

# Patent Disclosure

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Patent systems across the world have two main objectives: to provide inventors with the incentive to invest in innovation, and to disclose patentees' technological know-how to the public. While several scholars have studied the incentive effects of patents, the disclosure function of patents remains under-explored. We propose to address this gap by investigating the effects on patenting and innovation of the American Inventor's Protection Act of 1999 (P.L.106-113; henceforth, "AIPA"), through which Congress harmonized U.S. patent laws with those of the rest of the world by requiring public disclosure of patent applications at 18 months from their filing date.

Before AIPA, inventors were allowed to keep the existence of their U.S. patent applications secret until the final patent was granted (in theory, for up to 20 years, and on average, about three years in 2000). However, AIPA also provided an important exception not available to applicants in other countries: Applicants could opt out of 18-month disclosure by declaring that they would not seek patent protection in a foreign jurisdiction. The 18-month disclosure rule was controversial—in an open letter to the U.S. Senate, 26 Nobel Laureates argued that early publication would stifle patenting by inventors who valued secrecy, in particular, small and independent inventors (Modigliani, *et al* 1999).

We propose to theoretically and empirically study the effects of patent disclosure on patenting activity and innovation. In particular, we ask how the 18-month publication rule enacted by AIPA affected: (i) the propensity to patent of inventors, (ii) investment per patent, and (iii) design-around and R&D duplication costs. We then compare these effects of disclosure across different technologies, and separately for large and small inventors to shed more light on the laureates' concerns.

## Theory and Testable Implications

We develop a heterogeneous firm model with endogenous innovation similar to Atkeson and Burstein (2010) in which firms decide between trade secrecy and patenting. Our model incorporates an initial patent evaluation period, during which uncertainty over the value of a patent, as well as follow-on design-around risk resolves. We then structurally simulate the introduction of an 18-month disclosure rule and generate four testable implications: (i) a rise in the number of patent applications, particularly by small firms and individual inventors, (ii) a rise in abandonment rates, (iii) a decline in patent interference rates, and (iv) an increase in investment per granted patent (measured as a rise in claims per patent, requests for continuing examination and increased pendency of patent applications). The intuition for these results is that the opt-out clause bounds potential losses from design-arounds, and with early disclosure, patent applicants have more information and reduced uncertainty over whether a rival patent exists. Early discovery of rivals encourages abandonments, and patentees who do not abandon applications increase their investments in patenting. The general reduction in uncertainty due to early disclosure of potentially overlapping claims benefits smaller, capital constrained firms the most,

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increasing their propensity to file patents. Thus, 18-month publication with the provision to opt out appears to increase the overall welfare of patentees.

### **Empirical Approach and Data**

Focusing on the four testable implications of our model, we measure the impact of AIPA using a differences-in-differences approach. While U.S. patents were historically held secret, foreign patents filed in the U.S. (that is, patents with a foreign priority date) were always published 18 months after filing (the publication occurred in the corresponding foreign jurisdictions). We exploit this heterogeneity and compare domestic patents (our treatment group) to foreign patents filed in the U.S. (our control group), before and after the enforcement of the 18-month publication rule. To ensure that the foreign patents filed in the U.S. are nevertheless not contaminated by the effects of pre-grant publication after AIPA, we identify and use only those foreign patents assigned to foreign companies (companies whose patenting is least likely to be affected by U.S. disclosure rules).

We have collected and constructed new proprietary data from the USPTO that covers the universe of all utility patent applications with a filing date between Jan. 1, 1996 and Dec. 31, 2005. The data has information on the abandonment of applications, the timing of abandonments, and whether they were involved in appeals and interference proceedings. We combine this data with patent user fee data, from which we infer the size of the patenting entity. We then merge the data with PATSTAT to identify those patents with foreign priority numbers.

Our preliminary results suggest that the data broadly support the predictions of the model. After the introduction AIPA, we find an increase in patenting, pronounced among small entities (both in terms of the number of applications and in terms of the share of applications filed by small entities), a sharp increase in abandonments (as well as earlier abandonments), a decline in interference rates, and a rise in investments per granted patent. We find that these reductions differ largely across technology fields with different design-around costs. Fields with arguably higher design-around costs, such as Drugs & Pharmaceuticals, exhibit the largest jumps in patenting post-AIPA (particularly by small firms in these fields) and the greatest reduction in design around/R&D duplication (as evidenced by higher abandonment and interference rates).

### **Contributions and Policy Implications**

Our study, when complete, will contribute to the body of research that explores the consequences of disclosing technical knowledge on innovation (in the spirit of Gans, Murray and Stern, 2014). We also extend the recent research on the effects of AIPA (*e.g.*, Johnson and Popp 2003 and Graham and Hegde 2015) by (a) building the first heterogeneous firm model that incorporates the benefits and costs of patent disclosure and (b) testing the effects of pre-grant disclosure on innovative output in different technologies and for different types of firms. Our findings will be of direct relevance to recent proposed legislation (*e.g.*, H.R. 5980) to limit pre-grant publication (to patent titles and abstracts) based on the untested assumption that disclosure imposes a net cost on patentees, particularly small inventors.

## References

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