Research Policy 42 (2013) 704–719

Contents lists available at SciVerse ScienceDirect

Research Policy

journal homepage: www.elsevier.com/locate/respol

A quality index for patent systems

Matthis de Saint-Georges[a], Bruno van Pottelsberghe de la Potterie[a,b,*]

[a] Université Libre de Bruxelles (ULB), Solvay Brussels School of Economics and Management (SBS-EM), Belgium
[b] iCites, ECARES, CEB and Bruegel, Belgium

ARTICLE INFO

Article history:
Received 22 July 2011
Received in revised form 5 September 2012
Accepted 11 September 2012
Available online 12 October 2012

JEL classification:
O30
O31
O34
O38
O57

Keywords:
Patent system
Quality
Patent propensity
Intellectual property

ABSTRACT

This paper presents a quality index for patent systems. The index is composed of nine operational design components that shape the transparency and stringency of patent systems and affect the extent to which they comply with patentability conditions. Seven components are related to rules and regulations (e.g., grace period, opposition process and continuation-in-parts), while two components measure patent offices' resource allocation policy (i.e., workload per examiner and incentives). The index is computed for 32 national patent systems, and displays a high degree of heterogeneity across countries. Cross-sectional quantitative analyses suggest that the demand for patent rights is lower in patent systems with a higher quality index, controlling for research efforts, patent fees and the "strength" of enforcement mechanisms. These results have important policy and research (metrics) implications.

1. Introduction

Recent policy debates in the US have focused on the importance of the quality of patent examination processes. In fact, the US Patent and Trademark Office (USPTO) is often criticized for its propensity to grant many patents of low quality.[1] In contrast, the European Patent Office (EPO) is perceived as offering higher quality patent prosecution services. Apart from these perceptions, no or little evidence is available on the quality of patent systems. As a consequence studies of how qualitative differences might influence the behavior of innovating firms are lacking.

As a matter of fact, the quality of patent systems has received relatively little attention in the economic literature. From the early theoretical investigations onwards, the focus has been on the "strength" of patent systems, which is generally assumed to affect the rate of innovation. The "strength" terminology is not typically used to reflect the degree of quality of a patent system. Instead, a patent system is commonly classified as *stronger* when more domains are patentable (Gallini, 2002), when the period of patent protection is longer (Grossman and Lai, 2004), or when the geographical scope is enlarged (Scherer, 2002). The indices of "patent rights" produced by Ginarte and Park (1997), and the updated versions published by Park (2008) for 110 countries and by Lerner (2002) for 60 countries, crystallize this tendency to define "strong" patent systems as those that are essentially applicant friendly. *Applicant friendliness* is a more relevant term because the index rises when more technological areas are patentable, when patents have a longer duration or when they provide patent owners with greater legal power.[2]

So far, the most common approach to empirically gauging quality within or across patent systems relies on rates. Scholars compare grant rates (e.g., Guellec and van Pottelsberghe de la Potterie, 2000; Jensen et al., 2006; Palangkaraya et al., forthcoming) or litigation rates (including opposition rates, e.g., Graham et al., 2002). A patent that is granted or that resists litigation is assumed to be of high quality. This approach, while undoubtedly useful, is subject to a series of biases (see van Pottelsberghe de la Potterie, 2011), as

* Corresponding author at: Université Libre de Bruxelles, CP 114, Solvay Brussels School of Economics and Management, 50 av. F.D. Roosevelt, B-1050 Brussels, Belgium.
E-mail address: bruno.vanpottelsberghe@ulb.ac.be (B. van Pottelsberghe de la Potterie).

[1] See, for instance, "Patent reform: the spluttering invention machine – America's patent system has problems; a new law would fix only a few" (*The Economist*, March 17, 2011).

[2] Claessens and Laeven (2003) is one of the many papers that rely on the Ginarte and Park index to measure the impact of patent systems on growth.

0048-7333/$ – see front matter © 2012 Elsevier B.V. All rights reserved.
http://dx.doi.org/10.1016/j.respol.2012.09.003

(1) applicants may adopt heterogeneous filing strategies across industries and countries; (2) many "borderline" patents are never litigated or opposed; and (3) patent disputes are often undisclosed and negotiated bilaterally between opponents.

Studies of patent litigations actually scrutinize 'only' the top of the "patent iceberg" (the most valuable patents are subject to litigation). The focus is rarely on the patent application assessment process or on the transparency of the system. Some authors explicitly consider the filtering process in their theoretical models (e.g., O'Donoghue, 1998; Dewatripont and Legros, 2008; Farrell and Shapiro, 2008) and find that more stringent assessment processes induce more effective incentives to innovate. For Picard and van Pottelsberghe de la Potterie (2011) the quality of examination system is associated with two opposite forces: a selection signal that should reduce the number of submitted inventions with a small inventive step (there is little chance to be granted) and a credibility signal that should induce more applications (inventors feel more 'secured' in case of litigation). The quality of examination processes has also received increasing attention in recent years, especially among authors focusing on the US patent system.[3] Jaffe and Lerner (2004), Maskus (2006), Quillen (2008), and Bessen and Meurer (2008) implicitly or explicitly raise the hypothesis of a vicious cycle in which a low-quality assessment process leads to the filing of more low-quality applications, which in turn reduces the examination quality because examiners become overloaded. Such authors frequently argue that the low patentability standard in the US is mainly driven by the Court of Appeals of the Federal Circuit (CAFC), because judges create jurisprudence with their decisions, especially regarding patent invalidation proceedings. Although this argument is valid to some extent, it should not hide the fact that many factors shape the quality and transparency of patent application assessment processes. Scholars have rarely systemically investigated the processes put in place to check patentability conditions. When they have done so, they have tended to explore only the US patent system (i.e., Quillen, 2006; Burk and Lemley, 2003).

To the best of our knowledge, van Pottelsberghe de la Potterie (2011) provides the first attempt of an international, systemic, comparison of patent system quality. The author makes the working assumption that the quality of a patent system depends on both its stringency and transparency. These two dimensions can be gauged through the operational design of patent systems, which includes rules and regulations, and patent offices' resource allocation practice. The author compares the operational designs of three major patent systems (Europe, Japan and the US) to investigate the extent to which the conditions of novelty and inventiveness are met in a transparent way. The international heterogeneity of operational designs may ultimately lead to different degrees of rigor and transparency in patent application assessment processes. The composite index built by van Pottelsberghe de la Potterie (2011) confirms that there is substantial variation in quality across the three patent systems, and graphical evidence suggests that the degree of quality is negatively correlated with the demand for patent rights. As a graphical representation of three points provides only partial evidence, there is an obvious need for further investigation into the impacts of the stringency and transparency of the application assessment process on applicants' behavior.

The objective of this paper, therefore, is to empirically test whether the degree of quality of patent systems – defined as the extent to which patentability standards are met in a transparent and stringent way – affects the behavior of applicants, especially in terms of their propensity to patent. This objective requires, first, the construction of a "quality" index of patent systems and, second, the inclusion of this index in a quantitative model designed to explain variations in the demand for patent rights across countries.

The quality index presented in this paper is based on nine operational design components. The index is computed for the national patent systems of 32 countries, with at least 1, 800 patent applications filed in 2008. The components include seven rules and legal standards (e.g., grace period, opposition process, hidden applications) and two resource allocation factors (i.e., workload per examiner and incentives). The quantitative analysis aims to explain various alternative indicators of demand for patent rights on the basis of the quality index of patent systems, controlling for research efforts, patent fees and the strength of enforcement mechanisms.

The paper is structured as follows. Section 2 presents the methodology used to compute the index from nine components of patent systems' operational designs. Section 3 presents and compares the indices computed with three alternative weighting schemes. Section 4 is devoted to the empirical model, which aims to evaluate the impact of the quality index of patent systems on the demand for patent rights. Section 5 concludes and presents several policy implications. The results confirm that there are significant variations in patent system quality across countries, and that these variations, together with research efforts, patent fees and enforcement mechanisms, help to explain cross-country variations in the demand for patent rights.

2. The quality index of patent systems and its nine components

In this paper, quality is defined as the extent to which patent systems comply in a transparent and stringent way with their legal patentability standards: the novelty and inventiveness conditions. The novelty condition requires that the invention is new to the world. In other words, the invention cannot be published or presented at a conference before the patent application is filed. The inventiveness condition requires that the invention contribute sufficiently to the state of the art; in other words, it must be non-obvious for a person skilled in the art. These two legal standards might be similarly codified in patent systems but their implementation, or the extent to which they are fulfilled, varies significantly across countries.

It should be clear that the index developed in the present investigation is intended to measure the quality of *patent systems*. As such, the index does not measure the degree of novelty required for grant of a patent nor the height of the inventive step. Yet, it measures the stringency of the patent application assessment process and the transparency of the system. The degree to which patentability requirements are satisfied in a stringent and transparent way is not only dependent on the legal standards but also on the operational designs of the patent systems. The index includes seven legal components and two operational or managerial components that reflect patent offices' resource allocation profiles. These nine components help shape the quality of patent systems. They include: (1) the ownership of an invention, (2) the intermediate search report during the examination process, (3) the allotted period for an examination request, (4) post-grant opposition, (5) the grace period, (6) the option to hide patent applications, (7) the option to adapt patents through continuation-in-parts and other mechanisms, (8) resource allocation per examiner and (9) the examiners' workload. As shown in Table 1, those components might affect the transparency of the patent systems, the applications assessment process, or both.

Each of these components takes a value ranging from 0 to 1 for each patent system. The un-weighted sum of these nine values gives the un-weighted quality index (QUW). Two alternative weighting schemes could be used as well: the first is based on a

[3] Guellec and van Pottelsberghe de la Potterie (2007) provide an in-depth analysis of the European patent system.