



## Exploring the validity of patent applications as an indicator of Chinese competitiveness and market structure

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### ABSTRACT

An increasing number of studies are using either worldwide Chinese patent applications as an indicator to assess the country's international competitiveness or applications at the Chinese SIPO as an indicator of the internal structure of innovative activities on its domestic market. Whenever such macro level studies are presented, however, many practitioners tend to express disbelief regarding the validity of patent indicators in this emerging market, where IPR protection is perceived to play a role that differs strongly from that in other economies. This paper, therefore, compares the structure of both patent applications at the Chinese national office and global applications by Chinese inventors. Moreover, it contrasts Chinese application activities with those of other nations. On this basis, it analyses if there is evidence of different underlying motivations for and logics of application that would substantiate such doubts. It concludes that, following WTO accession, the Chinese technology market is finding its specific equilibrium but retains certain persistent particularities. Global filings of Chinese applicants, in contrast, remain biased towards the few major firms that can compete at the world markets for technology.

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### 1. Introduction

Patent applications are a well acknowledged indicator to measure national innovative capacity in developed market economies [1–4]. In emerging markets, in contrast, their validity as an indicator is often challenged for a number of different reasons, relating to both the emerging nature of the economy itself and common deficiencies of systems of IPR protection in their early stages of development (cf. e.g. [5,6]). While many of these objections are relevant in principle, the author is not aware of any basis on which such claims could be made in a *generalisable* way. Consequently, a detailed empirical analysis of each particular situation is needed.

This article, therefore, will analyse the situation in China, one of the emerging countries that is becoming an increasingly central focus of interest for patent based analysis, since more and more studies find that following a period of knowledge adaptation and absorption in the 1990s – during which patent applications may have been a less relevant indicator – the number of patent applications has surged since the country's accession to the WTO in 2000. Additionally, moreover, there are signs suggesting a shift towards genuine in-house innovation in universities and private enterprises, that calls for patent protection [7]. Consequently, a number of studies, including many in this journal, have started to use pat-

ent applications for complex analysis of national competitiveness in China [8–10].

Despite a number of arguments in favour of its utility as an indicator, patent applications remain a highly politicised issue in a country that on the one hand uses them as a *per se* measure of research performance at universities [11] – and thus at least implicitly a prerequisite for promotions following evaluations. On the other hand it is still sufficiently unable to enforce litigation claims that many private firms prefer secrecy to patenting as a means of IPR protection [12,5], thus raising doubts about whether the degree of patent activity really creates a suitable image of the factual innovative activities on the ground.

While all this is undoubtedly the case, it remains unclear whether it really compromises the validity of patents as an indicator of innovation in China. Anecdotal evidence is certainly not enough to make this case. The key argument of this paper, therefore, will be based on the assumption that if, indeed, there were differences in the underlying processes and motivations so substantial to call into question the overall validity of the indicator itself, this would have to be reflected in significant structural differences in many respects.

Consequently, one aim of this paper is to examine how structurally similar the overall pattern of patent applications at the Chinese State Intellectual Property Office (SIPO) is to that at other globally relevant offices. In addition to that, the structure of applications by Chinese applicants at the SIPO will be compared to that of applicants from leading economies at their respective national offices.

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## 2. Conceptual background

In transformation economies, the validity of patent indicators is called into question for a number of reasons beyond those typically quoted for technologically leading economies.

Firstly, transforming economies are often also learning economies [13] with such a substantial presence of foreign enterprises – both under foreign and local legal status – [14] that the validity of patent applications at the national office as a measure of national innovative capability could be called into question. First and foremost, applications at a national office are a descriptor of *national market structure*. From that perspective, internationally controlled R&D constitutes one element of activities on the domestic market and poses no problem for interpretation. An analysis of *national innovative potentials* based on domestic applications at the national office, however, became difficult to interpret if we knew that those constitute but a tiny share of overall applications or if the majority of the inventors were foreign employees of foreign or multinational corporations (MNC) that just happen to apply under their Chinese postal address.

Secondly, it is often argued that – to a far greater than the usual extent – patenting in transforming economies is a can rather than a must option. As, typically, no suitable enforcement regime is in place for patented technologies, many firms resort to secrecy and non-disclosure rather than to seek legal protection of their inventions [12,5]. Arguably, the composition of patent activities does not really reflect the true composition of innovative activities and thus cannot be considered a valid indicator. In contrast, it is often argued that pioneering domestic technology firms (such as Huawei Technologies in China) or universities will use patent applications as a measure and token of performance to, with public support, generate visible beacons of innovation on the national stage. Additionally, governments of emerging nations tend to select certain national champions that they “push out” onto the international market and strongly favour by means of export regulations.<sup>1</sup> Consequently, those will tend to dominate the patent landscape to a much higher extent than in more developed economies. Under such framework conditions it appears questionable if patent applications can provide valid evidence, both at the national and the international stage.

Finally, there is a tendency to argue that the national patenting offices of emerging economies oftentimes do not intend to or simply cannot technically live up to applying the same rules as common in the international lead offices such as the EPO or the USPTO. Firstly, due to the emerging nature of the domestic market and the lack of pre-existing IPR, national patent offices will tend to set lower requirements with regard to the inventive step needed. Moreover, filing for patents can be a politicised matter in emerging countries as policy makers want to demonstrate progress by means of increasing the total number of applications – thus exacerbating the common problem of junk patents to an intolerable degree. While due to its conceptual approach this paper cannot address this question in detail, it will compare the performance and structural set-up of Chinese applicants at the national office to those at international patent offices on which domestic policy decisions have no impact.

## 3. The Chinese patent system – a brief overview

In China, as in any other country, patents are a means to protect intellectual property, i.e. to ensure a temporary monopoly for an

invention made. To be granted, an application has to fulfil the criteria of novelty (not previously published elsewhere in the world), applicability (commercial utility) and sufficient inventive step (non-obviousness) [4,15]. Moreover, in China, as in many countries, intellectual property law distinguishes patents proper, utility models and industrial designs [16]. In some discussions about patenting in China these categories tend to be mixed up as, in direct translation, Chinese patent law speaks of utility models and industrial designs as ‘utility patents’ and ‘design patents’. This article, however, will focus exclusively on patents proper, which in SIPO terminology are labelled ‘invention patents’.

Since China’s patent law came into force in 1985, applications by foreigners as well as China’s domestic firms and individuals have grown rapidly [10,9]. Until recently, applications by foreign firms or individuals tended to concentrate on invention patents, while the majority of Chinese applications used to focus on utility models and industrial designs. In the course of the last 5 years, however, the number of domestic invention patents continues to increase. In 2006 109,435 applications were filed at the national SIPO while 6271 applications of transnational relevance were filed by Chinese applicants at the EPO and via PCT (transnational concept according to Frietsch and Schmoch [17]).

In a broader sense, China has had a history of IPR protection legislation that dates back to the late 19th century. A patent system in the modern sense, however, only emerged in the year 1984 when the first modern patent law was adopted, and China signed up to the Paris Convention. Substantial revisions of this law in 1992 broadened the scope of patent protection to imported patented products and additional stipulations were added to support domestic applicants. It was this step becoming effective in January 1993 that technically brought China’s patent law in line with international standards. Later, as a consequence of China’s accession to the WTO and the resulting TRIPS stipulations, a major revision of the patent law was enacted, becoming effective in July 2001 [18,15].

While a number of studies for example by Sun [19] and Fai [18] have in the past suggested that China’s patent system is technically not that significantly different from that of other nations and, they have also confirmed that it reflects the notion that in China patenting is to a greater extent regarded as a means to promote technology diffusion (as politically desired by the Chinese government) rather than protecting inventors’ rights (as desirable in a fully developed market economy) [6].

More importantly, some studies have argued that it stands comparison with the country’s ‘physical production system’, i.e. the innovative activities on the ground [7]. While China’s innovation system shares many of the classical traits of the East Asian Tiger Economies it also displays some notable particularities. Among them is that China exhibits a much larger reliance on universities, public research institutes (PRI) and on enterprises spun-off from those as sources of innovative activity [7]. In contrast to that, the sprawling public enterprise sector has so far played less of a role in building China’s innovative activity than could be expected, based on other East Asian experiences – such as Korea or Singapore [7]. Instead, [7] find that it were predominantly universities and private enterprises that have moved from a period of knowledge adaption and absorption in the 1990s to a stage of increased in-house innovation evidenced by the number of own patent applications in a substantially decreased technological cycle time.

For the empirical situation to be analysed in this paper this has the following implications.

Firstly, the structure of Chinese applications is likely to display specific particularities. While the structure of applications differs between most countries and most offices, there are certain universal trends such as the home country bias (i.e. the share of applicants from a certain nation is highest at the national office of

<sup>1</sup> Due to the nature of these policy activities no direct reference can be given. The assessment is based on press coverage and repeated conversation with both Chinese and European experts in China.

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