining Procedure (MPEP) § 301(II) wherein assignments transfer the *entire* ownership interest meaning the entirely of the "bundle of rights" are transferred to the new owner or partial owner. In contrast, it is a license when use is permitted but ownership is not transferred. In this document, all references to the MPEP are to the Ninth Edition, effective March 2014, unless otherwise noted.

[4] MPEP § 314.

notice of "equitable interests" or other matters pertaining to the ownership of a patent or patent application.[5]

The *Dataset* contains detailed information on roughly 6 million patent assignments and other transactions recorded at the USPTO between 1970 and 2014 involving over 10 million U.S. patents and U.S. patent applications. It includes identifying information for the assignor(s) and assignee(s), dates the transaction was executed and subsequently recorded at the USPTO, patent and application ("property") numbers, and a self-asserted "nature of conveyance" (e.g., assignment, merger, security agreement, or license). Because these assignment data have not been widely used in the research community, we provide here a comprehensive description of the *Dataset* and explain the institutional details necessary for understanding and using the data.

As part of this description, we also highlight a number of stylized facts derived from the *Dataset* to facilitate understanding and to help motivate further inquiry. Notably, the number of patents changing ownership each year appears to be stabilizing or even falling, although we are unsure whether this observation reflects fewer transactions in the market, or a reduced propensity of parties to voluntarily record, or indeed a result of substituting among "conveyance type" descriptions over time (modified recording behavior). We note that analysis of the recorded transactions in the *Dataset* suggests that information technologies are more immune to recent flattening trends in the number of annual transactions, that changes in ownership prior to grant appear more common among recently issued patents relative to older cohorts, and that the number of patents assets being pledged as collateral to secure debt is also growing in absolute terms and relative to the stock of patents-in-force.

The USPTO continues to release patent assignment records to the public in hierarchically-structured XML files. However, these data require considerable effort (parsing and cleaning) to be useful for most research purposes. While some researchers have invested those efforts individually,[6] the burden is nevertheless a barrier to a broader set of empirical scholars. In order to facilitate their wider use, we parsed the XML files and migrated the data to a relational database in formats more compatible with statistical software and accessible to the research community.

This assignment information also poses difficulty for users since the records are entered by parties and reported "as is" by the USPTO with minimal to no verification, validation, or standardization. To lower the costs of doing research, we also constructed two data files to aid users. One file identifies and classifies the "nature of conveyance" categories (i.e., transaction type) based on keyword searching. Another file indicates and corrects for possible errors in the patent and application numbers listed in the user-input record. To offer more information, we also discuss in this paper various complications for *Dataset* users, namely duplicate redundant records, recording lags, and broken chains observed in title (ownership).

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[5] MPEP § 313.
[6] *See e.g.* Serrano, 2010 and Mann, 2014.

While the patent laws provide an incentive for interested parties to record an assignment with the USPTO, such recording is not mandatory. As a result, how accurately transactions recorded at the USPTO represent the population of assignments or other transactions affecting title in patent properties remains an open question. While we briefly explore patent owners' motivations to record in relation to government interest disclosure and maintenance fee payment decisions, we encourage researchers to continue to examine the accuracy and coverage of the *Dataset*, and consider how coverage may vary over time, across technologies, by nature of conveyance, and by type of assignor or assignee.

Despite these limitations, release of the *Dataset* opens multiple avenues for conducting original research. A particular advantage in using patent assignment information is that these transactions are dynamic and may be observed over the life cycle of a patent term unlike the "static" ownership information listed on a patent at grant. Moreover, useful information includes the identities of the parties to the transaction, lengths of assignment histories, recording lags (time from execution to recording), and the asserted conveyance type. As such, the *Dataset* offers an opportunity to advance our understanding of the redistribution and value of intellectual property as well as market dynamics related to the rate and direction of technological change.

The remainder of this paper is organized as follows. In Section 2, we survey existing research employing patent assignment data. Section 3 discusses the types of transactions recorded with the USPTO and legal details needed to understand how and why the information is archived. Section 4 describes the organizational structure of the *Dataset* and the variables in each data file. Section 5 discusses some limitations inherent in the *Dataset*, including caveats and cautions for researchers. Section 6 presents a set of stylized facts derived from these data to facilitate understanding and to help motivate future research, while Section 7 evaluates the problem of selection and unrecorded transactions. Section 8 concludes.

2 Literature Review

While an extensive body of literature investigating or employing patent data has been developed in recent decades (Hall and Harhoff, 2012), research employing information derived from the USPTO patent-assignment recordings data is relatively uncommon. Chesbrough (2006) supplied one of the initial studies using USPTO patent-assignment recordings data, showing a rising trend in reassignments to support his writings on "open innovation." Serrano (2006, 2010) provided a largely descriptive treatment of these data for the 1980-2001 period, highlighting trends in the markets for technology by utilizing US patent renewals. Galasso, Schankerman, and Serrano (2013) employed patent assignments with patent litigation data to test a model of gains from trade in patent enforcement and show that patent litigation risk decreases after patent sales. Fischer and Henkel (2012) utilized data on patent acquisitions to examine the role of non-practicing entities in the market for technology. Griffith, Miller, and O'Connell (2014) used data on the legal owners of European patent applications to show that the ownership location of patentees is affected by changes in corporate tax regimes.

Assignment and transactional data may supplement other widely-used patent value indicators such as forward citations (Griliches, Hall, and Pakes, 1991; Jaffe and Trajtenberg, 2002; Hall, Jaffe, and Trajtenberg, 2005); patent renewal (Pakes, 1986; Pakes and Simpson, 1989; Schankerman, 1991; Lanjouw, Pakes, and Putnam, 1998; Cornelli and Schankerman, 1999; Bessen, 2008; Lee and Jeong-Dong, 2008); and patent families (Harhoff, et al. 1999; Grefermann et al., 1974; Putnam, 1996; Schmoch et al., 1988; Lanjouw and Shankerman, 2001; Harhoff, Scherer, and Vopel, 2002). Unlike most of these indicators, however, recorded assignments can, in some cases, be observed prior to grant (i.e., transferring patent applications) thereby possibly offering an early signal of private value.

Recorded assignments may offer researchers other opportunities. These data may provide a signal of private patent value by showing when patents are used to secure financial obligations (Amable, 2010; Loumioti, 2011; Brassell and King, 2013; Hochberg et al., 2014; Mann, 2014), licensed (Zuniga and Guellec 2009) or litigated (Lanjouw and Schankerman, 2001; Schankerman and Galasso, 2010, 2011). Moreover, assignments enable examination of the "chain-of-title" and offer an opportunity to add to prior literature on relationships between the parties to the transaction ("small-large" Figuero and Serrano, 2013; "foreign to domestic" McAleer, 2007; "faculty to university" Thursby and Thursby, 2009; "funded scientists to sponsors" Aldgridge and Audretsch, 2010; "practicing to non-practicing entities" Fischer and Henkel, 2012) and complementaries and spillovers from mergers (Marco and Rausser, 2011). Recorded assignment data may also enhance econometric models on patents, R&D and productivity (Hall, Griliches, and Hausman, 1984), and suggest strategic or competitive relationships relative to R&D spillovers (Hanel, 2002), knowledge flows (Jaffe, Trajtenberg, and Henderson 1993; Jaffe and Trajtenberg, 1996, 1999; Jaffe, 1998, and Peri, 2005), patent quality (Lanjouw and Schankerman, 2004; Marco, 2007) and R&D organization (Arora et a. 2011).

3   Types of transactions recorded with the USPTO

Recording an assignment of assignor's interest in patent applications and issued patents provides legal notice to the public of the assignment.[7] The Office also permits the recording of other documents affecting title to applications or patents, including certificates issued by appropriate authorities showing a change of name or a merger of business as well as documents supporting security interests, licenses, liens, and mortgages.[8] Below we provide a primer on assignments and the more common types of transactions recorded with the USPTO.

3.1   Assignment of Assignor's Interest

An assignment of assignor's interest (henceforth "assignment") is a transfer by an assignor of its right, title, and interest in a patent or patent application to an assignee.[9] A patent or application is assignable by

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[7] 37 CFR Part 3 (2015).

[8] "Assignments of applications, patents, and registrations, accompanied by completed cover sheets as specified in §§ 3.28 and 3.31, will be recorded in the Office. Other documents, accompanied by completed cover sheets as specified in §§ 3.28 and 3.31, affecting title to applications, patents, or registrations, will be recorded as provided in this part or at the discretion of the Director." 37 CFR 3.11(a)(2015).

[9] 37 CFR 3.1 (2015).

an instrument of writing,[10] and the assignment transfers to another a party's entire ownership interest or a percentage of that party's ownership interest in the patent or application.[11] Valid assignments indicate ownership to establish standing to bring suit against infringers.[12] Typically, a properly executed assignment is in writing, identifies the assignor and assignee and the property interests conveyed, and is signed by an individual with proper authority to act for the assignor.

Federal recording of an entire or partial patent assignment is not mandatory. There is no expressed legal requirement for parties to disclose assignments to the USPTO; however, both patent statute and federal regulations provide some incentive for recording. By statute, failure to record an assignment in the USPTO renders it void against any subsequent purchaser or mortgagee.[13] Thus, theoretically, if an assignment goes unrecorded, the assignor may sell the patent or application to a subsequent purchaser, and that subsequent assignment, if recorded, will take priority. The statute does not impose a fixed time limit for recording but requires filers to record within three months of the execution date or before the next assignment to secure protection against subsequent purchasers.[14] Despite the strong statutory language, we have not identified case law where a party was denied notice protection for failing to record. Conversely, case law and assignment records allow for retroactive recording through *nunc pro tunc* ("now for then") transactions that treat the lack of recording as a clerical error and provide for retroactive notice protection of a current agreement, even if recorded after the time to record had expired.[15]

Federal regulations provide some incentive for assignees to record an assignment with the USPTO. Specifically, if an assignee of an allowed application wants the patent to issue in its name, then the assignee must record the assignment (or have filed for recording) in the assignment records of the USPTO at the time of making the request.[16] However, to take certain action in the application, patent, or other patent proceeding – namely prosecute a patent application or reexamination or engage in an interference

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[10] *Akazawa v. New Link Tech. Int'l, Inc.*, 520 F.3d 1254 (Fed. Cir. 2008), confirmed that Section 261 requires all assignments to be in writing. Defendant challenged the plaintiff's standing to sue for infringement based on a missing writing in the assignor's claim of ownership in the patent as the patents passed to his heirs. The Federal Circuit held that passage of title through intestacy under Japanese common law is not an assignment and, therefore, did not require writing. Net, there is nothing that limits assignment as the only means for transferring patent ownership…by operation of law" *Id*. at 1356.

[11] 35 U.S.C. 261 (2015).

[12] CHISUM ON PATENTS § 23.01[f] ("The issue in determining standing is whether the claimant possesses legal title ownership of the patent."). *See Schreiber Foods, Inc. v. Beatrice Cheese, Inc*., 402 F.3d 1198, 1203 (Fed. Cir. 2005); *Lans v. Digital Equip. Corp.,* 252 F.3d 1320, 1328 (Fed. Cir. 2001)(affirming dismissal of complaint and denial of motion to amend pleadings to substitute assignee as plaintiff when plaintiff-inventor assigned the patent prior to filing the action).

[13] "An assignment, grant, or conveyance shall be void as against any subsequent purchaser or mortgagee for a valuable consideration, without notice, unless it is recorded with the Patent and Trademark Office within three months from its date or prior to the date of such subsequent purchase or mortgage." 35 U.S.C. 261 (2015).

[14] "An assignment, grant, or conveyance shall be void as against any subsequent purchaser or mortgagee for valuable consideration, without notice, unless it is recorded in the Patent and Trademark Office within three months from its date or prior to the date of such subsequent purchase or mortgage." MPEP § 261.

[15] Such cures arise most commonly in cases where the supposed patent owner's standing to sue for infringement is itself at issue. Where the assignment that establishes the asserting party's claim to the patent right may be insufficient, a subsequent *nunc pro tunc* agreement can make the assignment complete—however, any such assignment must be in writing and must still precede the filing of the lawsuit. *See, e.g., Enzo APA & Son, Inc. v. Geapag A.G.*, 134 F.3d 1090, 1093 (Fed. Cir. 1998).

[16] For a patent to issue to an assignee, the assignment must have been recorded or filed for recording in accordance with 37 CFR 3.11. *See* 37 CFR 3.81(a) (2015).

proceeding[17] – the assignee must make the assignment part of the file wrapper of the patent, application, or proceeding.[18] These indications of assignment operate independently, meaning that an assignment recorded in the Office's assignment records does not, by itself, permit the assignee to take action; whilst recording in the file wrapper to take action does not automatically result in a recording in the assignment records.[19] Thus, since the *Database* mirrors the Office's assignment records, it will not include any assignments made part of the file wrapper unless they were also recorded separately in the assignment records. It is important to note that recording an assignment with the USPTO is "merely a ministerial act…not an Office determination of the validity of the assignment document or the effect of the assignment document on the ownership of the patent property."[20]

As discussed in more detail in Section 6, the majority of recorded assignments represent the first within-firm transfer from inventing employees to their employer assignees. Because for all applications filed before September 16, 2012, the patent must issue to a human inventor, requiring a legal assignment to an employer-owner.[21] Inventor-employees are typically under some contractual obligation to transfer ownership of an application or resulting patent to their employers.[22] Thus, before the recent enactment of the America Invents Act (AIA), in order to take action in a patent matter, an assignee had to establish ownership of the patent or patent application in compliance with 37 CFR 373 (pre-AIA), which generally required submitting or specifying the location of documentary evidence of a chain of title from the inventor to the assignee in the assignment records of the Office.[23] The recording condition no longer applies for applications filed on or after September 16, 2012, because the original applicant, whether inventor or inventor's employer, is presumed to be the owner of a patent application and any resulting

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[17] *See* 37 CFR 1.46 (2015) and MPEP 325 for applications filed on or after September 16, 2012; pre-AIA 37 CFR 3.73 and MPEP 324 for applications filed before September 16, 2012.

[18] Making an assignment part of the file wrapper may be necessary to permit the assignee to take action in the application, patent, or other patent proceeding under the conditions set forth in 37 CFR 1.46 and 37 CFR 3.81(a) and MPEP § 325 (for applications filed on or after September 16, 2012) or under the conditions set forth in pre-AIA 37 CFR 3.73 and MPEP § 324 (for applications filed before September 16, 2012). MPEP § 301(V).

[19] MPEP § 301.01(b). Both databases are available to the public. Patent and trademark assignment databases can be searched using the following link http://assignments.uspto.gov/assignments/q and helpful search information, variable definitions, and search tips can be found at the Assignments on the Web (AOTW) link at
http://www.uspto.gov/products/services/Assignments_on_the_Web.jsp#assignee_name.
Patent application files also known as the "application file wrapper" can be searched at the Patent Application Information Retrieval (PAIR) homepage at http://www.uspto.gov/patents/process/status/index.jsp.

[20] MPEP § 301(V). When necessary, the Office will determine what effect a document has, including whether a party has the authority to take an action in a matter pending before the Office. 37 C.F.R. 3.54.

[21] 37 C.F.R. 3.73(a) (pre-AIA). For applications filed before September 16, 2012, the ownership of the patent (or the application for the patent) initially vests in the named inventors of the invention of the patent. See *Beech Aircraft Corp. v. EDO Corp.*, 990 F.2d 1237, 1248, 26 USPQ2d 1572, 1582 (Fed. Cir. 1993). A patent or patent application is assignable by an instrument in writing, and the assignment of the patent, or patent application, transfers to the assignee(s) an alienable (transferable) ownership interest in the patent or application. 35 U.S.C. 261.

[22] MPEP § 261 "Subject to the provisions of this title, patents shall have the attribute of personal property. Applications for patent, patents, or any interest therein, shall be assignable in law by an instrument in writing. See also, "*IpVenture v. Prostar Computer*, 503 F.3d 1324 (Fed. Cir. 2007), an employment agreement provided that inventions made during employment are the sole property of employer and that employee "agrees …to assign" them to employer. Employee assigned invention to IpVenture who sued Prostar for infringement. The appeal court reversed lower court holding employer "agreement is an agreement to assign" and interest in the patent was not implemented by written assignment. Employer was held not to be the owner of the patent.

[23] 37 C.F.R. 3.73(b)(1) (pre-AIA).

patent.[24] An inventor-to-employer transfer of rights, which we will refer to as an "employer assignment" reflects considerably different economic phenomena than subsequent inter-firm assignments (i.e., re-assignments) of patents that are more reflective of the market for technology. Accordingly, we treat employer assignments as a unique subcategory and provide methods for identifying such recorded transactions in the *Dataset* in Section 4.2.2.

3.2   Security Interest Agreement

Unlike changes in the title to patent properties that often occur in assignments and mergers, security interest agreements reflect patents being pledged as collateral for debt. In a typical agreement, a third-party lender takes an interest in the patent or application to secure payment on a loan. The lender, as a secured creditor, has preferential rights in the disposition of the asset upon any default. Thus, legal ownership does not change unless and until the borrower defaults and the lender forecloses on and seizes the patent or application.[25] Dominion over the collateral is returned to the property owner upon the issuance of a security release by the creditor.

Security interests are enforceable between parties to the agreement, but creditors wishing to defend their interest against third parties must record, or "perfect," their security interest in the debtor's collateral. Perfecting a security interest assures creditors priority over subsequent third party claims to the collateral. The law is not settled concerning the proper venue in which to record a financing statement in order to perfect a security interest in a patent. At present, perfection can be accomplished at the state level under Article 9 of the Uniform Commercial Code (U.C.C.). Murphy (2002) provides a detailed review of the U.S. laws governing collateralization of intangible property and the ambiguity of perfecting a security interests in such assets relative to tangible counterparts. While presently there is no requirement to perfect at the federal level, there is at least some suggestion from the Federal Circuit that doing so might perfect the security interest against a later bona fide purchaser or mortgagee.[26] Thus, recording a security interest with the USPTO does not constitute constructive notice but may provide actual or inquiry notice to subsequent purchasers who rely on the USPTO record.[27]

3.3   Government Interest Agreement

According to Presidential Executive Order 9424, departments and executive agencies of the Federal Government are required to promptly forward to USPTO for recording all licenses, assignments, or other interest of the Government in or under patents or patent applications.[28] Assignments and documents affecting title or otherwise pertaining to a patent or patent applications required to be filed by Executive

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[24] 37 C.F.R. 3.73.

[25] Henry, S., Ferraro, H. and Keeton, H. "Securing a Loan with Patents, Trademarks, and Copyrights is Best for Lenders," Pratt's *Journal of Bankruptcy Law*, Issue 1, January 2010, pp. 50-64

[26] *Rhone-Poulence Agro, S.A. v. DeKalb Genetics Corp.*, 284 F.3d 1323 (Fed. Cir. 2002).

[27] Murphy, 2002. . See William C. Hillman, *Documenting Secured Transactions*, PLIREF-SECTRN § 3:11.1 at 3-20 (2007) ("The fact remains that any recorded instrument can provide actual notice, if someone searches the records of the Patent and Trademark Office."); Thomas M. Ward, *The Perfection & Priority Rules for Security Interests in Copyrights, Patents & Trademarks; The Current Structural Dissonance & Proposed Legislative Cures*, 53 ME. L. Rev. 391, 433 (2001) (Filing an ordinary security agreement with the PTO may provide "inquiry notice" to those who access the database.) See Snow Machs., Inc. v. S. Slope Dev. Corp., 754 N.Y.S.2d 383, 386 (N.Y. App. Div. 2002) (illustrating that an unprotected security interest can obtain priority over a buyer, if the buyer took the collateral with actual knowledge of the unperfected security interest).

[28] 37 C.F.R. § 3.11(b). Executive Order 9424 of February 18, 1944 9 FR 1959, 3 CFR 1943-1948 Comp., p. 303.

Order 9424 are recorded in the Office's assignment records[29] and, with some exceptions, will appear in the *Dataset*.[30] To our knowledge, there has been no systematic review of patents, or agencies, for compliance with the Executive Order. We propose a possible approach in Section 7.1, comparing the Office's assignment records with the subset of patents for which government interest is disclosed on the front page of the patent in accordance with the Bayh-Dole Act.[31]

4 Data structure and files

4.1 Data source

To record a document with the USPTO Assignment Services Branch, parties must submit supporting documentation and a PTO-1595 cover sheet and pay prescribed fees.[32] Proper supporting documentation consists of a copy of the original document (e.g., an executed assignment) or an extract thereof.[33] In 2003, the USPTO launched the Electronic Patent Assignment System (EPAS) to ease and expedite the assignment recording process, though submissions by facsimile are still accepted. Paper and electronic versions of the PTO-1595 are shown in Appendices A and B, respectively. The Office facilitated recording further by eliminating the fee for documents recorded electronically on or after January 1, 2014, though the per-property fee still applies to facsimile submissions.[34] The USPTO Assignment Services Branch records the cover sheet and documentation and issues a notice to the parties reflecting the location of the information recorded (i.e., reel and frame number).

The *Dataset* is derived from the information submitted to the USPTO in the PTO-1595 cover sheet, supporting documentation for paper submissions, and the menu screen for electronic submissions. The USPTO releases this information to the public in hierarchical XML files via Data.gov.[35] The XML files contain data for each transaction recorded with the Office, including the *reel number*, *frame number*, and *recording date*, as well as multiple nested elements, such as an entry for each assignor and assignee. We converted the hierarchically-structured files into non-nested rectangular data files in comma-separated values (CSV) and Stata dataset (DTA) formats to be more compatible with statistical software. We include only the most current XML record for each recorded transaction and omit any earlier duplicate

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[29] *Id.*

[30] 37 C.F.R. 3.58. Instruments to be recorded will be placed on a Secret Register to record governmental interest at the request of the department or agency submitting the instrument. No information recorded concerning such instruments will be make available for examination or inspection, except on the written authority of the head of the department or agency which submitted the instrument and requested secrecy and the approval by the Director.

[31] 35 U.S.C. § 200-212.

[32] 37 C.F.R. §§ 3.21 and 3.24-3.28 (2015).

[33] *See* MPEP § 302.

[34] Effective January 1, 2014, the fee is $0 if recorded electronically. Setting and Adjusting Patent Fees, 78 Fed. Reg. 4,272 (January 18, 2013) (codified at 37 C.F.R. 1.21(h)(1)). Available at http://www.uspto.gov/aia_implementation/AC54_Final_Rule_Setting78FR4212-2013JAN18.pdf.; A $40 fee is charged for non-electronic submissions. 37 C.F.R. §§ 1.21(h). *See* fee code 8021 at http://www.uspto.gov/learning-and-resources/fees-and-payment/uspto-fee-schedule#Patent Post Issuance Fees.

[35] The USPTO also makes the Patent Assignment XML files available for bulk download, *see* http://www.uspto.gov/products/catalog/patents.jsp.

XML records from the data files.[36] In addition researchers should be aware of the Assignments on the Web for Patents (AOTW-P), a searchable database of individual USPTO assignment records keyed on reel-frame identification, patent number, and assignor or assignee name.[37]

4.2 Data files

Figure 1 displays the organizational structure of the *Dataset*. The **assignment** file contains a single observation for each transaction recorded with the USPTO, uniquely identified by a *reel-frame identification number* (**rf_id**).[38] We generated the **assignor**, **assignee** and **documentid** files from the nested sub-elements of each record in **assignment**. The **rf_id** variable serves as the primary key for linking records between data files. For the sake of brevity, we discuss only variables of particular interest to researchers below. Appendix C provides a table of all variable names, formats, and definitions for each data file. The number of observations (i.e. assignors, assignees, or properties) per **rf_id** are provided in Table 1. We also provide definitions of relevant concepts to assist *Dataset* users in Table 2.

4.2.1 assignment

The **assignment** data file contains a single entry for each of the 6,328,178 transactions recorded at the USPTO between January 1970 and December 2014 (inclusive). While the earliest recording date in the data file is January 4, 1970, the number of transactions recorded in the initial years is negligible. It appears the data coverage in the *Dataset* is sufficient for time series analysis during 1981-2014. The **assignment** data file includes the recording date, a page count, and the correspondent name and address, typically reflecting the assignor's power of attorney or legal representative.[39] The correspondent name and address fields consist of free-form text strings rather than distinct fields for street, city, state, etc.

Finally, there is a conveyance text field capturing the choice from a pre-specified menu of "nature of conveyance" types (for instance, Appendix A, Form PTO-1595, page 1, item 3). There is some difference in the conveyance text captured in **assignment** depending on whether the record was derived from the paper or electronic version of Form PTO-1595. Table 3 compares the possible choices from these two versions. While the electronic form offers, in general, many more choices, the paper form includes "Joint

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[36] The XML file are updated at varying times such that downloading XML files directly will result in multiple duplicate entries for a distinct reel-frame identification number. We included only the most current entry per the updated file date.

[37] For detailed information on an individual patent or patent application, the USPTO provides multiple tools, including the public Patent Application Information Retrieval (PAIR) (http://www.uspto.gov/patents/process/status/index.jsp) for real-time access to the electronic file wrapper of the case and Patent Full-Text and Image Database (http://patft.uspto.gov/netahtml/PTO/search-bool.html) and Patent Application Full-Text and Image Database (http://appft.uspto.gov/netahtml/PTO/search-bool.html) for searching and viewing complete patent and application documents, respectively. Additionally, the USPTO's Patent Technology Monitoring Team provides regular statistical reports that profile patents by geographic origin, technology, and assignee, accessible at http://www.uspto.gov/web/offices/ac/ido/oeip/taf/reports.htm. Reports by assignee are the product of a patent assignee name harmonization effort which attempts to harmonize the first-listed assignee names for all utility patents granted since 1969 and design, plant, and reissue patents granted since 1977. The results of this harmonization effort can be accessed and downloaded at: http://www.uspto.gov/web/offices/ac/ido/oeip/taf/data/misc/data_cd.doc/assignee_harmonization/.

[38] The 4-5 digit reel number refers to the microfilm reel number of the assignment entry in physical USPTO records; similarly the 1-4 digit frame number refers to the location of the assignment entry on the reel number in physical USPTO records. Thus, each assignment recorded with the USPTO has a unique reel number and frame number combination. While both reel number and frame number are sequential, there are missing values in the sequence because each only specifies the first page of the assignment records and records may have multiple pages.

[39] The data file also includes a purge indicator designating whether the entry was deleted from the historical database, however, because items are never purged from the database, this indicator never varies when present.

Research Agreement" not included online. Recording parties may also select "Other" for the conveyance type, and input text to describe the transaction or the equitable interest being recorded. For records on which the "Other" selection was made, the conveyance text field is not standardized (especially for certain subgroups, such as partial assignments and corrections). The most common choice is "Assignment" ("Assignment of assignor's interest"), although all categories show a non-trivial number of entries in the *Dataset*.

4.2.2   **assignment_conveyance (constructed)**

To facilitate analysis (discussed below in Section 6), we made a reasonable attempt to assign all entries to the enumerated conveyance type categories, using key search terms such as "assignor's interest," "government interest," or "merger" for pattern matching.[40]

In a few cases, we can identify an employer assignment through a keyword search (for example, the conveyance text specifies "employment agreement"). In most instances however, the conveyance text associated with a (presumable) employer assignment is indistinguishable from that of an inter-firm assignment (or reassignment). We therefore developed an algorithm to identify (presumable) employer assignments not otherwise identified using keyword search. The algorithm identifies an "employer assignment" when the record meets the following conditions: a) the earliest transaction recorded for the property (rf_id with earliest execution date); and b) the property was transferred alone (i.e., no other properties were listed in the PTO-1595 cover sheet); and c) the execution date is prior to the patent application disposal (grant or abandonment) date (or December 31, 2014 for pending applications); and d) keyword searching identifies the conveyance text as an "assignment." We included the results in the **assignment_conveyance** (constructed) data file. Users should note that our best efforts at identifying conveyance type categories and employer assignments may nevertheless introduce error, so use these constructed data with care. We encourage *Dataset* users to improve on our method.

4.2.3   **assignee / assignor**

The **assignee** file contains data captured for the assignee(s) for each **rf_id** in **assignment**. It includes the assignee's name and address (street, city, state/country, postal code). Data coverage of assignee street, city, and state/country improve for transactions recorded in the early 1990s to near 100 percent for post-1996 recordings. Note that typically only the state field is populated for assignees with US addresses, whereas only the country field is populated for assignees with foreign addresses.

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[40] The basic algorithm removes all special characters and duplicative spaces. It then searches on key terms or stems derived from those on the Form PTO-1595 or occurring frequently in the *Dataset*. Searching alone places roughly 19 percent of unique conveyance text observations into a single conveyance type. Where searching results in multiple conveyance type categories, we impose certain conditions to limit the conveyance type to a single designation: i) the "correction" conveyance type is imposed for all observations matching a correction search term; ii) the "release" conveyance type is imposed for all observations matching a release search term but not a correction search term; iii) the "merger" conveyance type is imposed for observations matching both merger and name change search terms; and iv) the "employer assignment" conveyance type is imposed for observations matching employer assignment and assignment or security interest search terms. After imposing these rules, roughly 94 percent of unique conveyance text observations are designated a single conveyance type. For another 3 percent of observations, we impose additional rules based on the search terms identified. The remaining 3 percent of observations without a matching search term are included in the "other" conveyance type.

Similarly, the **assignor** data file contains data recorded for the assignor(s) for each **rf_id** in **assignment**. It includes only the assignor name as assignor addresses are not collected on the Form PTO-1595. A potential, though highly imperfect, substitute for assignor address may be the correspondence address in the **assignment** file. In addition to the assignor name, the **assignor** file contains date fields capturing the *execution date* (**exec_dt**; the date that the transaction actually took place) and the *acknowledgement date* (**ack_dt**; the date of signature of acknowledgement). Predominantly, only the former field is populated. Multiple execution dates are possible for a single transaction as execution dates are recorded per assignor. While a small majority (56 percent) of recorded transactions in the *Dataset* has multiple assignors, only 24 percent have multiple execution dates. That is, often, there is one execution date per **rf_id** even when there are multiple assignors. For the roughly 1.5 million transactions with multiple execution dates (ranging from 2 to 34 unique dates), the mean duration between earliest and latest execution date is 37 days (median is only 7 days). While a case could be made to use any of the execution dates recorded for a single transaction, we favor using the last date because it typically denotes conveyance of rights by all parties. Accordingly, we use the last execution date for each **rf_id** throughout the remainder of this paper.

4.2.4   documentid / documentid_admin (constructed)

The **documentid** data file contains identification data for the patent(s) and/or application(s) conveyed in each transaction. It contains the *application number* (**appno_doc_num**) of each property as well as other applicable identifiers (*Pre-Grant Publication number*, *patent number*), patent *title*, and relevant prosecution dates (application *filing date*, *pre-grant publication date*, patent *grant date*).[41] Because missing and possibly erroneous patent and/or applications numbers are evident in **documentid**, we attempted to identify such inaccuracies by matching application numbers (**appno_doc_num**) and patent numbers (**grant_doc_num**) to internal USPTO administrative data, writing the results to variables in **documentid_admin**. For each patent number in the assignment records, we extracted the corresponding application number from the administrative data (**admin_appl_id_for_grant**), and for each application number in the assignment records we extracted the administrative patent number (**admin_pat_no_for_appno**). Application numbers and patent numbers match between these data sources for about 99 percent of observations in **documentid**. To tag the remaining disparities, we construct an **error** field in **documentid_admin** indicating what appear to us to be recording errors, namely: i) missing application number in assignment records; ii) possible incorrect application number in assignment records; iii) missing grant number in assignment records; and iv) multiple mismatches (e.g., applications and / or patent numbers in the assignment records cannot be matched, or match to different related documents, in the USPTO administrative records). Such errors collectively account for just over 1% of all recordings 1980-present.

5   Cautions

With the few exceptions noted above, we reproduced the data from the XML files in their entirety, making no attempt to correct errors. Because the USPTO does not validate the accuracy of information

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[41] The data file also includes some country fields are populated by "US" or blank. The origin or meaning of these fields is unclear at this time.

recorded, such errors and inaccuracies are expected. Regrettably, we are unable to conduct a large-scale, retrospective validation to determine the extent to which data errors may be non-random. Moreover, substantial portions of these data are not regularized, especially in the assignor and assignee name and address fields. Wanting to provide researchers maximal flexibility in employing these data, we opted to retain the original free-form text throughout the *Dataset*.

Serrano (2010) provides a thorough discussion of the general limitations of patent assignment data, namely that these data do not distinguish the acquisition of a firm from the acquisition of a bundle of patents. Further they cannot distinguish parties' intended purpose in transacting (for instance, between assignments intended to facilitate technology adoption versus those made by licensing entities interested only in monetizing the patent). Moreover, patent assignment records provide no information on the price paid for assigned patents. For these reasons, we encourage researchers to link the *Dataset* to other data sources to further study these transactions within the market for technology.

Dataset users should be aware of potential biases resulting from selective recording. Because the *Dataset* only captures those transactions voluntarily recorded with the USPTO, users should be cautious about making inferences about the entire population of assignments and other transactions. In Section 7, we discuss in more detail the potential bias from systematic non-recording. In this section, we highlight less serious, though noteworthy, complications for *Dataset* users.

5.1 Duplicate recording

Duplicate recordings occur when the same transaction is (apparently) recorded multiple times (when the variables – assignor and assignee names, execution dates, properties, and conveyance text – are identical across multiple **rf_id** observations) or under different conveyance types (assignor and assignee names, execution dates, and properties are identical, but the nature of conveyance differs across multiple **rf_id** observations). An example of the latter involves **rf_id** 17057/0787 ("assignment") and **rf_id** 17057/0793 ("security interest"), both recorded with the Office on October 6, 2005 for transactions executed on October 3, 2005 between Anvil International, Inc. (assignor) and Bank of America, N.A. (assignee), involving the same 13 patents. Subsequent transactions suggest that Bank of America retained only a security interest in the patents, which was released back to Anvil in 2010.[42] It is possible that these are independent transactions, involving a security interest agreement and a transfer of the collateral assets upon foreclosure, or a duplicate record of a single, complex deal. Whether the recording is a duplicate is uncertain, and raises thorny questions concerning how to think about multiple activities occurring within a single transaction. Moreover, the motivation for such dual recordings is unclear, though it may reflect uncertainty regarding perfecting title (see Section 3.2) or (overly) cautious recording practices.

Because duplicate recordings will tend to overstate the number of transactions (**rf_id** counts) and the number of properties involved (property counts), *Dataset* users may – depending on the research question under consideration – opt to remove likely duplicates. Additional rules may need to be imposed by the researcher, particularly for certain conveyance types. We identified roughly 63,600 transactions (1.0%)

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[42] *See* rf_id 24892/0282. Anvil likely maintained ownership as it assigned a subset of the patents to Mueller International, LLC in 2010 per rf_id 32932/0813.

involving about 252,600 properties (2.3%) that may be duplicate recordings with matching conveyance text.[43] We also identify 3,110 transactions (0.05%), involving roughly 31,500 properties (0.3%) that may be duplicates, but with different conveyance texts (although most are the same *type* of conveyance).[44] Figure 2 shows annual transactions and property counts with and without duplicate recordings, by recording year.[45]

5.2 Recording lag

Another important consideration when using the *Dataset* is the recording lag between stated execution dates and recording of transactions. Short recording lags suggest diligence by the parties or possible posturing for subsequent behavior.[46] Longer recording lags may suggest inattention, time spans of no foreseeable transaction activity, or abandonment of the property altogether. Figure 3 depicts the mean and 95 percent confidence interval recording lag over time, broken out by recording year and execution year to highlight censoring (which appears most acute in the post-2005 figures). Recording lags execution date by roughly 182 days, on average (21 day median), but lags appear to be increasing over time.

Technically, a timely recordation should occur within three months (or, prior to a subsequent purchase or mortgage).[47] Because we anticipate that incentives to meet these requirements will differ depending on the nature of a conveyance, we examine recording lags by conveyance type in Figure 4. Assignments, employer assignments, security interests, and releases tend to have the shortest lags. Short recording lags in employer assignments may reflect incentives for employers to quickly secure rights from inventing employees. By contrast, the recording lags for mergers and name changes are much longer and grow steadily over time.[48]

The assignee data shows that security interests are often recorded by financial institutions and lien holders. Figure 4 suggests that such parties record in a more timely fashion, possibly to provide notice of their stake in the patent collateral. Releases from such agreements have lags that are also relatively short, consistent with debtors having an interest in clearing their title. Interestingly, some of the volatility shown in the government interest lags by recording year in Figure 4 reflects the behaviors of individual

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[43] We identified true duplicative recordings as those with matching execution dates, assignor name, assignee name, conveyance text (after special characters have been removed) and properties (application and/or grant numbers). The vast majority of these recordings are in conveyance type assignments (85%), followed by name changes (5%); government interest (4%); merger (2%); and security interest (2%).

[44] This set of removed duplicates are spread across conveyance types with 36% assignment, 25% security interest, 28% name change, 8% government interest, and 2% merger.

[45] In Figure 2, and for the analysis in Section 6, we omit the 63,600 recordings that are exact matches. As for the 3,110 records in which only conveyance type differs, for conducting analysis we retain the **rf_id** with the most relevant conveyance type, e.g., omitting name changes in favor of mergers, and assignments in favor of security interest. Where conveyance type differed, we omitted a name change if it appeared to be a duplicate recording of any other conveyance type, and an assignment if appeared to be a duplicate recording of any other conveyance type, except name changes. All removed duplicates (exact matches and matches with different conveyance) are distributed among conveyance types as follows: 83% assignments, 6% name changes, 4% government interests, 3% security interests, and 2% mergers.

[46] Recall 35 U.S.C. § 261 voids an assignment unless the recording is performed "within three months from its date or prior to the date of such subsequent purchase or mortgage". Recording at or prior to the three month point would suggest a desire to secure outright federal notice protection.

[47] 35 U.S.C. 261 (2015).

[48] In mergers, lengthy lags may indicate a delay in post-formation housekeeping, or recording only upon the resulting entity wanting to act on a patent application or establish standing to bring suit.

government entities. For example, the spike in average lags near recording year 2008 was primarily caused by the National Institutes of Health (NIH) recording roughly 8,600 transactions (about 98% of the government interests recorded that year). These transactions, some executed as early as 1981, had an abnormal mean lag, and may have been the result of an attempt by the agency to improve compliance with regulations (see Section 3.3). This anecdote provides users with a good example of how such housekeeping efforts may affect the data and measures derived from the *Dataset*.

Across nearly all conveyance types, excepting government interests, the mean recording lag in the first decade of the 21st century has increased relative to the prior decades. We leave as open questions what is driving recording lags in general, or by conveyance type in particular, and why lags vary over time and over the life of patents. Of particular interest is whether shorter recording lags for assignments and security interests reflect some motivation to provide timely notice for such transactions in general or are the result of selection bias (possibly reflecting organizations behaving differently when changes in patent value or circumstances motivate more or less prompt recording).

5.3 Establishing chain of title

A further complication for *Dataset* users is the lack of a straightforward method for establishing the chain of title for any individual patent or patent application. Names are recorded anew from the cover sheet for each transaction recorded with the Office. Linking records in an automated way by application or patent number often produces gaps in the observable chain of title. A new name may appear as an assignor despite not having previously appeared as an assignee of the property, possibly because the prior assignment went unrecorded, the conveying party was listed under a different name, or the name was simply not listed in the record.

For example, as illustrated in Figure 5, patent 5,216,281 was involved in twelve recorded transactions. In 1991, the inventor (Douglas Bulter) recorded an assignment of the patent to two entities, Ramtron Corporation and NMB Semiconductor Company (one or both of which may have been the inventor's employer). The recorded transfer did not indicate what share of patent rights each entity retained. In that same year, Ramtron Corporation merged with and recorded an assignment of its rights in the patent to the resulting entity Ramtron International Corporation. In 1993, NMB Semiconductor Company recorded a name change to Nippon Steel Corporation, affecting title to the patent. Nippon Steel Corporation appears to have recorded no further transactions with the Office (as of 31dec2014).

By contrast, Ramtron International Corporation recorded having executed four security interest agreements against the patent with three different secured parties (Oren L. Benton, National Electrical Benefit Fund, and Infineon Technologies AG) between 1993 and 2002. Two of the secured parties recorded releases of their interest in the patent in 1995 and 2004. The third, Infineon Technologies, has yet to record a release (as of 31dec2014), possibly indicating an outstanding lien on the patent, that the creditor no longer exists, or merely that the termination went unrecorded. Ramtron International Corporation and a presumed subsidiary Enhanced Memory Systems, Inc., not previously appearing in the chain of title, assigned their interests in the patent to Purple Mountain Services in 2004. Ownership of those interests then was recorded as being transferred to Intellectual Ventures I LLC via merger in 2010.

While Figure 5 illustrates a fairly complete chain of title, it is unclear whether Nippon Steel Corporation, or Infineon Technologies for that matter, retains any rights in the patent. Additionally, had only Ramtron's subsidiary been recorded as the assignor in the assignment to Purple Mountain Services, it would have been unclear how the subsidiary became owner. While we selected a relatively complete set of recordings to illustrate the complexities that may be found in a chain of title, much less complete chains are often evident in the *Dataset*.

6 Discussion and Stylized Facts

Turning to the data, Table 4 shows the frequency of each recorded conveyance type, based on **rf_id**, and property counts, based on patent and application number identifiers, in the *Dataset*. Measures in Table 4 are calculated after duplicates have been removed.[49] Property frequencies in Table 4 are calculated to allow for multiple transfers, thus tending to over-represent properties (patents or applications) that have been transferred multiple times.

Employer assignment (presumed) is the most prevalent recorded conveyance type, accounting for 82 percent of **rf_id** observations and 52 percent of properties transacted. Assignments are relatively common, comprising 11 percent of **rf_id** observations and 20 percent of properties in the *Dataset*. Still, non-trivial activity is observed among the other recorded conveyance types, particularly security interest agreements, releases, and name changes which tend to involve more properties per **rf_id**. Mergers, while low in number in terms of **rf_id** counts (accounting for a 0.6% share overall), tend to involve portfolios of multiple properties, so comprise nearly 3 percent of transacted properties in the *Dataset*. Government interest related recordings are relatively infrequent, comprising just under 1% of all recorded transactions.

In order to generate a set of stylized facts, we incorporate several new data elements. Among conveyance types recorded, assignments and mergers appear most likely to reflect a real change in ownership. We observe commonly in these conveyances that transfers occur between differently named individuals, or differently named entities. For convenience, we combine these two conveyance types in subsequent analysis in a single category called "changes in ownership." We also incorporate into our analysis the set of six top level technology categories, and their subcategories, introduced by Hall et al. (2001),[50] and extended to patent applications and post-2006 patent grants by Marco et al. (2015). Using these micro-level data sources, we match to **documentid_corrected** by application or patent number to assign technology categories to each transacted property in the *Dataset*.[51] Additionally, to normalize trends in the number of properties showing a recorded transaction, we use time series data on patents-in-force by technology category and subcategory taken from Marco et al. (2015).[52]

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[49] See section 5.1.1 above.

[50] Top level categories (6 in total) and subcategories (37 in total) are delineated in Table 2 of Marco et al. (2015).

[51] In this matching we omit properties with multiple mismatch error, as explained in Section 4.2.6.

[52] Marco et al. (2015) calculate the stock of patents-in-force for years 1840-2014 accounting for irregular statutory changes and other factors that affect patent term. To determine the status of each patent, they combine data on maintenance, parent applications, and patent term adjustments and extensions with different rules applying at time of filing. They do not account for

We chose to highlight several stylized facts derived from the *Dataset* to help motivate future research and provide insights into opportunities and limitations in the data. Because recording patent transactions with the USPTO is voluntary, we cannot provide credible estimates of how representative the *Database* is of the population of various conveyances, or subsets across entities, technologies, or time. Researchers must read our findings with this caveat in mind, although the nature of this selection means that any counts and some proportions provided in these stylized facts will reflect lower bound estimates of transactions and properties being transferred.

As regards to the number of properties showing a recorded change in ownership (in assignment or merger), we observe a steady increase over time, but also signs of stabilizing (or even declining) in the last decade. Figure 6 and Figure 7 show how the frequency of recorded transactions and the properties they affect, respectively, have evolved across conveyance types over the past three decades. In Figure 7, we see rapid growth in the number of properties recorded as being transferred between parties through 2007, after which roughly 120,000 properties are recorded as having changed hands per year (even in the years subject to censoring). Examining these trends as a proportion instead of a frequency, in Figure 8, we show the number of patents with a change in ownership as a share of patents-in-force. Disregarding the 1986-88 spike, the fraction of patents-in-force transferred between parties generally increased through the late 1990s, with roughly 4 to 4.5 percent of patent-in-force changing hands each year 1998-2010. That proportion has since declined, though numbers are subject to censoring. Still, overall, Figure 8 suggests – if recording propensity has not changed over time – that patent asset transfers grew relative to the number of patents-in-force only through the late 1990s and have since merely kept pace with, or even lagged, growth in the stock of active patents.

Resembling the documented large growth in information technology patenting since the early 1980s (Hall, 2005), patents in Computers & Communications, and to a lesser extent Electrical & Electronic, account for much of the overall growth in recorded patent transfers (Figure 9, upper panel). While some growth in the number of patents showing a recorded change in ownership per year is evident across technology categories, the upper panel in Figure 9 shows recorded transfers diminished as early as 2000 for all but Computers & Communications and Electrical & Electronic technologies. In Chemical, Drugs & Medical, Mechanical, and Other categories, the number of patents with a recorded change in ownership has held at roughly 9,000 per year since 2000; whereas the number Computers & Communications patents recorded as being transferred between parties continued to climb, exceeding 50,000 in 2014 (despite right side censoring). The lower panel of Figure 9 depicts trends by technology category as a proportion of patents-in-force. For each technology category, we see a similar pattern of recorded patent transfers increasing relative to the stock of patents-in-force until the late 1990s when the fraction stabilizes or declines. However, there is variation in the proportion across technologies: roughly 3.5 percent of Chemical, Electrical & Electronics, Mechanical, or Other patents-in-force showing changes in ownership per year since 1998, while about 5 percent of Drugs & Medical and 6 percent of Computers & Communications patents-in-force change hands during the same period.

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patents that may have been invalidated or found unenforceable between maintenance events. Consequently, patent-in-force counts may be overstated, and this would tend to understate trends normalized by the stock of patents-in-force.

When we shift the analysis from top level category to technology subcategory (Hall, et al. 2001), we observe similar trends in the proportion of patents-in-force having a recorded change in ownership per year (as illustrated for the highest- and lowest-ranked subcategories in Figure 10). Biotechnology is a notable exception: as the stock of active Biotechnology patents grew (from nominal levels in the 1990s), the proportion recorded as being transferred between parties each year rapidly decreased. Whether this finding indicates a market reality, for instance that patent asset transfers were common among first-movers but declined as entry became more common in this emerging technology, we leave as an open question. Also noteworthy in Figure 10 is the relatively high proportion of active Electronic Business Methods & Software patents changing hands per year – 8 to 14 percent in all but the later years (except those subject to censoring).

Another stylized fact is that recently issued patents appear more likely to have a recorded change in ownership relative to older vintages. Figure 11 depicts transfer rates by grant year and technology at several points in the patent life cycle: cumulatively from filing (upper panel) and for specific intervals pre- and post-grant (lower panel). Across technologies, a higher proportion of patents issued since the years 2000-2005 was recorded as transferred between parties than that of patents issued in the prior decades. Generally, we observe pre-grant changes in ownership driving higher transfer rates overall, since post-grant transfer rates are fairly stable across grant years (with the exception of Computers & Communications patents, as we can see in the lower panel of Figure 11). While evident across all technologies, higher pre-grant (and overall) recorded transfer rates in younger vintages are more pronounced for Drugs & Medical, Computers & Communication, and Chemical patents. Among the most recently issued patent cohorts in these three technologies, 15 to 20 percent show a recorded change in ownership prior to grant. Unanswered research questions stemming from this finding relate to the selection mechanisms driving these transactions, and the endogenous nature of the transfer and ultimate grant decision, both of which likely reflect something about the willingness to invest time and resources.

A third stylized fact is that the number of patents and applications recorded as collateral pledged to secure debt is also growing in absolute terms and relative to the stock of patents-in-force. Figure 7 shows exponential growth in the recorded number of properties pledged as collateral each year in a security interest, peaking at roughly 90,000 properties per year in 2009, 2010, and 2013. Likewise, the proportion of patents-in-force pledged as collateral has largely increased over the past three decades, though fluctuating between 1.5 percent and 2.5 percent since 2000 (Figure 8).

Recorded patent-backed financial obligations have grown across technology categories (Figure 12, upper panel). Considerable volatility is apparent, however, with the recorded number of patents pledged as collateral peaking in different years for different technologies. As with ownership changes, Computers & Communications patents seem to be driving much of the overall growth in recorded patent collateralization. Interestingly, relatively few Drugs & Medical patents are pledged as collateral based on recorded security interests – whether that observation reflects less trading in the market, or simply a lower likelihood of selecting into this reporting mechanism we remain unable to say.

The lower panel of Figure 12 depicts the fraction of patents-in-force involved in a recorded security agreement by technology category. Again, we see substantial volatility across technologies, with the

fraction pledged peaking in different years. What factors may be driving this volatility within and across technologies, whether financial market conditions, security interest recording practices, or other factors, remains an open research question.

The fourth stylized fact we produce is that the number of patents with a government interest (a transfer of some inventor rights)[53] recorded with the USPTO is relatively small in comparison with other transaction categories, but has increased considerably across nearly all technology categories since 2008. Recorded transactions as a share of all government-interest patents may, however, be relatively high: The USPTO for instance published a finding that US universities have been issued a total of 75,000 during 1969-2012.[54] The upper panel of Figure 13 suggests a structural break in the trend of recorded transfers on government-interest patents per year around 2008, which may reflect an effect coinciding with the initial federal fiscal stimulus.[55] There is some variation across technologies, however, with recorded government interest patents in Mechanical and Other technologies maintaining a largely declining trend. While government interests are recorded for more Drugs and Medical patents than any other technology category, both in terms of volume and as a proportion of patents-in-force (Figure 13, lower panel), we are able to report no reliable information as to whether this showing reflects market realities or selection characteristics.

7   Unrecorded transactions

When using these data, researchers should bear in mind the self-selection into recording by parties to patent transactions. This reality likely affects how accurately the *Dataset* represents the population of transactions involving patent assets. In this section, we examine in more detail the potential bias from systematic non-recording, specifically for patents with government interests and those with a change in ownership prior to expiration for non-payment of required maintenance fees.

7.1   Unrecorded Government Interest

In addition to regulations that require Federal Government agencies to record interests in patents and patent applications with the USPTO (see Section 3.3), there are statutory requirements related to patents developed with Government support or funding. The Patent and Trademark Law Amendments Act of 1980, commonly referred to as the Bayh-Dole Act, generally requires that any patent or patent application covering an invention for which Federal funding was provided include a statement specifying that the invention was made with Government support or disclosing that the Government has certain rights in the invention.[56] Such disclosures were made on the face of patents even before the Bayh-Dole Act was enacted. Accordingly, we are able to estimate coverage by comparing patents containing a front-page

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[53] For a discussion, see, e.g., Pressman et al. (2006).

[54] See table at http://www.uspto.gov/web/offices/ac/ido/oeip/taf/univ/org_gr/all_univ_ag.htm.

[55] The Troubled Asset Relief Program (TARP) was created by the Emergency Economic Stabilization Act (EESA; P.L. 110-343) in October 2008. *See* https://www.fas.org/sgp/crs/misc/R41427.pdf. The American Recovery and Reinvestment Act of 2009 (ARRA) – commonly referred to as the Stimulus or Recovery Act - was signed into law on February 17, 2009. *See* http://www.recovery.gov/arra/About/Pages/The_Act.aspx.

[56] 35 U.S.C. § 202(c)(6).

government interest disclosure against those with a government interest recording in the *Dataset*. Marco and Vishnubhakat (2015) identifies nearly 83,000 patents issued during the 1981-2014 period with some form of government interest disclosure appearing on the face of the patent.[57] For our comparison group, we use the nearly 43,000 patents with a government interest recording in the *Dataset* issued during those same years. Figure 14 depicts a comparison of the two groups – only 24,580 patents (24%) show a government interest on both the patent front page and in the *Dataset*. If we assume that the roughly 101,000 patents in the union of these two groups represents all patents with a government interest, under half (42%) have a recording in the *Dataset*. While we are unable to know with certainty the number of type I and II errors affecting these figures, the 101,000 count may well be an undercount, suggesting that 42 percent *Database* coverage in this category may be an upper bound estimate.

7.2 Unrecorded Changes in Ownership for Expiring Patents

When patent transactions result in a complete change of ownership in the property, we expect that the incentive for purchasers to record a transaction will be correlated with the planned or observed payment of maintenance fees for the focal patents. We hypothesize that new owners who reveal their willingness to pay maintenance fees on the acquired patents will also possess a stronger motivation to record the change in ownership (relative to acquired patents that are not be maintained).[58] The notion that the incentive to record an assignment may be positively correlated with maintenance has consequences for statistical inferences between assignment and patent value.

Serrano (2010, 2013) found that patent assignments are indicators of patent value, as measured by renewal (maintenance) models. However, if maintenance itself is positively correlated with the incentive to record transactions, then the relationship between assignment and value may be overstated. In other words, the relationship between *observed* assignment and patent value may be stronger than the true relationship between assignment (observed and unobserved) and patent value. This result would hold if the unobserved assignments (those not recorded) are more likely to contain patents that are not maintained (and, thus, of lower value according to renewal models).

Figure 15 demonstrates this point. The figure shows the proportion of patents issued between 1981 and 2001 with a change in ownership (in an assignment or merger) observed at three distinct numbers of years after patent grant: 0-3; 4-7; and 8-11 years. These periods correspond to the marginal protection a patentee "purchases" when making each of the three maintenance-fee payments required by the USPTO in order to keep a patent in force over its life. These three payments (M1, M2, and M3) are due post-grant at 3.5 years, 7.5 years, and 11.5 years, respectively.[59]

In order to conduct our analysis, we identify four maintenance cohorts: patents with no maintenance fees paid (Not maintained); patents for which only the first maintenance fee was paid (M1 paid); patents for

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[57] Marco and Vishnubhakat (2015) utilize the patent grant full text files, available at http://trademarks.reedtech.com/pgrbft.php, then extract only the patent documents that contain the code or tag designating a government interest disclosure, then extract that text and use natural language processing to detect whether any known government organization is referenced.

[58] Patent acquirers may purchase properties they subsequently allow to lapse into the public domain, for instance to secure freedom to operate, but suffering no follow-on costs of paying maintenance fees.

[59] Applications filed after December 12, 1980 are subject to maintenance fees per 37 C.F.R. 1.362. Historically, maintenance fees increase over time, i.e., M1<M2<M3.

which only the first and second maintenance fees were paid (M2 paid); and patents for which all three maintenance fees were paid, and thus renewed to the full patent term (M3 paid). Figure 15 appears to show a positive correlation between the maintenance cohort and the proportion of those in each cohort involved in a recorded change of ownership; this correlation is evident in each of the three periods after grant. However, closer observation provides some evidence for censoring of transactions based on maintenance.

In particular, observe the proportionate difference between M1, M2, and M3 in the 0-3 year period after grant: the transaction proportions are 7.4%, 8.1%, and 8.8%, respectively. Examining the 4-7 year period suggests that the relative relationship between M2 and M3 is preserved. But, the relationship between M1 and M2 appears to change dramatically, in that the M1 transaction share falls by over three percentage points (to 4.0%), whereas the M2 and M3 transaction shares fall by less than one percentage point each (to 7.4% and 8.0%, respectively). While it is possible this outcome reflects a real difference in transaction and maintenance rates, viewing these data through a very simple "difference in difference" lens, one would expect the relationship between maintenance cohort and assignment proportion to be preserved between the 0-3 year and the 4-7 year periods. Such an "expected" preserving relationship is indicated by the dotted line in Figure 15. Instead however, we observe a dramatic decrease in the *recorded* assignment proportion for patents maintained only once (M1) relative to those maintained twice (M2). This result suggests to us a range of "censoring effect" values for unrecorded assignments associated with the non-renewal decision. An analogous "censoring effect" can be observed in Figure 15 between the payments of the second (M2) and third (M3) maintenance fees. While our limited findings on these effects are intriguing, we encourage other researchers to look more carefully into the relationship between assignment recording and maintenance, and how it may affect appropriate inferences concerning patent value.

8   Conclusion

While recorded patent transactions have been maintained by the USPTO for over 40 years, these data have not been extensively employed for research. To help remedy a deficit in research use of these data, and to foster scholarship on intellectual property and the innovation economy, the Office of Chief Economist of the U.S. Patent and Trademark Office is releasing this document to describe the *USPTO Patent Assignment Dataset*, a database of roughly 6 million assignments and other transactions recorded during the 1970-2014 period and affecting about 10 million patents or patent applications. We have provided a comprehensive description and presented a set of stylized facts to help motivate future research.

Release of the *USPTO Patent Assignment Dataset* provides for unique opportunities to build on existing research as well as advance original inquiry across multiple policy-relevant spaces. Despite some limitations in using these data (thoroughly discussed in this document), we anticipate the release of the *Dataset* will open multiple avenues for original follow-on research. Possible areas include the markets for technology and innovation, the relationships of intangible assets to firm financing, and government

interest sponsorship to innovation and commercial outcomes. We encourage researchers to learn from our efforts and these newly-released data in order to answer important questions related to these topics and others we do not have the prescience to predict.

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10 Tables and Figures

Table 1. Number of assignors, assignees, or properties per assignment.

Data file	Mean	Standard Deviation	Min	Max	N
assignment.dta	1.00	0.00	1	1	6,328,178
assignor.dta	2.29	1.72	1	237	14,460,415
assignee.dta	1.03	0.30	1	116	6,548,956
documentid.dta	1.61	18.22	1	10,319	10,170,696

Table 2. Definitions of key concepts.

Concept	Definition/Summary
transaction or recording	A single assignment or instrument recorded with the USPTO involving one or more patent or patent application. Indicated by a unique reel frame identification number (**rf_id**) in the *Dataset*.
reel frame identification number (**rf_id**)	A combination of the reel and frame numbers that uniquely identifies each transaction in the *Dataset*. The 1-6 digit reel number refers to the microfilm reel number of the transaction entry in USPTO records. The 1-4 digit frame number refers to the location of the transaction entry on the reel number. Leading zeroes are retained in the *Dataset* to facilitate matching.
property or asset	A single patent or patent application involved in a transaction. Indicated by a unique application number or a unique patent number for patents in the *Dataset*.
transaction level data	Data per unique transaction (**rf_id**), i.e. where an individual transaction is the unit of observation.
property level or transacted property data	Data per unique combination of transaction (**rf_id**) and property (**appno_doc_num** or **grant_doc_num**), i.e. where an individual transacted property is the unit of observation.
nature of conveyance	Nature of conveyance describes the interest conveyed or transaction recorded with the USPTO. The nature of conveyance text (**convey_text**) is captured from the coversheet, entered either from a pre-specified list or as user inputted text (see Appendices A and B). Conveyance types include assignment, merger, change of name, government interest agreement, security agreement, and release by secured party.
assignment	An assignment (or assignment of assignor's interest) is a transfer by an assignor of all or part of its right, title, and interest in a patent or patent application filed with the USPTO.
employer assignment	Assignment of rights within a firm from inventing employee to employer assignee. Employer assignments are identified in this paper as the first recorded transaction for a property; where the property was transferred alone; with an execution date prior to the patent application disposal (grant or abandonment) date; and identified as an assignment via key term searching.
change of name	A change to the name or address of incorporation of a patent or patent application owner. Supporting documentation for name changes, principally certificates issued by an appropriate authority, are recorded with the USPTO to provide public notice of a change of title to the property.
security agreement	An agreement in which a lender takes an interest in a trademark to secure payment on a loan. The debtor retains title to the trademark and the lender, as a secured party, has certain preferential rights in the disposition of the property.
government interest agreement	A government interest agreement is a license, assignment or other interest of the Federal Government in or under a patent or patent application. Per Executive Order 9424, such instruments must be promptly forwarded to the USPTO for recording in the assignment records.
merger	A merger reflects the consolidation of patent assets from two or more merging businesses. Supporting documentation for mergers, principally certificates issued by an appropriate authority, are recorded with the USPTO to provide public notice of a change of title to the property.
release	A release terminates an existing agreement between parties. Such transactions in the *Dataset* largely entail the release of a security interest by the secured party.
correction	A correction reflects an amendment or correction to a prior recording. Corrections are issued with a new **rf_id** and are recorded separately from the original recording.
change of ownership	Change of ownership designates any assignment or merger. Amongst the conveyance types, assignments and mergers are the most self-evident of a real change in ownership where property transfers from one party to another or from one corporate entity to another.

assignment	**assignment** is a data file containing a single entry for each of the XX transactions recorded with the USPTO during the 1970 to 2014 period. It includes the **rf_id**, recording date, a page count, fields for the correspondent name and address, and nature of conveyance text.
assignment_conveyance	**assignment_conveyance** is a constructed data file containing the conveyance type (**convey_ty**) and an "employer assignment" indicator (**intrafirm**) for each **rf_id**. [The conveyance type field was generated by removing all special characters and duplicative spaces from the nature of conveyance text (**convey_text**) from **assignment** and searching on key terms or stems derived from those on the Form PTO-1595 or occurring frequently in the *Dataset*. Where searching resulted in multiple conveyance type categories, we impose certain conditions to limit the conveyance type to a single designation (see Section 4.2.2).
assignee	**assignee** is a data file containing data captured for the assignee(s) for each **rf_id** in **assignment**. It includes the assignee's name and address (street, city, state, country, and postal code).
assignor	**assignor** is a data file containing data recorded for the assignor(s) for each **rf_id** in **assignment**. It includes the assignor's name, the execution date (**exec_dt**), and the date of the signature of acknowledgement (**ack_dt**).
documentid	**documentid** is a data file containing the identification data for the patent and patent application property(ies) for each **rf_id** in **assignment**. For each property observation, the file contains the application number, pre-grant publication number (if application published prior to grant), and patent number (if a U.S. patent was issued prior to the **rf_id** recording date). It also contains patent title, filing date, pre-grant publication date, and patent grant date.
documentid_corrected	**documentid_corrected** is a constructed data file containing the **rf_id**, application number, and patent number from **documentid** and matching application and patent number from USPTO administrative records (indicated by the prefix **admin_**). For the 1 percent of observations for which property identification does not match across the two data sources, the **error** field designates possible reasons for the mismatch.

Table 3. Comparison of form selections.

Selection	PTO Form 1595 (paper)	EPAS (electronic)
a. Assignment	X	X
a1. Nunc Pro Tunc Assignment		X
a2. Conditional Assignment		X
b. Security Agreement	X	X
b1. Mortgage		X
b2. Lien		X
b3. Option		X
c. Merger	X	X
d. Change of Name	X	X
e. Government Interest Assignment	X	X
e1. Executive Order 9424, Confirmatory License	X	X
f. Release by Secured Party		X
g. Corrective Assignment		X
g. Other	X	X
g1. Joint Research Agreement	X	
g2. License		X
g3. Decree of Distribution		X
g4 Letters of Testamentary		X
g5. Letters of Administration		X
g6. Court Appointment of Trustee		X

Table 4. Frequency of conveyance types (duplicates removed).

	rf_id		*property*	
Conveyance type	*Frequency*	*Proportion (%)*	*Frequency*	*Proportion (%)*
employer assignment*	5,140,987	82.1	5,150,980	52.1
assignment	680,981	10.9	2,019,070	20.4
correct	123,837	2.0	222,012	2.2
name change	114,174	1.8	560,673	5.7
security interest	60,324	1.0	1,055,478	10.7
government interest	59,238	0.9	65,012	0.7
merger	40,399	0.6	253,879	2.6
release	25,087	0.4	508,739	5.1
other	16,486	0.3	50,752	0.5
total	6,261,513	100.0	9,886,595	100.0

*Both true and likely duplicates removed. True duplicative recordings are identified as those with matching execution dates, assignor name, assignee name, conveyance text (after special characters have been removed) and properties (application and/or grant numbers). Likely duplicates are identified as those with matching execution dates, assignor name, assignee name, and properties (application and/or grant numbers) but with different conveyance text; though within the same conveyance type. *"Employer assignment" presumed, according to the rule specified in Section 4.2.2.*

Figure 1. Structure of data files.

assignor.dta	
Observations:	14,460,415
Variables:	5
Unit of Observation:	rf_id and or_name
Size:	3.7 GB

assignee.dta	
Observations:	6,548,956
Variables:	11
Unit of Observation:	rf_id and ee_name
Size:	5.9 GB

assignment.dta	
Observations:	6,328,178
Variables:	15
Unit of Observation:	rf_id
Size:	3.2 GB

1:m
key: rf_id

1:m
key: rf_id

1:m
key: rf_id

1:1
key: rf_id

1:m
key: rf_id

documentid.dta	
Observations:	10,170,696
Variables:	13
Unit of Observation:	rf_id, appno_doc_num, and grant_doc_num
Size:	3.1 GB

assignment_conveyance.dta (constructed)	
Observations:	6,328,178
Variables:	3
Unit of Observation:	rf_id
Size:	0.11 GB

documentid_admin.dta (constructed)	
Observations:	10,131,063
Variables:	6
Unit of Observation:	rf_id, appno_doc_num, and grant_doc_num
Size:	1.1 GB

Figure 2. Annual rf_id and property counts by recording year (1981-2014).
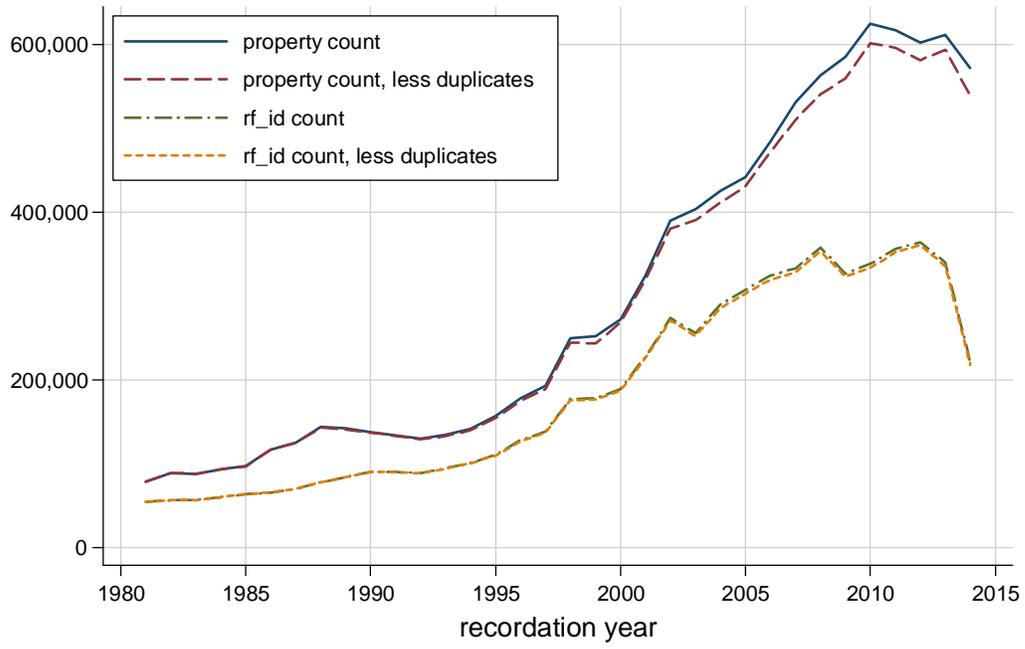
Figure 3. Overall recording lag in days (1981-2014).
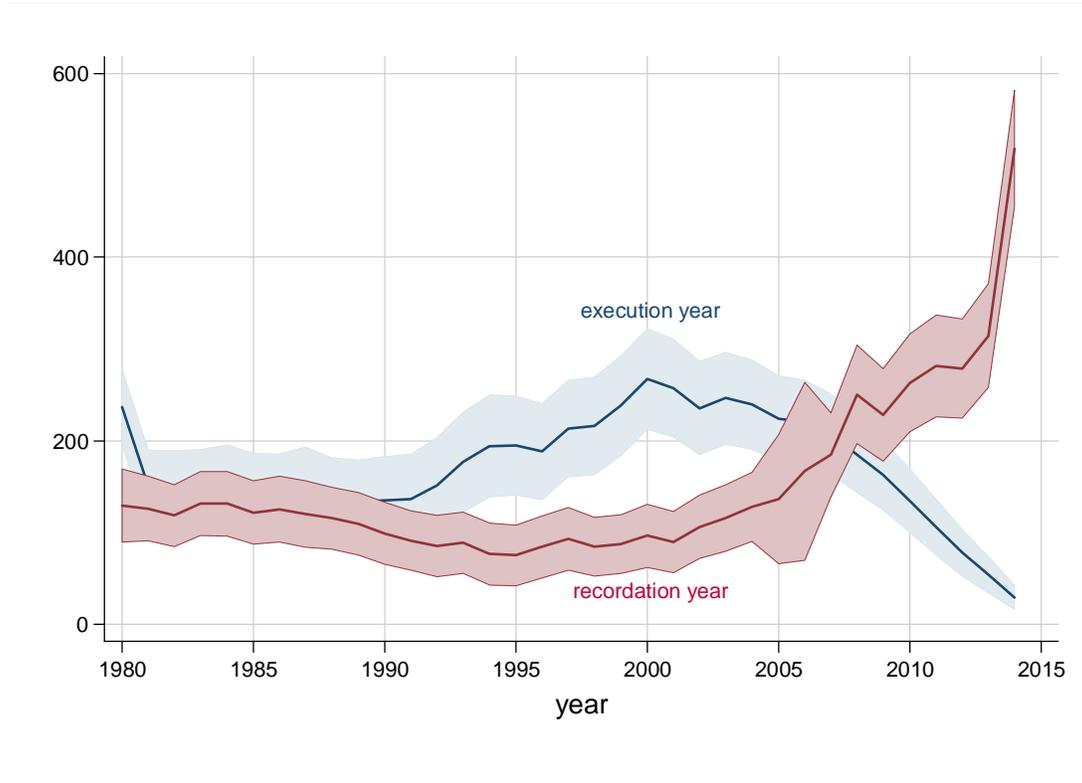
Mean and 95 percent confidence interval recording lag (in days) by recording year and execution year. Censoring appears most acute in the post-2005 numbers. Recording lags execution by roughly 182 days, on average (21 day median), but the data by recording year show lags steadily increasing in first decade of the 21st century compared to prior decades.

Figure 4. Recording lag in days by conveyance type (1981-2014).

Graphs by conveyance type.
For display purposes, government interest lag figures include only rf_ids with post-1987 recordation dates in the by recordation year trend and post-1994 execution dates in the by execution year trend.
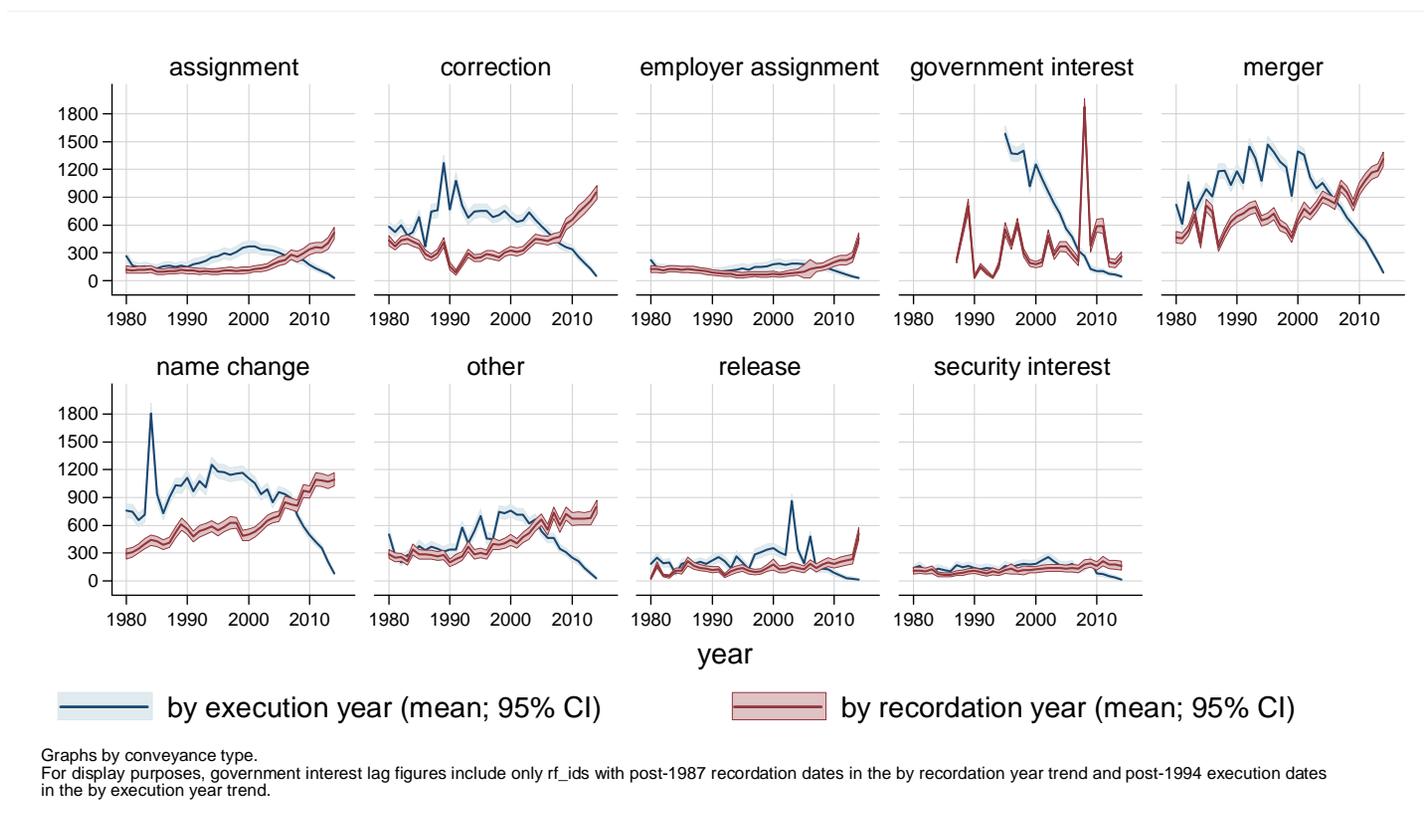
Mean and 95 percent confidence interval recording lag (in days) by recording year and by execution year for each conveyance type. Assignments, employer assignments, security interests, and releases tend to have the shortest lags, suggesting entities have incentive to provide timely notice of their interest in the patent or application. By contrast, the recording lags for mergers and name changes are much longer and steadily growing, possibly indicating post-formation housekeeping or recording only upon the resulting entity wanting to "take action" in an application or prove standing to bring suit. "Employer assignment" presumed, according to the rule specified in Section 4.2.2.

34

Figure 5. Example of a broken chain of conveyance (patent number 5,216,281).
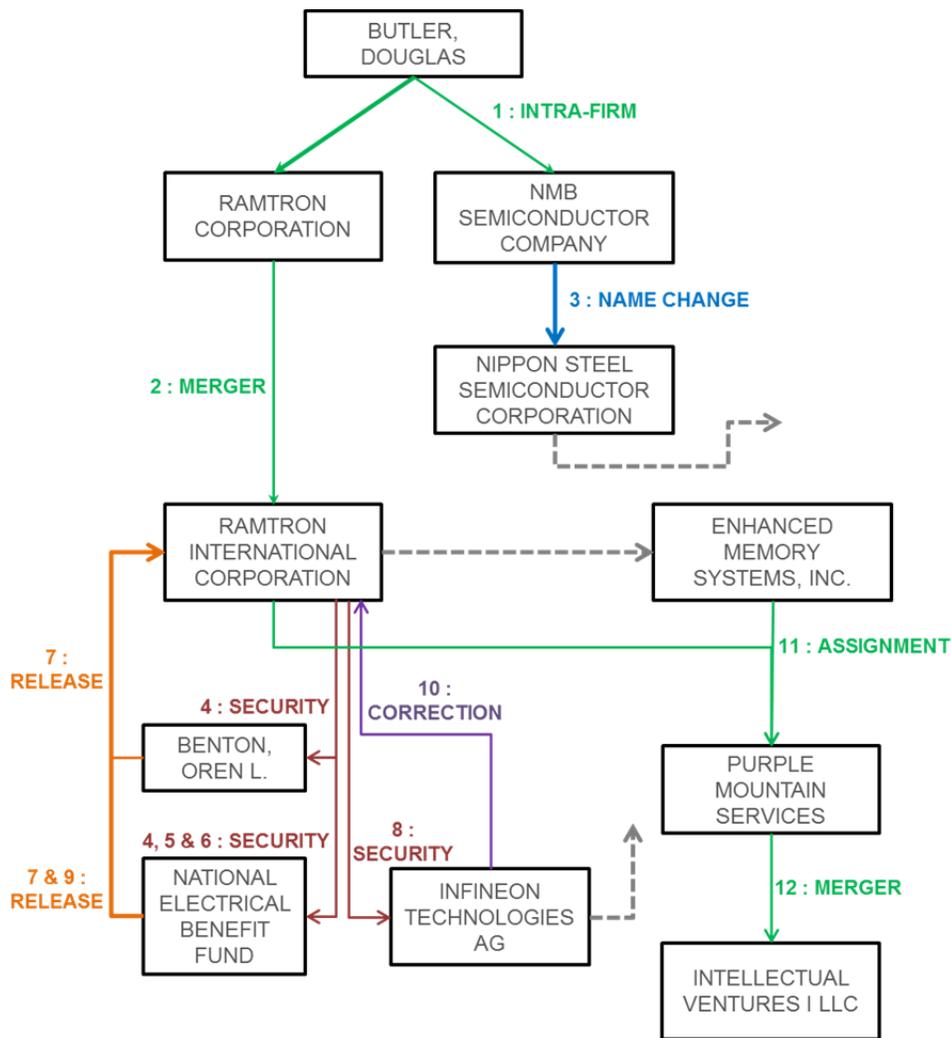
Diagram of twelve recorded transactions for patent 5,216,281. In 1991, the employer assigned the patent to two entities, Ramtron Corp. and NMB Semiconductor Coy, and Ramtron Corp. merged with and assigned its rights in the patent to the resulting entity Ramtron International Corp. In 1993, NMB Semiconductor Co. recorded a name change to Nippon Steel Corp. Ramtron International Corp. executed four security interest agreements against the patent with three different secured parties between 1993 and 2002. Two of the secured parties recorded releases of their interest in the patent in 1995 and 2004. Ramtron International Corp.n and a subsidiary (Enhanced Memory Systems, Inc.) assigned the patent to Purple Mountain Services in 2004. Ownership then transferred to Intellectual Ventures I LLC via merger in 2010.

Figure 6. Recorded transactions (rf_id count) by conveyance type and execution year (1981-2014).
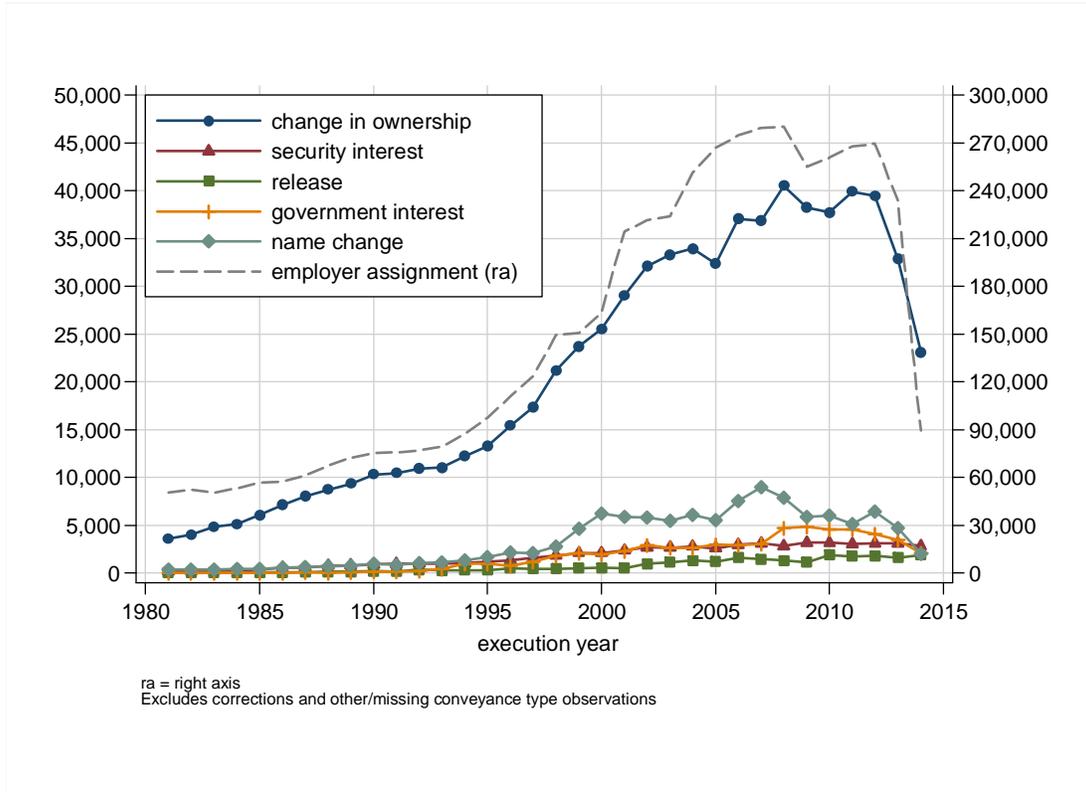
Number of transactions recorded (rf_id count) with the USPTO by conveyance type per execution year. Employer assignments recorded transactions plotted on right axis; all other conveyance type transactions on left axis. "Employer assignment" presumed, according to the rule specified in Section 4.2.2.

Figure 7. Properties affected by recorded transaction (property count) per execution year, by conveyance type (1981-2014).
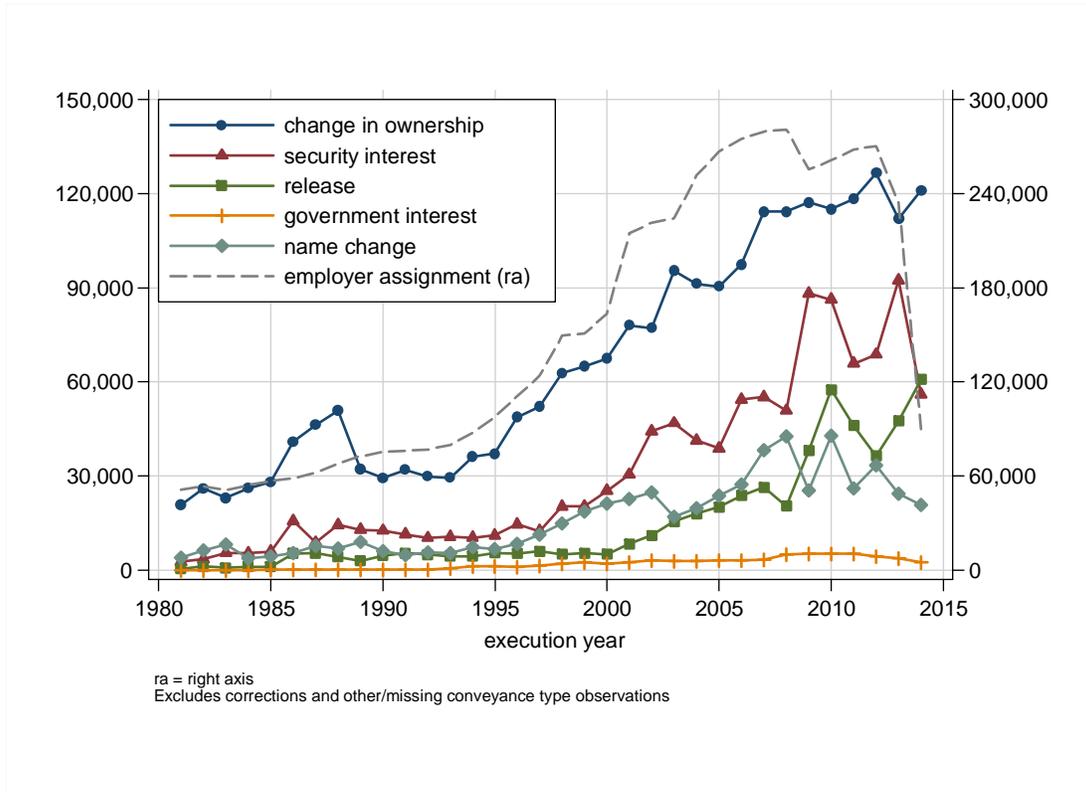
Number of patents and applications (property count) involved in transactions recorded with the USPTO by conveyance type per execution year. Employer assignment properties plotted on right axis; all other conveyance type properties on left axis. "Employer assignment" presumed, according to the rule specified in Section 4.2.2.

Figure 8. Fraction of patents-in-force with a change in ownership, security interest, government interest, or name change by execution year (1981-2014).
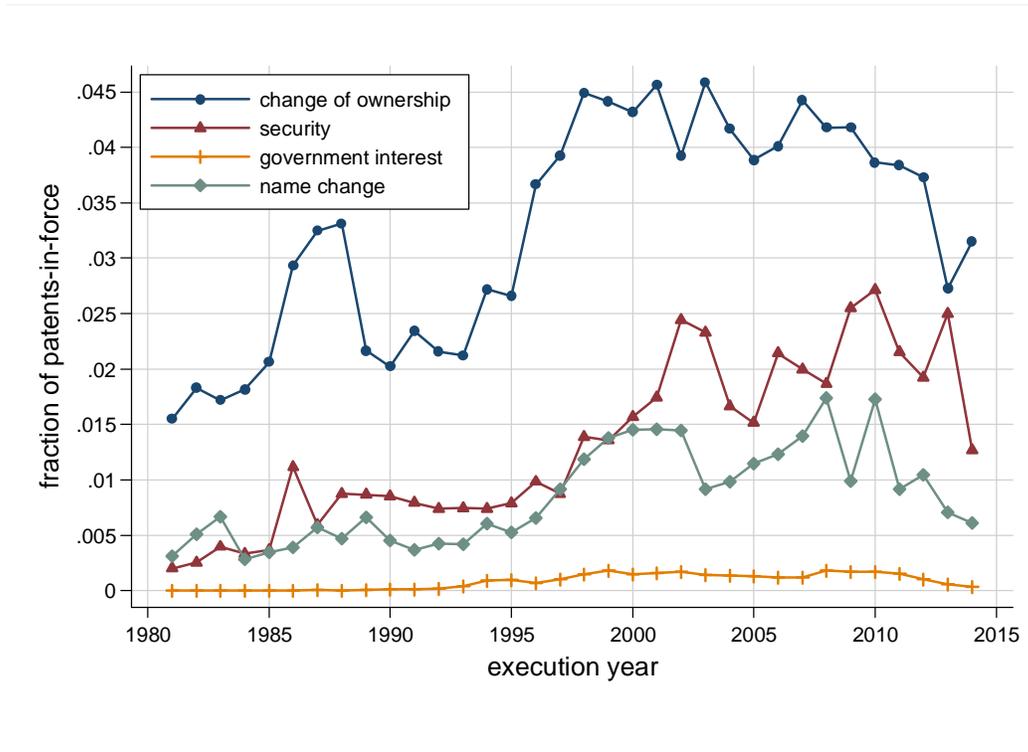
Fraction of patents-in-force with a recorded change in ownership (via assignment or merger), security interest, government interest, or name change per year. Patents only counted for first transaction within execution year.

Figure 9. Patents with a change in ownership per execution year by technology category, number and fraction of patents-in-force (1981-2014).
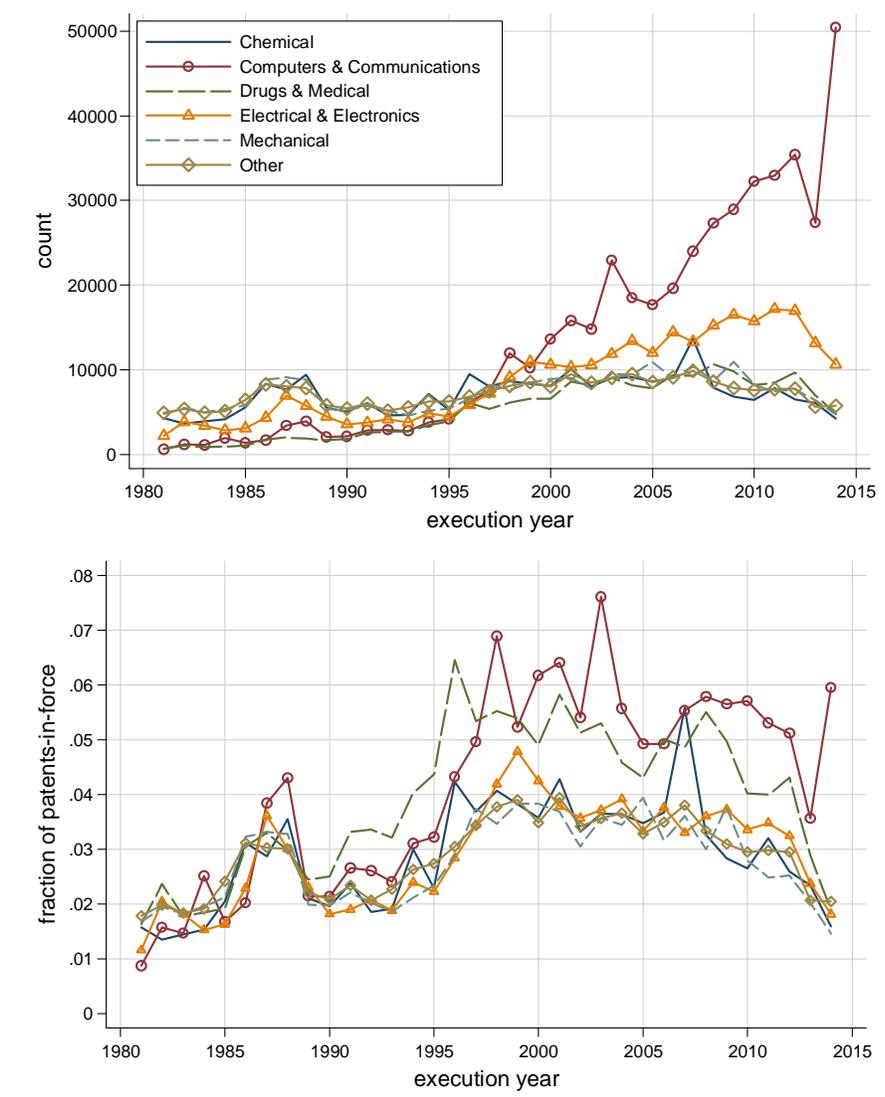
(upper) Number of patents with a change in ownership (via assignment or merger) per year by technology category.

(lower) Fraction of patents-in-force with a change in ownership (via assignment or merger) per year by technology category.

Technology categories from Hall et. al. (2001) and Marco et. al. (forthcoming). Patents only counted for first change in ownership within execution year.

Figure 10. Highest and lowest technology subcategories: Patents with a change in ownership per execution year, fraction of patents-in-force (1981-2014).

*Omits years with less than 500 Biotechnology patents-in-force
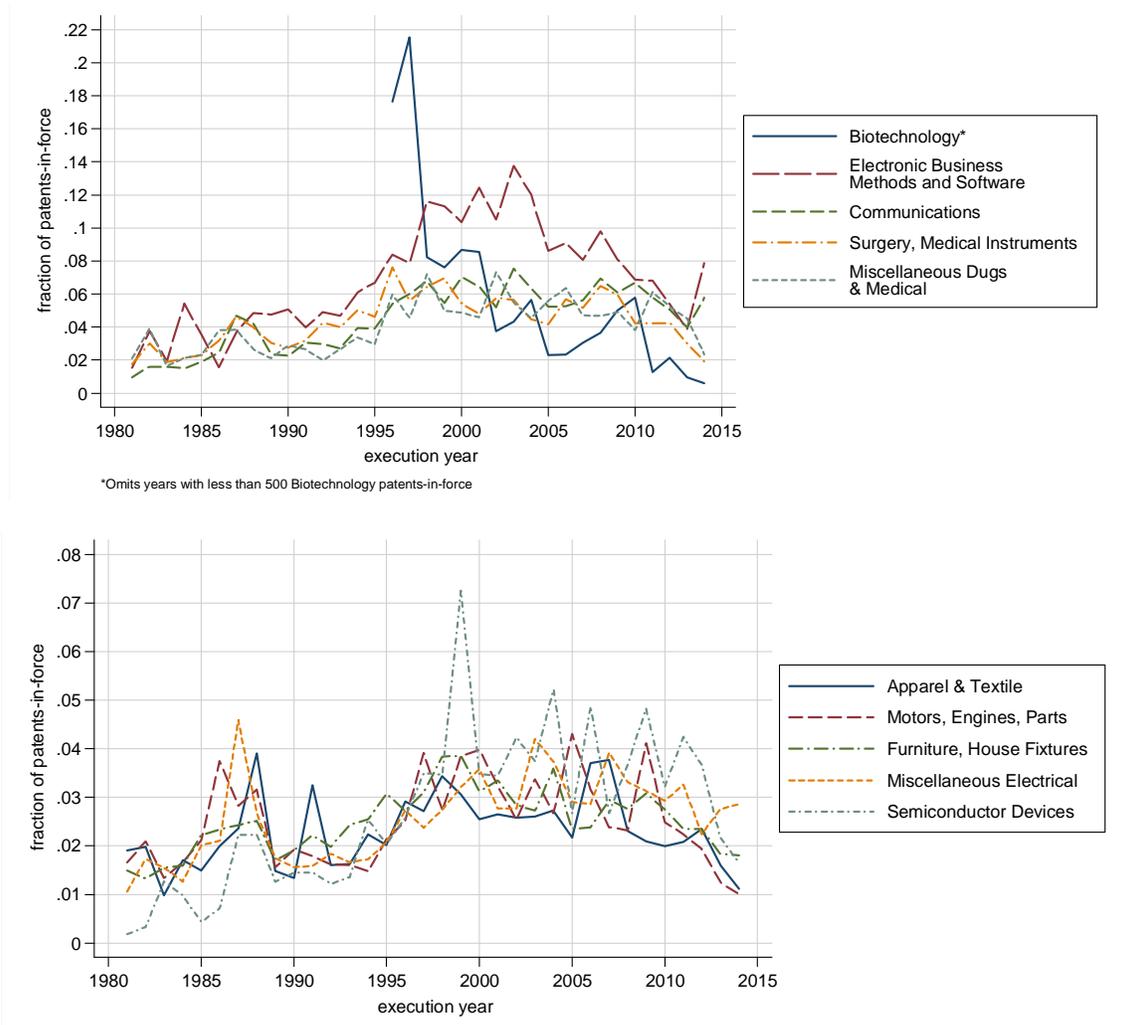
Highest (upper) and lowest (lower) five technology subcategories: Fraction patents-in-force with change in ownership (via assignment or merger) per year by technology subcategory from Hall et. al. (2001) and Marco et. al. (forthcoming). Patents only counted for first change in ownership within execution year. Ranking based on mean fraction per year during 1981-2014 period.

Figure 11. Fraction of patents with a change in ownership by technology and grant year (1981-2014).
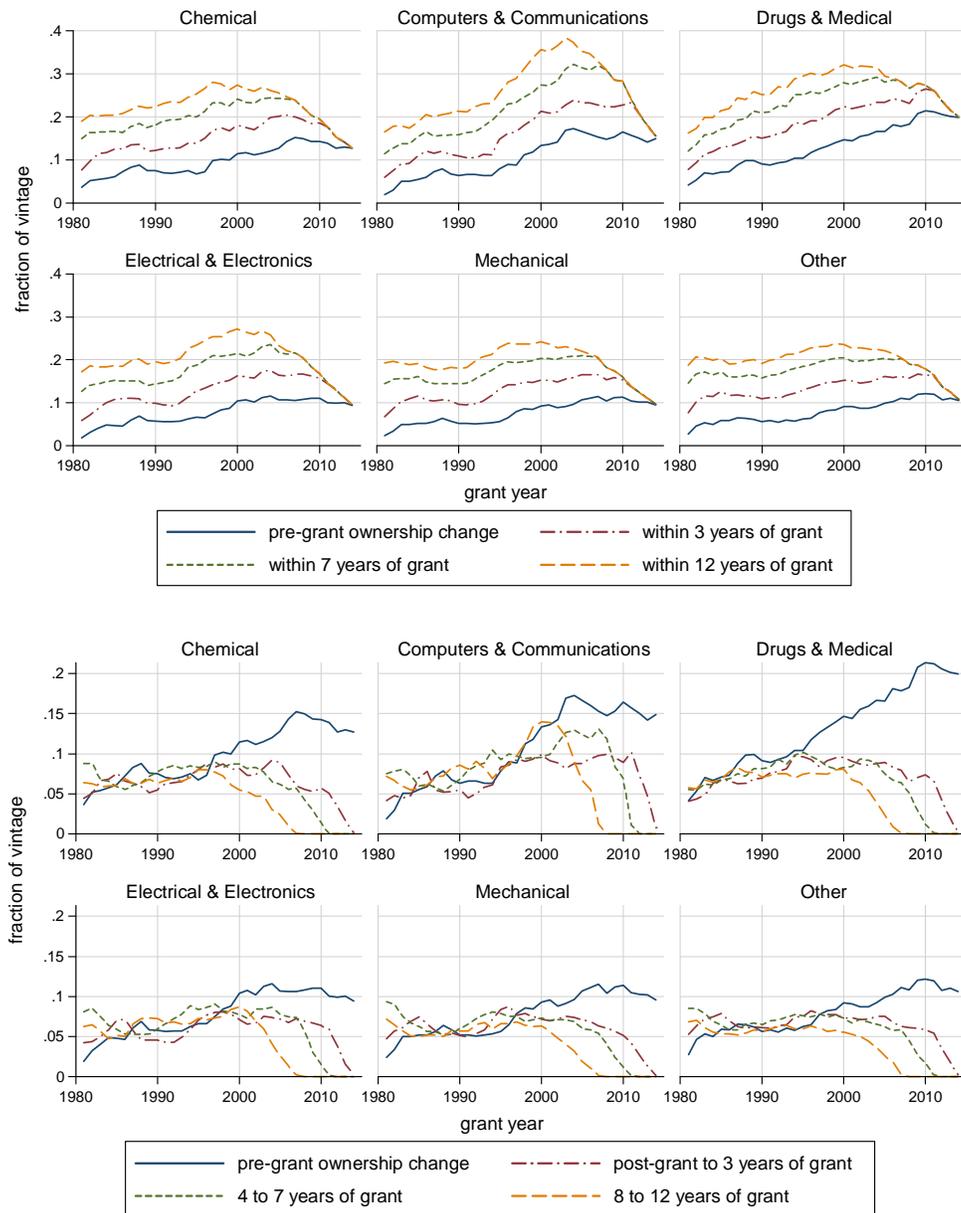
Fraction of patent grant vintage with change in ownership (via assignment or merger) cumulatively, i.e. within specified years of filing (upper), and in distinct periods (lower) of the patent life cycle by technology subcategory from Hall et. al. (2001) and Marco et. al. (forthcoming).

Figure 12. Patents pledged as collateral by technology category per execution year, number and fraction of patents-in-force (1981-2014).
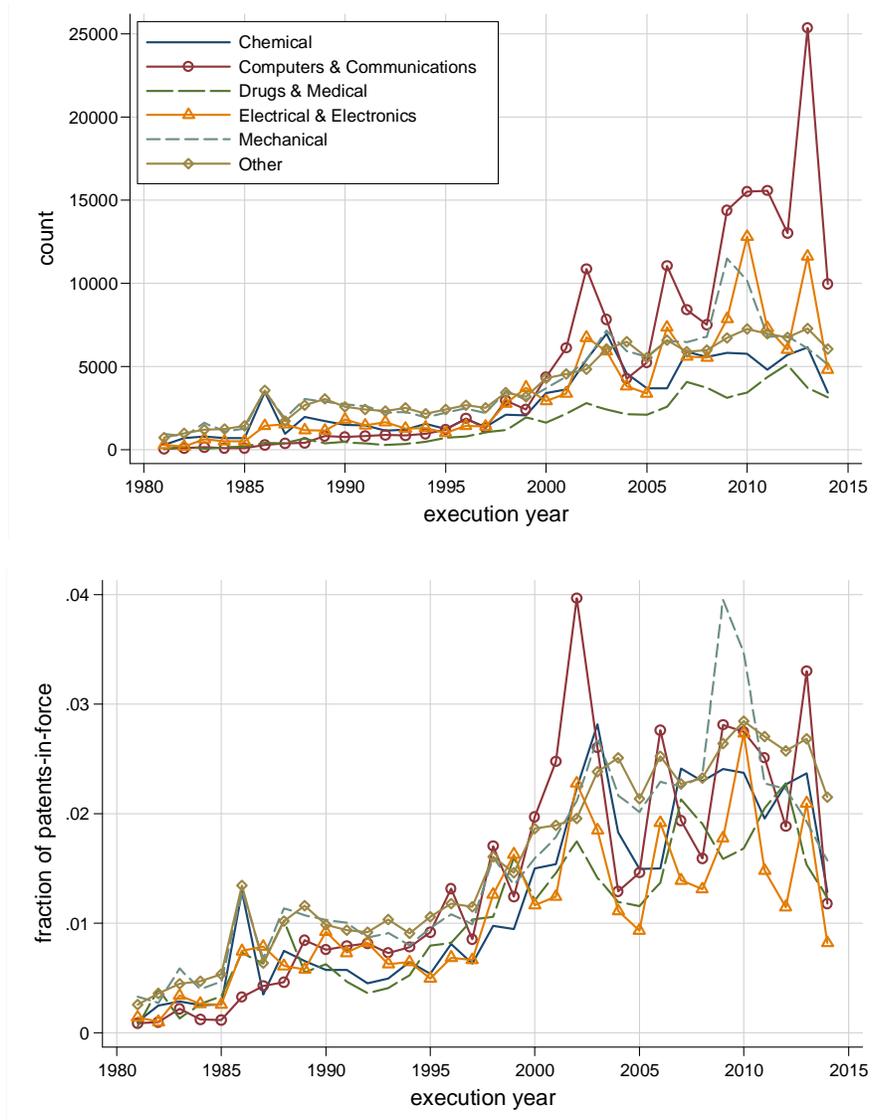
(upper) Number of patents pledged as collateral (based on a recorded security interest) per year by technology category.

(bottom) Fraction of inforce patents pledged as collateral (based on a recorded security interest) per year by technology category.

Technology categories from Hall et. al. (2001) and Marco et. al. (forthcoming). Patents only counted for first recorded security interest within execution year.

**Figure 13. Patents with recorded government interest by technology category per execution year, number and fraction of patents-in-force (1981-2014).**
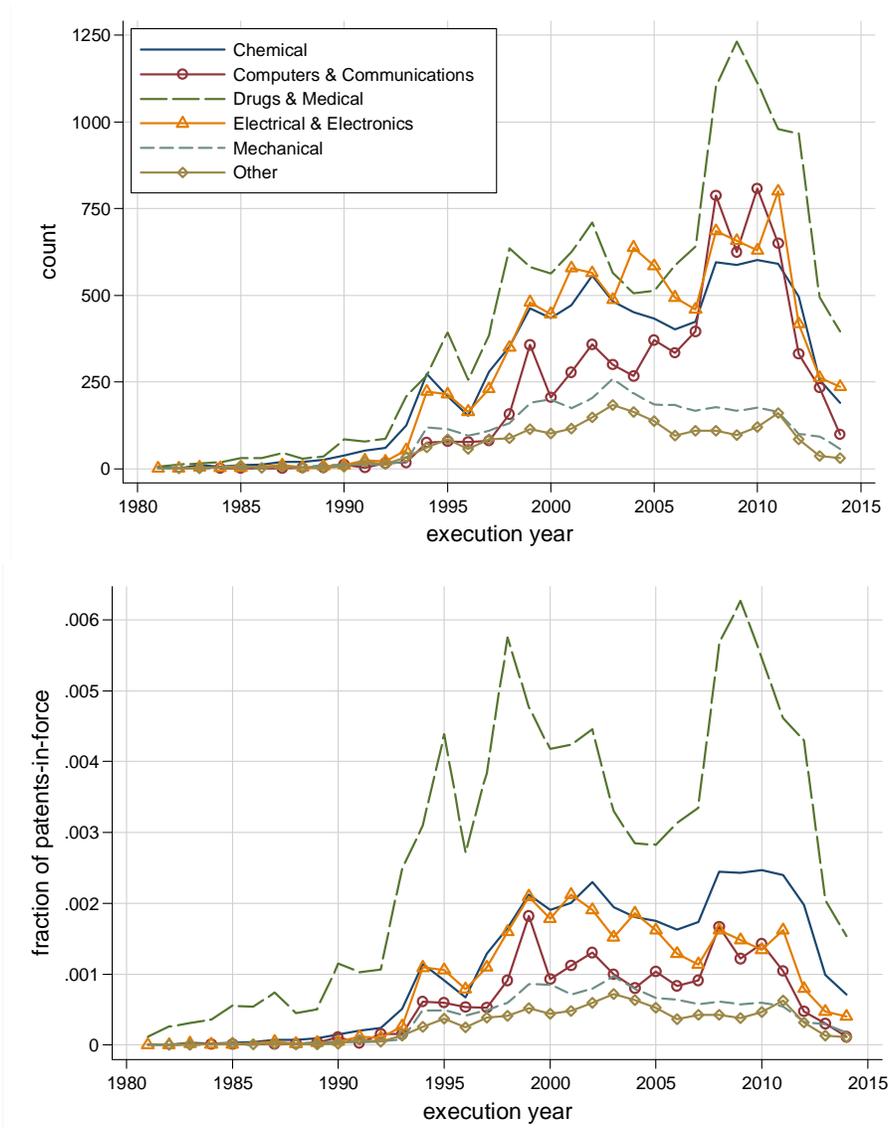
(upper) Number of patents with a recorded government interest per year by technology category.

(lower) Fraction of inforce patents with a recorded government interest per year by technology category.

Technology categories from Hall et. al. (2001) and Marco et. al. (forthcoming). Patents only counted for first recorded government interest within execution year.

Figure 14. Venn Diagram – Patents with Government Interest on Face of Patent versus *Dataset* Government Interest Recording (Grant Years 1981-2014)
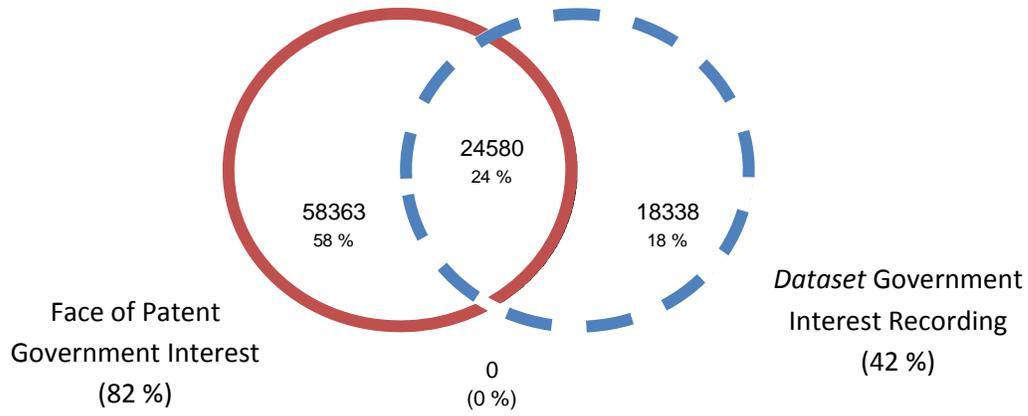
Figure 15. Fraction of patents with change in ownership in each renewal term by maintenance cohort (Grant Years: 1981-2001).
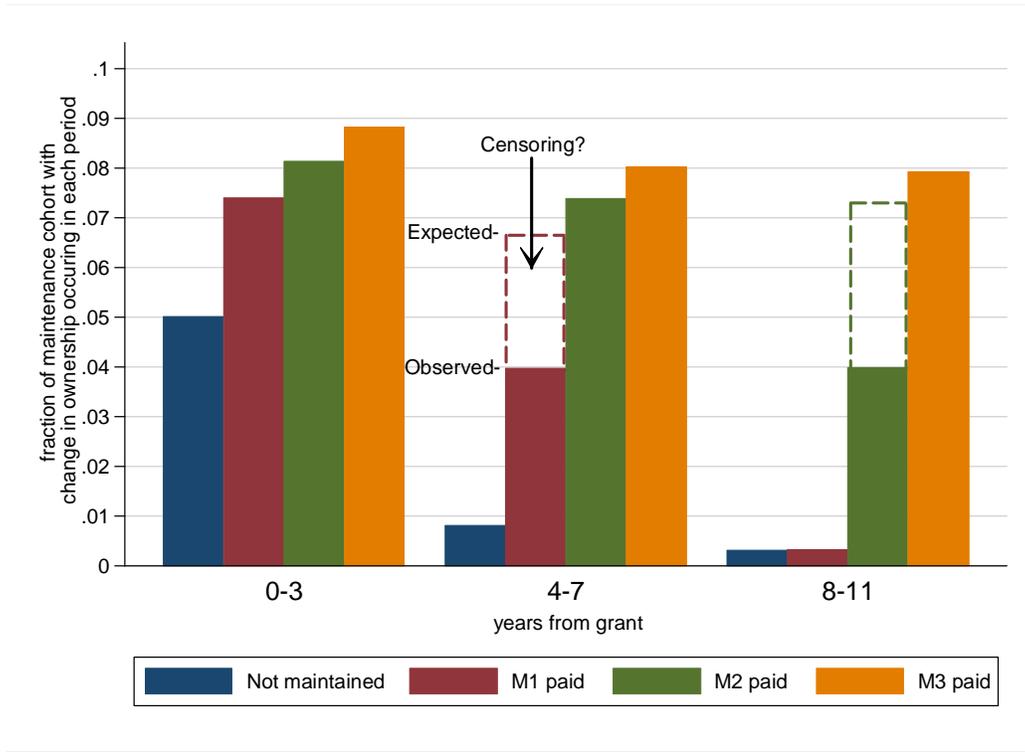
11 Appendix A – (Paper) USPTO Form PTO-1595

Form **PTO-1595** (Rev. 03-11)
OMB No. 0651-0027 (exp. 04/30/2015)

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A. Patent Application No.(s)

B. Patent No.(s)

Additional numbers attached? ☐ Yes ☐ No

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12 Appendix B – Electronic Patent Assignment System (EPAS)

Electronic Patent Assignment System

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Select nature of conveyance

○ **Assignment**	
○ **Change Of Name**	
○ **Merger**	Effective date: [_____] Format: MM/DD/YYYY
○ **Nunc Pro Tunc Assignment**	Effective date is required for 'Merger' and 'Nunc Pro Tunc' types
○ **Security Agreement**	
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○ **Executive Order 9424, Confirmatory License**	

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○ **Lien**	
○ **License**	
○ **Option**	
○ **Decree of Distribution**	
○ **Letters of Testamentary**	
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○ **Court Appointment of Trustee**	
○ **Release by Secured Party**	
○ **Conditional Assignment**	
○ **Other**	[_____] Enter other conveyance type text here

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EPAS v.1.5
PTO-1595 (Rev. 06/12)
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Enter correspondence information
** Verify pre-filled address for correctness

Phone	
Name ★	
Address	Street ★
	Internal
	City ★
	State ★
	Switch to non US address
	Postal code ★
E-mail Address ★	Note: The confirmation receipt for this request and the Official Notice of Recordation/Non-Recordation will be sent via e-mail to the above-listed address.
Fax number	Note: Leave it blank or 10-digits, US or Canadian number, digits only.

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Date of Execution ★		Format: MM/DD/YYYY			

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State *

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If you would like to paste a list of properties to the form, click here .

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Patent number		[Add]	[Add and Go To The Next Screen]

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49

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EPAS v.1.5
PTO-1595 (Rev. 06/12)
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Attach required legal documents
Document pages must be in TIFF or PDF format, letter size (8.5"x11"), 300 dpi, portrait orientation, black and white with black text on white background.
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If the file type attached is not of TIFF type, the attached document(s) will be converted to single page tiff files.
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13 Appendix C – Variable description by data file

Data file	Variable name	Storage type	Variable label
assignment	rf_id	long	Reel Frame ID Number - unique linking variable for this dataset
	file_id	int	US Patent Assignment ID
	cname	str50	Correspondent Name
	caddress_1	str50	Correspondent Address Line 1
	caddress_2	str50	Correspondent Address Line 2
	caddress_3	str50	Correspondent Address Line 3
	caddress_4	str44	Correspondent Address Line 4
	reel_no	int	Reel Number of Microfiche Record
	frame_no	int	Frame Number of Microfiche Record
	convey_text	str244	Conveyance Text - Describes Type of Assignment
	convey_text_len	int	Length of Conveyance Text - Describes Type of Assignment
	record_dt	float	Recorded Date with USPTO
	last_update_dt	float	Last Update Date
	page_count	int	Page Count of Assignment Record
	purge_in	byte	Purge Indicator = 1-yes assignment deleted
assignee	rf_id	long	Reel Frame ID Number - unique linking variable for this dataset
	ee_name	str244	Patent Assignee Name = Entity Assigned TO
	ee_name_len	int	Length of Patent Assignee Name = Entity Assigned TO
	ee_address_1	str244	Patent Assignee Address Line 1
	ee_address_1_len	int	Length of Patent Assignee Address Line 1
	ee_address_2	str244	Patent Assignee Address Line 2
	ee_address_2_len	int	Length of Patent Assignee Address Line 2
	ee_city	str40	Patent Assignee City
	ee_state	str59	Patent Assignee State
	ee_postcode	str15	Patent Assignee Postal Code
	ee_country	str44	Patent Assignee Country
assignor	rf_id	long	Reel Frame ID Number - unique linking variable for this dataset
	or_name	str244	Patent Assignor Name = Entity Assigned From
	or_name_len	int	Length of Patent Assignor Name = Entity Assigned From
	exec_dt	float	Execution Date between Entities
	ack_dt	float	Acknowledgement Date
documentid	rf_id	long	Reel Frame ID Number - unique linking variable for this dataset
	title	str244	Invention Title
	title_len	int	Length of Invention Title
	lang	str8	Language of Invention Title
	appno_doc_num	str8	Application Document USPTO Number
	appno_date	float	Application Date
	appno_country	str2	Application Country
	pgpub_doc_num	str8	Pre-Grant Publication Document USPTO Number
	pgpub_date	float	Pre-Grant Publication Date
	pgpub_country	str2	Pre-Grant Publication Country
	grant_doc_num	str8	Granted Patent Document USPTO Number
	grant_date	float	Granted Patent Date
	grant_country	str2	Granted Patent Country
assignment_conveyance (constructed)	rf_id	long	Reel Frame ID Number - unique linking variable for this dataset
	convey_ty	str10	Conveyance Type
	employer_assign	float	Employer Assignment Indicator
documentid_admin (constructed)	rf_id	long	Reel Frame ID Number - unique linking variable for this dataset
	appno_doc_num	str14	Application Document USPTO Number
	grant_doc_num	str8	Granted Patent Document USPTO Number
	admin_appl_id_for_grant	str14	Application number for grant_doc_num from administrative data
	admin_pat_no_for_appno	str7	Patent number for appno_doc_num from administrative data
	error	str61	Identifier Error