

# **PATENT POOLS AND PATENTING FOR TECHNOLOGICAL STANDARDS**

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## **Extended Abstract**

Over the last ten years, the increasing number of patents declared essential to technological standards has attracted wide attention in the academic literature and among policy makers. A patent is called essential for a standard when it is necessarily infringed by any implementation of the standard. Obtaining such a blocking power over a standard may increase the commercial value of a patent for its holder (Rysman and Simcoe, 2009, Bekkers et al. 2001). Standardization thus generates additional incentives for firms to file more patents (Layne-Farrar, 2008), or to adjust their patent files to ongoing standardization (Berger et al., 2012). The increasing number of patents around standardization thereby evolves to become a challenge for standard development and implementation (Shapiro, 2001).

In order to deal with these challenges, standardizing firms have come up with mechanisms to coordinate their strategies with respect to Intellectual Property Rights (IPR). Patent pools are probably the most important of these mechanisms. Pools combine IPR to be licensed under a single contract. This increases transparency, reduces coordination costs and avoids costly infringement litigation (Lerner & Tirole, 2004). For these reasons, pools are generally believed to foster standard-related innovation (Merges, 2001; Lerner and Tirole, 2004; Lerner, Strojwas, and Tirole, 2007, Aoki and Schiff, 2007). Nevertheless, as most pools redistribute royalties according to the number of patents, pools could exacerbate the incentives to file numerous standard-related patents (Layne-Farrar & Lerner, 2011; Baron and Delcamp, 2011), thereby diluting the returns on valuable inventions. Patent pools could thus trigger a higher patent propensity, while the rate of technological progress actually decreases (Lampe & Moser, 2010).

While both theory and micro-evidence on patenting strategies point to a positive effect of patent pools on the number of patents, the expected effect of patent pools on innovation is thus ambiguous. Recent empirical work however even finds a negative effect of patent pools on the number of related patents (Lampe and Moser, 2011; Joshi and Nerkar, 2011). This apparent contradiction can be explained by two facts: first, in contrast to contemporary pools, the earlier pools studied by Lampe and Moser (2010, 2011) have often included substitutable patents of technological competitors, thus reducing the incentives for innovation through cartelization (Gilbert, 2007). Second, the empirical investigation of the effects of contemporary ICT patent pools on innovation effort is methodologically challenging. For instance, we argue that a decline in patenting after pool creation, or a relative decline in the level of patenting by insiders compared to outsiders, is no evidence of a negative effect of patent pools.

We will thus investigate the effects of patent pools on innovation using data on contemporary pools and through a different methodology. First, we include standardized technologies, for which patents are licensed individually rather than through a pool, as a counterfactual into our analysis. We will address concerns of heterogeneity through a careful matching procedure based upon information on the characteristics of the standards. Second, we make use of the relatively sharp policy change with respect to patent pools at the end of the 1990s as a source of exogenous variation.

We especially exploit information from the timing of patenting and declaration with respect to the development of the standard. We will identify empirical predictions of theoretical work on pools that can be tested against available data in this framework: 1) as pools increase the value of patents for both members and outsiders, all standardizing firms increase patent files when they observe an unpredicted pool creation, 2) as the effects of royalty sharing rules of patent pools only affect pool members, we expect that companies joining a pool increase the number of related patent files compared to outsiders, 3) as companies would rather be founding members of a patent pool than having to negotiate entry with incumbent members, predictable pool creation generates incentives for patent races and for earlier R&D investments with respect to standardization timing.

We test these hypotheses against a database of 7 million patents, filed by over 150 companies that are active in more than 700 standards and technical specifications of the last 18 years. We find evidence that in the case of standards released before the policy change, firms increase

their related patenting in response to a pool creation. Pool members increase their patenting after entry into an existing pool. There is no such response to pool creation in the sample of standards released after 1999, when the creation of pools has become a general practice for important ICT standards. Consistent with Dequiedt and Versaevel (2007), we find that in this sample the expectation of patent pools shifts standard related R&D investment to earlier periods. There is no such relationship between pool existence and R&D timing in the subsample of standards released before the general clearing of patent pools in 1997 by antitrust authorities. This policy shock indicates that we can interpret our findings to measure a company level reaction to pool creation.