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When the clock starts ticking: Measuring strategic responses to TRIPS's patent term change

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ABSTRACT

As a consequence of the patent term harmonization introduced by TRIPS, the term of U.S. patents became contingent on how quickly the patents are granted. We find that patent applicants strategically responded to this change in incentives. In the pharmaceutical industry, narrower patents with less detailed descriptions allowed applicants to reduce the approval time by 10.8% (170 days). Also consistent with a ticking clock, we find a reduction in the use of continuations across all industries. Our results suggest that the patent term change created long-lasting efficiencies in the patent office.

1. Introduction

We examine the response of patent applicants in the U.S. to the patent term harmonization induced by the Trade-Related Aspects of Intellectual Property Rights (TRIPS) agreement in 1995. Prior to TRIPS, a patentee was granted a fixed term of 17 years of protection starting from the *issue* date of the patent. Since June 8, 1995, patent protection expires 20 years after the *filing* date,[1] regardless of the patent issue date.

This change in patent law allowed patent applicants to increase the effective length of protection by strategically choosing actions to shorten the prosecution time—i.e., the time elapsed between the filing and issue dates. Applicants choose the number of independent and dependent claims (breadth); the number of figures and words used to describe the patented invention (disclosure); how many and what type of continuations are used[2]; the number of continuations *after* allowance (a proxy for submarine patents); how promptly they respond to USPTO communications (applicant promptness); and how much effort to exert to perfect their applications (polishedness). By constructing a comprehensive dataset that includes application history and observable patent characteristics for all issued patents filed between 1991 and 1998, we study how applicants' choices changed in response to the patent term harmonization.

The TRIPS agreement was ratified by the U.S. Congress in December 8, 1994, and came into force on June 8, 1995.[3] To gauge the impact of the patent term change on applicants' behavior, Fig. 1 shows the average prosecution time of successful patent applications filed between 1992 and 1998. The figure displays two salient features. First, there is a downward shift in average prosecution time after June 8, 1995, suggesting permanent efficiency gains in applicant behavior in response to the new incentives to shorten the prosecution time.[4] Second, there is anticipation: the average prosecution time increased by almost 50% days before June 8, 1995, suggesting that before TRIPS came into effect applicants filed applications that they expected would take longer to prosecute.

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[1] For continuation applications, the patent term ends 20 years from the filing date of the earliest parent application referenced in the application. For more details visit: http://www.uspto.gov/web/offices/pac/mpep/s201.html.

[2] "Continuations" prolong or restart the examination of a rejected or even an allowed application.

[3] For patent applications filed between December 8, 1994 and June 8, 1995, the patent length was the maximum between 17 years from grant date and 20 years from the filing date. This transition period offered the "best of both worlds," providing incentives to submit applications instead of waiting for the new system to be in place.

[4] Alternatively, TRIPS could have generated a structural break and a change in the slope of the time trend of the average prosecution time. Had the slope increased after TRIPS, the efficiency gains would have been only temporal. From Fig. 1, however, we see that the slope flattened slightly after TRIPS came into force. This evidence suggests that TRIPS caused permanent efficiency gains in prosecution time.

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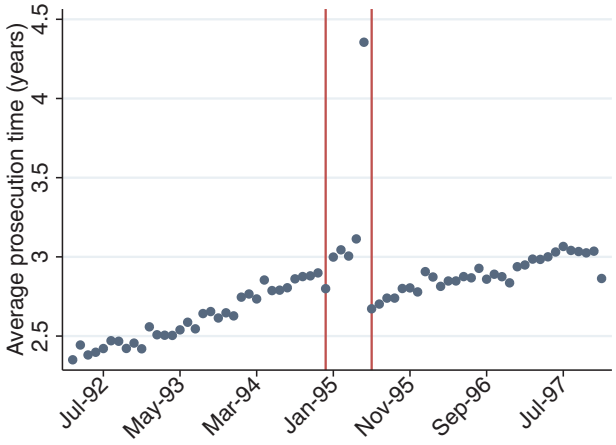

Fig. 1. Average prosecution time of patent applications filed between 1992 and 1998. The vertical lines indicate the beginning and the end of the transition period, December 8, 1994 and June 8, 1995, respectively.

Fig. 1 raises an economic puzzle since there are many strategic decisions made by patent applicants that affect prosecution time. By analyzing each one of the variables that contribute to the prosecution time, we can understand what actions and which applicants are responsible for this drop in the average prosecution time. More broadly, this analysis sheds light on how the incentives of patent applicants are shaped by the patent system.

Our main source of identification is the change in incentives after June 8, 1995: the patent term became dependent on the prosecution time. We argue that the patents filed before TRIPS came into force (in particular, those filed some months before June 1995) are a good counterfactual for the patents filed after TRIPS, as the trends of patent observables evolved similarly before and after TRIPS (see Fig. 1 for an example). We use (time adjusted) differences between these groups of patents to identify the effect of TRIPS's patent term change on the outcomes of interest. A potential identification threat is that the USPTO could have taken actions concurrent to TRIPS to deal with the policy change, which may explain the structural break in Fig. 1. Two facts minimize this threat. First, the USPTO was subject to the Federal Workforce Restructuring Act of 1994, which limited the USPTO's ability to hire new employees in the fiscal year of 1995.[5] Second, the number of patents that were allowed did not experience a structural break when TRIPS came into effect, suggesting no change in the patent examination criteria.

We find that the prosecution time (shown in Fig. 1) fell on average by 44 days after the patent term change. We decompose this change by size of the applicant (small or large) and by industry (using the NBER industry classification in Hall and Adam (2002)). In the pharmaceutical industry,[6] large entities experienced the largest reduction in prosecution time, falling on average by 10.8% or 170 days. We then explore what actions led to shorter prosecution time and we find heterogeneous responses by firm size and industry. For instance, after TRIPS came into force, large entities in the pharmaceutical industry decreased the use of words and figures by 11.67% and 10.72%, respectively; they also decreased the number of independent claims by 7.5%. In the computer industry,[7] we find a 43% decrease in our measure of "submarine" patents—those kept secret and issued strategically after a long period of prosecution—after TRIPS came into effect (Graham and Mowrey, 2004).

We also find two strategic responses to TRIPS's patent term change that are consistent across industries and firm size: a permanent reduction in the use of continuations and an increase in application polishedness. Since most continuations restart the prosecution process without restarting the prosecution time clock, patent applicants had strong incentives to avoid them after TRIPS came into effect, because filing them directly shortens the patent term. On average, we find that large entities reduced the total number of continuations by 47.89% after TRIPS, while small entities by 28.48%. Our estimates show that the reduction of continuations caused by the patent term change saved the USPTO about 263,186 hours of examination during the 1995–1996 period. Back of the envelope calculations suggest that these savings are approximately $6.43 millions in 1995 dollars, which was roughly 1.6% of the USPTO's revenues in 1995.[8] This calculation is a conservative lower bound because it does not consider the benefits for the USPTO of examining more polished applications, which could have saved hours of examination.

Our findings suggest that TRIPS's patent term change caused permanent changes in the patent system along different dimensions, i.e., the impact of the policy change was far beyond a simple change in the statutory length of patents. TRIPS overall injected efficiency into the patent examination process through different channels: fewer continuations (i.e., less congestion), narrower patents (i.e., reduced entry costs, which promote competition), faster applicant responses (i.e., increased efficiency in the prosecution process), and fewer submarine patents. Also, pharmaceutical patents are shorter (fewer words and figures) after TRIPS, which may allow for faster examination. However, we cannot measure whether fewer words and figures reflects a more efficient use of words to describe the invention or a less detailed description of the invention, the latter of which could negatively affect the disclosure of the invention. Finally, our results may shed light on how to address the use of 'Request for Continuing Examination' (RCEs), a recent and prominent issue affecting the USPTO (Tu, 2015).

The paper is organized as follows. In Section 2, we review the literature. In Section 3, we describe our data and define the key variables of interest. Section 4 describes our empirical framework and discusses identification. In Section 5 we present our results, which are supported by tables and figures in the main text as well as in the Supplementary material. Finally, in Section 6, we summarize and discuss our findings.

2. Literature review

Jaffe (2000) discusses major changes to the U.S. patent system from 1980 to 2000. These include the creation of the U.S. Court of Appeal for the Federal Circuit (CAFC), the Bayh-Dole act, the expansion of patentability of software, and the TRIPS agreement. The creation of the CAFC, which according to Jaffe and Lerner (2011) weakened the patent system overall, affected the incentives to appeal patent-invalidity decisions (Henry and Turner, 2006). The Bayh-Dole act changed incentives to file patents (see, e.g., Mowery et al. (2002) and Thursby and Thursby (2003)). Bessen and Hunt (2007) study the incentives for public firms to patent software-related inventions. Katznelson (2007) discusses the effect of the creation of the CAFC and the TRIPS agreement on patenting behavior. Closer to our analysis, Abrams (2009) studies the effect of TRIPS on patent counts and citations,[9] and Sukhatme and Cramer (2014) argues that TRIPS caused a short-run

[5] As noted by the commissioner of patents in the 1995 USPTO annual report: "Government-wide restrictions on personnel ceilings prohibited additional hiring to address the new work." See http://www.uspto.gov/sites/default/files/about/stratplan/ar/1995annualreport.pdf (page 43).

[6] We use 'pharmaceutical industry' for the NBER category 'Drugs and Medical'.

[7] We use 'computer industry' for the NBER category 'Computers and Communications'

[8] Using our regression estimates we calculate an expected reduction in continuations of 13,694 per year due to TRIPS's patent term change. We assume that applications were examined on average for 19 h (Frakes and Wasserman, 2017). Patent Examiners make about $80,000 per year, which is equivalent to an hourly wage of $38.46 (or $24.61 in 1995 dollars after adjusting for inflation).

[9] In this analysis, it is assumed that applications pre-TRIPS and post-TRIPS have similar prosecution times. This assumption is problematic since, as we will show in Section 4, patent applicants endogenously changed their behavior after TRIPS and they also anticipated the change.