Chinese Patent Quality: Running the Numbers and Possible Remedies

Mark Liang

Abstract

In an effort to improve its economic and technological prowess, China in recent years has promulgated measures that encourage patenting activity. These measures have had their intended effect. Over a million patent applications were filed at China’s State Intellectual Property Office (“SIPO”) in 2010, making it the busiest patent office in the world—by comparison, a mere 600,000 were filed at the United States Patent and Trademark Office, placing it a distant second. The disparity and trend is expected to grow in the coming years. But looking behind the headline numbers raises doubts about the quality of China’s patents and the degree to which the surge reflects true innovation. For example, the vast majority of Chinese patents do not relate to actual inventions, but instead to designs and minor improvements. The SIPO also suffers from problems of understaffing and its average pendency period for the patent review process is suspiciously brief. Surveys, anecdotal evidence, and studies also present reasons to doubt the quality of Chinese patents. To improve patent quality, China should reform SIPO procedures and replace short-term rewards for applying for patents with incentives that reward valuable patents. China should more generally reorient its “innovation agenda” away from intellectual property procurement.
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INTRODUCTION

In recent years, policy makers, academics, and others have been preoccupied with the issue of whether China can become a truly innovative country.1 There is little doubt that China's economic growth—averaging over eight percent annually since 20002—over the past few decades has been impressive. There is also little doubt that the key drivers of China's growth during this period have been manufacturing and infrastructure development.3 China has, within a generation, effectively become the world's factory—the producer of the world's toys, furniture, electronics, clothing, and other consumer products.4 Few other countries have proven as able to take designs and ideas for products and transform them into physical tangible products as cheaply, efficiently, and on the same scale.5 There remains, however, an abundance of doubt over whether China can move up the industrial value chain and begin producing its own designs and ideas for products and technologies.6

Skeptics have reason to be doubtful. Few Chinese companies have brand name recognition with products bearing their designs.7 Chinese universities lagged far behind their foreign peers in research output.8 Countless papers, reports, and

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5 Id.
6 Id.
articles have also documented China's poor record in enforcing intellectual property ("IP") rights. The nation's poor IP enforcement record only reinforced the notion that China did not care about intellectual property, in part because China has little intellectual property of its own to protect. Some observers go so far as to state that China's culture discourages innovation, while others note that China's education system encourages rote learning to the detriment of creative learning. And so the story goes that China has become brilliant at reproducing what's already been done, but is utterly incapable of coming up with the next big thing.

But if the explosive growth of patenting activity in China is any indication of its capacity for innovation, the skeptics are embarrassingly wrong. Since 2000, total patent filings at China's State Intellectual Property Office ("SIPO") has grown seven-fold. Even limiting the data to patent applications that relate to actual inventions (and excluding applications for patents relating to designs or minor improvements), the SIPO surpassed Japan in 2010 to become the second-leading patent office in the world as measured by patent filings for inventions. The SIPO is expected to match or exceed the United States Patent and Trademark Office ("PTO") as the leading destination for invention patent filings by 2012, with seventy-percent percent of those filings coming from domestic inventors. Projecting the past decade's growth...
rates forward, the number of invention patents filed in China will double that of the United States ("U.S.") a mere five years later in 2017.17

Nevertheless, the skeptics may still have a leg to stand on. To be sure, innovation has increased in China as its economy has developed and to some degree, the increase in patent filings does reflect progress.18 But does the 700 percent increase in patent filings in China over the past decade actually reflect a 700 percent increase in the nation’s capacity for invention? Or do impressive numbers instead reflect other, more nefarious factors at play?19

The skeptics would answer yes to the latter question and assert that China’s patent numbers are a fiction covering up the true facts about its innovative capacity and progress.20 As an initial matter, the correlation between innovation and number of patent filings is hardly one-to-one.21 It’s also difficult to believe that any nation, particularly one as large as China, could turn a corner in such short order.22 Looking past all that, there is reason to doubt whether the quality of the patents being applied for and granted in China.23 The burst in Chinese patenting activity is a product in large part from the Central Government’s “innovation agenda,”—a leading component of which are generous incentives for patent filings.24 For example, Chinese companies who file above a certain number of patents receive significant tax breaks.25 Tenure is more likely for university professors who are able to obtain patents.26 Patent application fees for qualifying individuals and companies are entirely subsidized by local governments.27 These incentives, among others, are all part and parcel of the agenda’s stated goal of 2 million patent filings (of any type) by 2015, making China’s SIPO far and away the world’s busiest patent office.28

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17 Id. (explaining that growth rates have averaged 22.4 percent for the SIPO in 2010: 391,177 invention parent applications were filed); U.S. Patent Statistics Chart, Calendar Years 1963 to 2011, U.S. PAT. & TRADEMARK OFF. (Jan. 18, 2012), http://www.uspto.gov/web/offices/ac/ido/oeip/taf/us-stat.htm (explaining that growth rates have average 5.2 percent for the PTO; in 2010, 490,226 utility patents applications—the equivalent of Chinese invention applications—were filed with the PTO).


19 Lee Chyen Yee, China Tops U.S., Japan to Become Top Patent Filer, REUTERS (Dec. 21, 2011), http://www.reuters.com/article/2011/12/21/us-china-patents-idUSTRE7BR0LQ20111221 (explaining that the Chinese “government provided attractive incentives for companies in China to file patent applications, regardless of whether a patent was eventually granted.”).

20 Yee, supra note 19 (explaining that the Chinese “government provided attractive incentives for companies in China to file patent applications, regardless of whether a patent was eventually granted.”).

21 Patents, Yes; Innovation, No, ECONOMIST (Oct. 14, 2010), http://www.economist.com/node/17257940/story_id=17257940 (explaining that “patents are easy to file . . . but gems are hard to find in a mountain of junk.”).

22 Id. (noting that there is skepticism as to China’s position as an innovation leader).

23 Yee, supra note 19 (explaining “[t]he idea of subsidizing patents is not bad in itself, however it is a blunt instrument because you get high figures for filings, but it does not tell you anything about the quality of the patents filed.”).

24 Patents, Yes; Innovation, No, supra note 21.


26 Patents, Yes; Innovation, No, supra note 21.

27 Id.

28 Lohr, supra note 25, at BU3.
Quantitative measures of patent quality, much less innovation, are hard to come by. The task is no easier for a country like China, whose institutions like the SIPO are less transparent than their foreign counterparts. Nevertheless, this paper aims to present various metrics by which the quality of Chinese patents, and thus innovation, may be measured.

In Section II, the substance and recent results of China’s innovation agenda is discussed. In Section III, the quality of Chinese patents is evaluated through a series of selected metrics, and additional metrics are proposed for further investigation. In Section IV, ideas for improving the quality of Chinese patents are proposed.

I. CHINA’S PLANS TO BECOME AN INNOVATION SOCIETY

A. Innovation Agenda

China only passed its first patent law in 1984. Since then, China has been criticized for failing to adopt and meet international standards for IP protection. The country’s poor enforcement record is well documented, as reports abound about rampant piracy and counterfeiting. Facing such criticism and acknowledging its obligations as a member of the World Trade Organization (“WTO”) since 2001 and the importance technological innovation to its economic growth, the Beijing government has gradually come to recognize that a strong IP regime and ecosystem is in its national interest.

Since the mid-2000s, the Beijing government has launched a coordinated phalanx of laws, policy statements, and initiatives, all aimed at aggressively increasing China’s capacity for innovation. In 2006, the government announced its fifteen-year Medium- to Long-Term Plan for Scientific and Technological Development (“15-Year Plan”). The 15-Year Plan included policies and standards

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30 Id. (explaining that Chinese IP law is hindered by a lack of transparency).
32 Patents, Yes; Innovation, No, supra note 21 (explaining that China had “a deserved reputation for trampling on intellectual property rights.”).
33 Fallow, supra note 4.

By 2020, China will become a country with a comparatively high level in terms of the creation, utilization, protection and administration of IPRs. The legal environment for IPRs is much better, market entities are much better at the creation, utilization, protection and administration of IPRs, the public awareness of intellectual property is increased greatly, the quality and quantity of the self-relied intellectual property are able to effectively support the effort to make China
aimed at increasing indigenous IP development before 2020, including a series of quantitative targets for development. Another key aspect of the plan was the development of sixteen “megaprojects” focusing on key technological fields.3

The 15-Year Plan has since been supplemented by other policy statements and objectives, all recognizing the importance of establishing and expanding the community of stakeholders in a strong IP regime.3 Such policy statements encourage IP transfer and alliances among companies, universities, and research institutes, in order to catch-up and “leapfrog” into positions of leadership in several technological areas such as clean energy, electric vehicles, and computing technology.3

The 15-Year Plan was followed by the National Intellectual Property Strategy of 2008 (the “2008 Strategy”).4 The 2008 Strategy emphasized the importance of creating and utilizing IP.4 More concretely, the 2008 Strategy sought to make IP creation and use ubiquitous in the research and innovation activities of companies and government bodies.4 For example, the strategy encouraged companies to incorporate IP into their technical standards and encouraged universities to commercialize their IP.4 The 2008 Strategy also included benchmarks, proclaiming that by 2014:

China will rank among the advanced countries of the world in terms of the annual number of patents for inventions granted to the domestic applicants, while the number of overseas patent applications filed by Chinese applicants should greatly increase. A number of world-famous brands will emerge. The proportion of the GDP accounted for by the value of core copyright industries will greatly increase. China should own the rights to a number of high-quality new varieties of plants and high-level layout-designs of integrated circuits. Trade secrets, geographical indications, genetic resources, traditional knowledge as well as folklores will be effectively protected and reasonably utilized.4

In its more recent National Patent Development Strategy of 2010,4 the government was even more assertive about benchmarks for future performance. Highlights include:

an innovative country, the role of the intellectual property system in promoting economic development, the culture prosperity and social progress in China become very apparent.

Id.; Cong Cao et al., China’s 15-year Science and Technology Plan, 2006 PHYSICS TODAY 38, 38 (2006).

36 See supra note 35 and accompanying text.
37 Id.
38 Id.
39 Id.
40 Id.
41 Id.
42 Id.
43 Id.
44 Id.
By 2020, a quadrupling of the number of inventions per capita and quantity of Chinese-origin patent applications filed abroad.\textsuperscript{46}

By 2015, the number of patent filings will reach 2 million. By comparison, in 2010, about a quarter of that number was filed at the PTO.\textsuperscript{47}

By 2015, China will rank in the top two for number of invention patents granted to domestic applicants.\textsuperscript{48}

In 2015, 100 billion yuan (15.8 billion USD) of IP transactions will be conducted.\textsuperscript{49}

By 2015, the average time needed to examine a patent, or pendency period, will be reduced to 22 months for invention patent applications and 3 months for utility and design patents.\textsuperscript{50} By comparison, the pendency period for the PTO in recent years has been around 34 months for the U.S. equivalent of invention patent applications.\textsuperscript{51}

By 2015, the number of SIPO patent examiners will reach 9000.\textsuperscript{52}

By 2015, the number of registered patent agents will reach 10,000.\textsuperscript{53}

By 2015, the establishment of a national data center, 5 regional patent information service centers and 47 local patent information service centers.\textsuperscript{54}


\textsuperscript{46} Id.

\textsuperscript{47} U.S. Patent Statistics Chart, Calendar Years 1963 to 2011, supra note 17 (explaining that 520,277 total patent applications were filed at the PTO in 2010).

\textsuperscript{48} 2011 PATENT STRATEGY, supra note 45, at 4.

\textsuperscript{49} Id.


\textsuperscript{52} 2011 PATENT STRATEGY, supra note 45, at 5

\textsuperscript{53} Id.

\textsuperscript{54} Id. at 3–5, 11.
In order to achieve these lofty objectives, the Chinese government, local
governments, as well as universities and companies, have promulgated generous
incentives for the acquisition of IP. As summarized in an Economist article:

Professors who do so are more likely to win tenure. Workers and students
who file patents are more likely to earn a hukou (residence permit) to live in
a desirable city. For some patents, the government pays cash bonuses; for
others, it covers the substantial cost of filing. Corporate income tax can be
cut from 25 percent to 15 percent for firms that file many patents. They are
also more likely to win lucrative government contracts. Many companies
therefore offer incentives to their employees to come up with patentable
ideas. Huawei, a telecoms-equipment manufacturer that craves both
government contracts and global recognition, pays patent-related bonuses of
10,000-100,000 yuan ($1500-15,000).

In addition to the above incentives, the Beijing government offers better housing
for individual filers. Some local governments also heavily subsidize the costs of
patent filings. Preferential corporate tax treatment also goes beyond a reduction in rates for
companies that file patents. China’s tax code also allocates a special “patent box”
rate that reduces rates on revenue derived from patents and other forms of
intellectual property. Qualifying IP is taxed at 0-12.5 percent, rather than the
ordinary 25 percent rate. Further, lower tax rates are offered to companies that
spend at least 3 to 6 percent of gross revenue on research and development, derive 60
percent of revenue from “core IP” (meaning patents, software, and copyrights), have
more than 30 percent of their workforce with a college degree, or more than 10
percent employed in technical positions.

The Beijing government has, in sum, fully committed to making China a global
leader in innovation, with accumulation of IP playing a leading role. The various
benchmarks that the government has proposed for 2015 and 2020 are ambitious to
say the least, and would put a significant gap between China and any other
country. The array of aggressive incentives and policies should have the

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55 Patents, Yes; Innovation, No, supra note 21.
56 Id.
57 Lohr, supra note 25.
58 Joff Wild, Quality is China’s Biggest Patent Challenge-Updated, INTELL. ASSET MGMT. (Jan.
explaining that “as long as you fill in the forms correctly you will get your design or utility grant”).
59 ROBERT D. ATKINSON & SCOTT ANDES, THE INFORMATION TECHNOLOGY & INNOVATION
FOUNDATION, PATENT BOXES: INNOVATION IN TAX POLICY AND TAX POLICY FOR INNOVATION 3
60 Id. at 5.
61 Id. at 3.
62 Patents, Yes; Innovation, No, supra note 21 (explaining that the Chinese government is
anxious to promote innovation).
63 Nin-Hai Tseng, Behind China’s Surge in Patents, CNN MONEY (Oct. 14, 2010),
explaining that while patent applications globally are falling, growth of applications in China are
rising).
unmistakable effect of boosting IP creation.\textsuperscript{64} But whether these initiatives will result in true innovation, rather than the disingenuous inflation of various statistical measures, is another question.

**B. Recent Results of the Innovation Agenda**

Before describing the recent impact of Beijing’s innovation agenda, a brief overview of SIPO procedures is in order.

1. **Brief Background on SIPO Procedures**

There are three broad categories of patents in China: (1) invention, (2) utility, and (3) design.\textsuperscript{65} Comparison to the PTO’s designations can be confusing. A Chinese “invention patent” is actually equivalent to the American utility patent. An invention patent presents a novel disclosure or teaching that is a significant advance from the prior art—an “invention” in other words.\textsuperscript{66} Invention patents are subject to a lengthy “substantive” examination.\textsuperscript{67} Invention patents by default receive twenty-year term of protection, starting from the filing date.\textsuperscript{68}

Chinese utility patents by contrast do not have a PTO equivalent—though many other national patent systems, such as those in Germany\textsuperscript{69} and Japan,\textsuperscript{70} do grant utility model patents. The Chinese utility patent represents a minor incremental improvement over the prior art.\textsuperscript{71} The application process is accordingly short and nearly superfluous; so long as an application meets basic form requirements, it will be granted.\textsuperscript{72} Utility patents also receive a shorter ten-year protection term, starting from the filing date.\textsuperscript{73}

Design patents in China cover industrial designs or visual ornamental characteristics of a physical article, much like design patents under PTO.\textsuperscript{74}

\textsuperscript{64} *Patents, Yes; Innovation, No*, supra note 21.
\textsuperscript{65} Stembridge, supra note 50.
\textsuperscript{66} Id.
\textsuperscript{67} Id.
\textsuperscript{68} Id.
\textsuperscript{71} Id.
\textsuperscript{72} Id.
\textsuperscript{73} Stembridge, supra note 50.
patents also receive a shorter ten-year term of protection, starting from the filing date.\textsuperscript{75}

China uses a delayed examination procedure for invention patent applications.\textsuperscript{76} The delayed procedure has three steps: (1) preliminary examination; (2) publication of application; and (3) substantive examination.\textsuperscript{77} The preliminary examination ensures that the patent meets all form and statutory requirements, which are prerequisites to requesting a substantive examination.\textsuperscript{78} Publication of the application typically occurs eighteen months after filing.\textsuperscript{79} Publication makes the invention public as prior art and also enables the applicant to charge fees for use of the invention.\textsuperscript{80} The applicant then has three years after the filing date to request a substantive examination.\textsuperscript{81} If requested, SIPO examiners will assess the novelty, inventiveness, and usefulness of the claimed invention and applicants must submit prior art to assist the examiner.\textsuperscript{82}

A more lenient registration system is used for utility and design patents.\textsuperscript{83} The registration system in effect entails only the initial preliminary examination step discussed above with respect to the delayed procedure.\textsuperscript{84} As also discussed, the preliminary examination step is limited to determining that statutory filing requirements are met, such as ensuring that all documents are properly filed and all fees are correctly paid.\textsuperscript{85} No assessment is made of novelty or inventiveness.\textsuperscript{86}

After a patent issues any third entity or individual can challenge the validity of the patent by filing a petition with the Chinese Patent Reexamination Board ("PRB").\textsuperscript{87} This proceeding is the SIPO equivalent of \textit{ex parte} reexaminations at the PTO.\textsuperscript{88} The validity of a patent may be challenged on the following grounds: unprotectable subject matter; double patenting; unpatentability or lack of novelty; insufficient disclosure; lack of support; indefiniteness; lack of essential technical feature (similar to lack of enablement); and amendment going beyond original scope of disclosure.\textsuperscript{89} After an invalidation petition is filed and assuming it meets all form requirements, the PRB panel—typically composed of three members—will examine

\begin{footnotesize}
\begin{itemize}
  \item \textsuperscript{76} LEI FANG, CHINESE PATENT SYSTEM AND ITS ENFORCEMENT 6 (2005).
  \item \textsuperscript{77} Id.
  \item \textsuperscript{78} Id.
  \item \textsuperscript{79} Id.
  \item \textsuperscript{80} Id.
  \item \textsuperscript{81} Id.
  \item \textsuperscript{82} Id.
  \item \textsuperscript{83} Id.
  \item \textsuperscript{84} Types of Intellectual Property in China, PAT. LENS, http://www.bios.net/daisy/patentlens/2297.html#day2297_procedure (last visited Apr. 16, 2012).
  \item \textsuperscript{85} Id.; Wild, supra note 58 ("[A]s long as you fill in the forms correctly you will get your design or utility grant.").
  \item \textsuperscript{86} Japanese Procedures, supra note 70.
  \item \textsuperscript{87} J. Benjamin Bai et al., What Multinational Companies Need to Know About Patent Invalidation and Patent Litigation in China, 5 N.U. J. TECH. & INTELL. PROP. 449, 450 (2007).
  \item \textsuperscript{89} Bai, supra note 87, 451–52.
\end{itemize}
\end{footnotesize}
the patent based on grounds presented in the petition and any response filed by the patentee.90 An oral hearing is normally held as well.91 It takes anywhere from six months to two years for the reexamination process to finish.92

2. The Numbers

Beijing’s concerted and determined effort to grow patent filings has paid off, probably beyond anyone’s expectations. As shown in Figure 1, in 2010, just over 1.2 million patent applications were filed at the SIPO.93 This is more than double the number of PTO filings that same year.94 A decade ago in 2000, by comparison, SIPO filings totaled about 170,000, while PTO filings numbered just over 300,000.95 Thus, while PTO filings have increased by 85 percent over the decade or 6 percent annually, SIPO filings increased about 700 percent, or 22 percent annually. And Beijing is far from satisfied with 1.2 million; as previously noted, the National Patent Development Strategy of 2010 aims to increase this number to 2 million by 2015.96

Figure 1
All Patents Filed at PTO versus SIPO

But the headline number of 1.2 million is misleading. The number includes all three types of Chinese patent applications: invention, utility, and design.97 Utility patents numbered about 400,000 in 2010—but they have no equivalent in the PTO

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90 Id. at 452–53.
91 Id. at 453.
92 Id.
93 Applications in 2010, supra note 14.
95 Id.
96 Id.
97 Applications in 2010, supra note 14.
Thus, comparing total patent filings between the PTO and the SIPO without discriminating against type is an unfair comparison. And although the PTO recognizes design patents, such patents do not disclose actual inventions, so including them in the comparison also inaccurately depicts innovative activities in the two countries. Finally, in assessing the inventive prowess of the two countries, the relevant figure should be the number of indigenous patent filings. Foreign filings say nothing about each country’s inventiveness and should therefore be excluded. In sum, a proper comparison is the number of Chinese-origin invention applications filed at the SIPO versus the number of U.S.-origin utility applications at the PTO.

Figure 2 shows the number of domestic patent filings at each patent office, with the comparison limited to SIPO invention applications and their U.S. equivalent, utility applications. As is apparent, the number of Chinese-origin invention applications filed at the SIPO in 2010, numbering nearly 300,000, represents less than a quarter of all SIPO filings. Nevertheless, the number exceeds the U.S. filings at the PTO. A trend is also worth noting: while domestic SIPO filings have risen at an annual rate of 28 percent since 2000, PTO filings have risen at a more tepid 4 percent rate.

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98 Id.
99 JOHN W. HAZARD, JR., 1 COPYRIGHT LAW IN BUSINESS AND PRACTICE § 1:47 (rev. ed. Oct. 2011) (explaining that “[a] design patent can be granted for an article of manufacture as well as for a distinctive design, yet it is clear that the design patent encompasses not the function of an invention but rather its distinctive appearance.”).
101 Id. (finding that in 2010, 241,977 indigenous patents were filed in the United States).
Chinese Patent Quality: Running the Numbers and Possible Remedies

Even if patent quality is questionable—which is discussed in the rest of this paper—it is hard to deny based on these numbers that technological development in China has progressed at breakneck speed over the past decade. As Robert Stembridge, an IP analyst at Thomson Reuters, noted: “It’s clear [China’s] moving from low technology to high-tech...[w]e’re seeing a stunning emergence of patent filings in digital computing and data communications over the past few years—close to 4000 percent.”

Statistics from the World Intellectual Property Organization (WIPO) show that in 2009, when many U.S. and European companies were slashing Research and Development (“R&D”) budgets during the recession, Chinese companies increased their R&D budgets by 25 to 45 percent. Chinese companies now rank among the world’s leading patent filers. Chinese telecom equipment maker Huawei filed more patents than any company in the world in 2008 and was a close second to Panasonic in 2009.

II. QUANTITATIVE MEASURES OF CHINESE PATENT QUALITY

Patent quality is inherently difficult to quantify using numeric metrics. Assessing the objective “value” of a patent or the inventiveness of a patent is an imprecise science that presents a number of normative and positive issues. Measuring the quality of the patent examination process also presents a number of

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105 Barboza, supra note 103.

challenges—what measures may be used to assess efficiency, thoroughness, and accuracy?

Even assuming that the quality of patents or their examination can be measured using some number or score, there remains the issue of how to calculate the score. What variables and formulas should the calculation use? The challenge is all the more daunting with China and the SIPO, given the relative lack of transparency and available data.107

With these qualifications and challenges in mind, this section presents available data points that suggest that the quality of patents and the patent examination process in China suffer from a number of shortcomings. This section also considers other potential data points that are not publicly available, or would require significant effort to research, that would further the analysis.

A. Available Data Points

1. Increase in Filings

The headline number of total Chinese filings—now over a million—is as staggering as it is misleading. As discussed, there are three categories of Chinese patents: invention, utility, and design.108 Only invention patents represent significant improvements over the prior art.109 In addition, any analysis of China’s innovative capacity should be limited to data relating to patents originating from Chinese inventors and exclude those from foreign applicants. Thus, the more accurate measure of China’s innovative capacity is the number of domestic invention patents that are filed each year.

Figure 3 presents the annual number of patent filings by category from 2001 to 2010, along with a first entry that is the average number of filings between 1985 and 2000. As shown, the number of invention filings each year has consistently lagged the number of filings for utility and design patents.110 In 2010, just under 300,000 invention applications were filed, or about one-quarter of all domestic filings.111 In other words, only one-quarter of domestic SIPO applications disclosed actual inventions.

107 See also, World Trade Organization: U.S. Companies’ Views on China’s Implementation of Its Commitments, U.S. GEN. ACCOUNTING OFFICE, 6 (2004) (indicating U.S. companies’ beliefs that it will be extremely difficult for China to implement greater “[t]ransparency of laws, regulations, and practices.”).
109 Id.
111 Applications in 2010, supra note 14.
China’s patent figures become even more grounded if one considers the number of invention applications that are actually granted each year, rather than merely filed. As Figure 4 shows, in 2010, 80,000 invention patents issued.\textsuperscript{112} That is, the SIPO found that only 80,000 invention applications disclosed significant teachings over the prior art.

\textsuperscript{112} Id.
Another striking aspect of Figure 4 is the sheer number of utility and design patents granted each year. Both consistently number more than three times the number of invention patents. There is nothing “wrong” with this. Utility and design patents are not supposed to disclose substantial innovations and are correspondingly subject to far less scrutiny in the review process. But the fact that utility and design applications are granted almost as a matter of course suggests that the majority of SIPO-issued patents are “junk patents,” having little to no economic or technological value. By comparison, at Japan’s patent office (“JPO”), only about 8,000 to 12,000 utility applications are filed each year, compared to about 350,000 to 450,000 invention patent applications. Likewise, design patents are not anywhere nearly as popular at the JPO or PTO, where an average of 35,000 and 30,000 are

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115 Wild, supra note 58.
116 JAPAN PAT. OFF., supra note 14, at 22.
117 Id.
filed respectively in recent years—far less than the over 400,000 design applications received by the SIPO in 2010.\textsuperscript{119}

Recall that Figure 2 showed that the number of Chinese-origin invention filings at the SIPO (just under 300,000) exceeded U.S.-origin utility filings at the PTO (about 240,000) in 2010. Comparing the number of granted patents in these categories paints a different picture, as shown in Figure 5 below. In 2010, the SIPO granted 80,000 invention patents that originated from China.\textsuperscript{120} The PTO meanwhile, granted nearly 110,000 utility patents originating from the US.\textsuperscript{121} Patent grants lag patent applications, given that applications precede any decision on issuance, so one may expect China to eventually leap past the U.S. in the coming years.\textsuperscript{122} Nonetheless, as of 2010, the number of U.S. issued patents that disclosed a novel invention exceeded the equivalent Chinese number.\textsuperscript{123}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure5.png}
\caption{Domestic Patents Granted}
\end{figure}

\subsection*{2. SIPO Staffing and Pendency Times}

In response to increasing workload, SIPO has increased staffing of “substantive examiners,” who review invention patents.\textsuperscript{124} The rate of increase, however, has been far from sufficient to keep pace with the increase in filings. Between 2002 and 2010,

\begin{itemize}
\item \textsuperscript{119} Applications in 2010, supra note 14.
\item \textsuperscript{120} Grants in 2011, supra note 113.
\item \textsuperscript{121} U.S. Patent Statistics Chart, Calendar Years 1963 to 2011, supra note 17.
\item \textsuperscript{122} Barboza, supra note 103.
\item \textsuperscript{123} Compare U.S. Patent Statistics Chart, Calendar Years 1963 to 2011, supra note 17 (indicating 107,792 domestic grants), with Grants in 2011, supra note 113 (indicating 79,767 domestic grants).
\end{itemize}
the number of invention applications rose by nearly 500 percent. The number of substantive examiners staffed to review these applications rose by less, 300 percent, over the same period according the SIPO’s own statistics. The SIPO reported about 2000 substantive examiners in 2010. But other sources place the number of examiners higher at about 5000. It is unclear what accounts for this major discrepancy. Based on the SIPO’s accounting, the average workload per examiner therefore increased by 60 percent between 2000 and 2010.

While it’s probably true to some extent that SIPO’s substantive review process has become more efficient, it is unlikely that patent examiners have managed to nearly double their examining efficiency. These doubts are reinforced when the increased number of SIPO examiners is compared to equivalent figures for the PTO over the same period. As presented in Figure 6, the number of SIPO examiners are outnumbered three-to-one by PTO examiners in 2010, though each patent office received approximately the same number of invention applications that year. And in a reversal of the relative growth in patent filings, the PTO has added examiners at a faster rate in recent years than the SIPO.

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125 Compare Applications from 2000-2006, supra note 14 (referencing 80,232 Invention applications), with Applications in 2010, supra note 14 (referencing 391,177 Invention applications).


127 2010 ANNUAL REPORT, supra note 124, at 46.

128 Wild, supra note 58.

129 Compare 2006 ANNUAL REPORT, supra note 126 at 17 (indicating that number of examiners has increased from roughly 1500 to roughly 2000 during time period of 2006-2010), with U.S. PAT. & TRADEMARK OFF., PERFORMANCE AND ACCOUNTABILITY REPORT FISCAL YEAR 2010, 53 (2010), available at http://www.uspto.gov/about/stratplan/ar/2010/USPTOFY2010PAR.pdf (indicating an increase in examiners from 4779 in 2006 to 6225 as of 2010).


131 Compare Applications from 2000-2006, supra note 14 (referencing 80,232 Invention applications), with Applications in 2010, supra note 14 (referencing 391,177 Invention applications).

132 Compare 2010 ANNUAL REPORT, supra note 124, at 46 (2000 SIPO examiners as of 2010) with, USPTO PERFORMANCE AND ACCOUNTABILITY REPORT FISCAL YEAR 2010, supra note 129, at 53 (indicating that there are 6225 examiners as of 2010).
Despite severe understaffing, SIPO has somehow accelerated the examination process, reaching disposition on invention applications faster than before. Per Figure 7, the average pendency period—which measures how long it takes the SIPO to reach a final grant or deny decision on an invention application starting from when a request for a substantive examination is filed—has hovered around twenty-five months since 2004. By comparison, the PTO’s pendency period in recent years has varied between thirty-three and thirty-five months.

SIPO’s shorter pendency period would appear to be a good thing. A shorter pendency period implies greater efficiency, and is preferred by patent applicants. In addition, SIPO’s current pendency period of twenty-four months is a significant “improvement” from past years. Figure 7 shows that the pendency rate exceeded fifty months as of 2001. A study by the European School of Management and Technology ("ESMT") found that the average pendency period between 1990 and 2002 was fifty-six months.

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133 2010 ANNUAL REPORT, supra note 124, at 46.
136 Patent Pendency Statistics, supra note 134 (referring to first action pendency, not total average pendency).
137 2006 ANNUAL REPORT, supra note 126, at 17.
But a shorter pendency period may also indicate that SIPO examiners are simply being less thorough in evaluating invention patents. Examiners may just be pushing applications through to a final decision under exceedingly short deadlines.\textsuperscript{139}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure7.png}
\caption{Average Duration of Substantive Examination at SIPO}
\end{figure}

The high volume of applications, yet comparatively low number of examiners and low pendency period implies that the substantive review of patent applications in China is very poor.\textsuperscript{140} The 2010 numbers for the SIPO—390,000 invention applications, a pendency period of twenty-four months, and 2000 examiners—mean that average SIPO patent examiner reviewed ninety-eight invention patent applications that year, or one application every four days.\textsuperscript{141} The burden on each employer will only grow worse in coming years as invention applications have increased at a rate of 22 percent annually in the past decade.\textsuperscript{142} By comparison, the 2010 numbers for the PTO—490,000 utility applications, a pendency period of thirty-four months, and 6000 examiners—mean that the average PTO examiner reviews twenty-nine applications a year, or one every thirteen days.\textsuperscript{143}

Wishful thinking may suggest that patent examiners at SIPO are simply three times more efficient than their peers at the PTO. This is hardly likely.\textsuperscript{144}

\begin{itemize}
\item \textsuperscript{139}See generally Patents, Yes; Innovation, No, supra note 21; but see Wild, supra note 58.
\item \textsuperscript{140}See generally Patents, Yes; Innovation, No, supra note 21; but see Wild, supra note 58.
\item \textsuperscript{141}2010 ANNUAL REPORT, supra note 124, at 46.
\item \textsuperscript{142}Compare Applications from 2000-2006, supra note 14 (indicating a 26.3 percent from 2000 to 2006), with Applications in 2010, supra note 14 (indicating a 24.1 percent growth in 2010).
\item \textsuperscript{144}See Liegsalz, supra note 138.
\end{itemize}
figures instead suggest that examiners are hastily pushing applications through the review process, without adequate investigation and consideration of the merits. Given that the PTO has come under fire as understaffed and overworked with a significant backlog of applications, the situation at SIPO is a full-on crisis.

Differences in accounting and examination procedures may partly explain some of the disparity in numbers. As previously noted, Chinese invention patents are subject to a two-stage examination process. The first stage, which applies to all categories of patents, checks that the patent meets basic form requirements. Not surprisingly, in 2010, utility and design patents had pendency periods of 4.3 months and three months respectively. The second stage, called “substantive examination” applies only to invention patents, and is more rigorous, ensuring that the invention does in fact represent a significant advance of existing technologies. In reporting the pendency period, SIPO may only be reporting the length of this second, substantive examination stage, and ignoring the time expended on the first stage. PTO calculations meanwhile measure the pendency from the moment the application is filed until a final disposition.

SIPO’s two-stage examination process may also explain why there are so few patent examiners. An application’s compliance with basic requirements is already assessed during the first stage, leaving less to do for substantive examiners in the second stage. Given the confined role of the substantive examination process, there is a reduced need for patent examiners. On the other hand, the substantive examination portion of the review process is supposed to be more involved and rigorous; it’s unlikely that offloading the preliminary examination process halves the need for substantive examiners.

3. Low Application Fees

Patent fees also provide a proxy of relative patent quality. Rational applicants will only file a patent application if they believe the resulting patent’s expected economic value is greater than the aggregate costs that must be paid, the uncertainty

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147 Prerequisites of Protection, in INTELLECTUAL PROPERTY LAW IN CHINA, § II (Peter Ganea et al. eds., 2005).
148 See supra Part II.B.1.
149 2010 ANNUAL REPORT, supra note 124, at 45.
151 See, e.g., Mabey, supra note 135, at 216 ("Comparing pendency times across patent offices proves as deceptive as measuring the number of applications pending or workload statistics.").
153 See Stembridge, supra note 50.
154 Id.
of the success of the application, and opportunity costs.\textsuperscript{155} Higher fees would therefore result in higher quality patents.\textsuperscript{156}

Table 1 below lists the fee schedules for SIPO and the PTO respectively in U.S. dollars.\textsuperscript{157} As the listing shows, SIPO fees are significantly lower than equivalent PTO fees.\textsuperscript{158} An apples-to-apples comparison is difficult given differences in prosecution procedures. For example, the PTO imposes a “publication fee”\textsuperscript{159} and “issue fee”\textsuperscript{160} that have no equivalent in SIPO.\textsuperscript{161} And while both offices charge excess claim fees, the PTO’s threshold is twenty claims whereas the SIPO’s threshold is ten.\textsuperscript{162}

An instructive exercise is to compare the total fees that must be paid in each patent office for a similar patent, assuming it does not have excess claims and is not filed by a small entity. Applying for an invention patent at SIPO would entail paying for the patent search, the initial filing fee, and a substantive exam fee.\textsuperscript{163} The total cost is 861 USD. By comparison, filing for the patent at the PTO, would require payment of the patent search fee, initial filing fee, publication fee, exam fee, and issue fee.\textsuperscript{164} The total cost is four times more at 3290 USD.


\textsuperscript{156} \textit{Id.} at 699–700.


\textsuperscript{158} See infra Table 1 and accompanying text.

\textsuperscript{159} \textit{Id.}

\textsuperscript{160} \textit{Id.}

\textsuperscript{161} See generally \textit{China Application Schedule of Fees}, supra note 157.

\textsuperscript{162} See infra Table 1 and accompanying text.

\textsuperscript{163} See generally \textit{China Application Schedule of Fees}, supra note 157.

What’s more, Table 1 understates the true financial burden of SIPO fees on most applicants. As discussed, local governments in China waive fees or offer significant subsidies to many applicants. Table 1 is also limited to fees paid collected by the respective patent offices. They do not include attorneys’ fees, which are probably higher in the U.S. An applicant hiring a reputable U.S. law firm will probably spend $11,000 to $15,000 USD on attorney’s fees per patent. Chinese law firms by contrast charge anywhere from 800 USD to just under 2000 USD.

### Table 1

<table>
<thead>
<tr>
<th>SIPO</th>
<th>PTO</th>
<th>PTO (small entity)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patent Search</td>
<td>314</td>
<td>620</td>
</tr>
<tr>
<td>Initial Filing Fee</td>
<td>151</td>
<td>380</td>
</tr>
<tr>
<td>Per claim charge for excess over 10</td>
<td>24</td>
<td>60</td>
</tr>
<tr>
<td>Substantive Exam Fee</td>
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<td>250</td>
</tr>
<tr>
<td>Maintenance (year 1-3)</td>
<td>143</td>
<td>1183</td>
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<td>Maintenance (year 4-6)</td>
<td>190</td>
<td>713</td>
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<tr>
<td>Maintenance (year 7-9)</td>
<td>317</td>
<td>1183</td>
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<tr>
<td>Maintenance (year 10-12)</td>
<td>634</td>
<td>0</td>
</tr>
<tr>
<td>Maintenance (year 13-15)</td>
<td>951</td>
<td>Maintenance at year 11.5 (annualized)</td>
</tr>
<tr>
<td>Maintenance (year 16-20)</td>
<td>1268</td>
<td>Maintenance after year 11.5</td>
</tr>
<tr>
<td>Filing for invalidity proceeding</td>
<td>475</td>
<td>Filing for invalidity proceeding</td>
</tr>
</tbody>
</table>

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155 *Patents, Yes; Innovation, No*, supra note 21.
156 See infra Table 1 and accompanying text.
157 Compare Masur, supra note 155, at 699, with *China Application Schedule of Fees*, supra note 157 (setting a Chinese patent firm’s fees at roughly 1349 USD per patent).
4. Triadic Patents and PCT Applications

Another indicator of the quality of Chinese patents is their recognition abroad in foreign patent offices. It’s one thing for the local SIPO to receive and grant hundreds of thousands of domestic applications; it’s another for those applications to receive the approval of foreign offices whose examination processes are more established.\(^{170}\)

One such indicator is the number of “triadic patent families” that originate from Chinese inventors each year. A triadic patent family is a set of patents that cover the same invention and has been granted by all three of the PTO, the JPO, and the European Patent Office (“EPO”).\(^{171}\) A triadic patent family has therefore received the stamp of approval from all three of the world’s most established patent offices.\(^{172}\) Such universal approval suggests that patents within a triadic patent family are higher quality, not only because of its allowance by three patent offices, but also because the applicant considered it worthwhile to invest in its protection in three large and geographically disparate markets.\(^{173}\)

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172 Beard, supra note 170, at 256.

173 OECD FACTBOOK, supra note 171, at 182.
As shown in Figure 8, Chinese inventors have been credited with only 500 triadic patent families as of 2009, which is actually far more than in previous years. Meanwhile, the U.S. and Japanese inventors have been issued approximately 13,000 to 16,000 triadic patent families annually for the past decade. As measured by triadic patent families then, China is far behind its peers and far from being regarded as a world technology power.

The triadic patent data, though, suffers from one obvious problem. It uses the PTO, EPO, and JPO as the patent offices for its assessment, and excludes the SIPO. Applicants tend to file protection in their home jurisdiction. Thus, Japan, the U.S., and Germany have a significant and inherent advantage of hosting one of the patent offices that is used to define a triadic patent. Another issue with the triadic patent data is its failure to account for the number of applications filed in each of the respective patent offices, broken down by origin. For example, it may just be the case that—for whatever reason such as lack of awareness, incentive, or

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174 Id. at 83.
175 Id.
176 Beard, supra note 170, at 255.
178 See generally OECD FACTBOOK, supra note 171, at 183.
179 Id.
resources—Chinese applicants simply do not care to seek patent protection in foreign jurisdictions, or at least at the PTO, EPO, and JPO. The number of Chinese “triadic applications” places an obvious cap on the potential number of resulting triadic patents.

Figure 9
PCT Applications

The number of applications filed by Chinese applicants under the Patent Cooperation Treaty (“PCT”) provide a measure of patent quality by similarly assessing the recognition of Chinese patents abroad.\textsuperscript{180} The PCT numbers convey a more favorable picture of China’s patenting activity on the international stage as compared to the triadic patent data. As Figure 9 shows, the number of Chinese PCT applications has grown by over 15-fold since 2000, totaling 12,296 in 2010, placing it fourth among all nations.\textsuperscript{181} As Figure 10 below shows, China’s share of PCT applications has grown from 0.84 percent in 2000, to 8.77 percent based on currently available 2011 numbers.\textsuperscript{182}

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\textsuperscript{180} Insofar as willingness to apply in multiple jurisdictions indicates that the patentee considers his patent valuable, the amount of PCT applications serves as a measure of Chinese Patent quality.


\textsuperscript{182} \textit{Id.}
Although China places fourth in the PCT rankings, an extraordinary feat given its position a decade ago, the PCT numbers are not nearly as impressive as the SIPO filing statistics, which put China well ahead of anyone else.\textsuperscript{183} The triadic patent family and PCT data collectively demonstrate then that Chinese innovation has yet to receive global recognition. Chinese inventors, as a group, still appear timid about seeking patent protection abroad. This reticence may be explained by a lack of familiarity with foreign patent systems.\textsuperscript{184} It may also be explained, however, by a

\textsuperscript{183} Applications from 2000-2006, supra note 14.

lack of confidence in the value own inventions, either because Chinese inventors do not consider them worth protecting outside of China, or because they do not think their patents can withstand the scrutiny of foreign patenting procedures.\textsuperscript{185}

5. Other Statistical Measures

Other available statistical measures provide additional reason to doubt the quality of Chinese patents and the adequacy of SIPO's examination procedures.

The Thomson Reuters and Intellectual Asset Management conducted a survey among 450 in-house lawyers and outside counsel worldwide at major companies and firms in 2009, seeking their opinions of four major patent offices: the EPO, PTO, JPO, and SIPO.\textsuperscript{186} The percentage of respondents who rated each patent office as “excellent” or “very good” is presented in Figure 11.\textsuperscript{187} The EPO ranked highest with satisfaction rates of 70 percent and 56 percent among in-house counsel and lawyers respectively.\textsuperscript{188} SIPO placed last, with satisfaction rates of 18 percent and 20 percent among in-house counsel and lawyers respectively.\textsuperscript{189}

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\textsuperscript{187} Id.

\textsuperscript{188} Id.

\textsuperscript{189} Id.
In 2010, the Organisation for Economic Co-operation and Development (“OECD”) conducted a study of patent quality across its member nations and a few other countries including China.190 The study collected data for all patents issued between 2000 and 2010 for each country, where such data related to: forward patent citations; backward patent citations; patent family size; number of claims; generality (or technology dispersion) index; and grant lag.191 Using that data, a “patent quality index” score was calculated for each country. Precise scores and underlying data from the study are not publicly available. But Figure 12 is a bar graph showing the published results of the study.192 It is apparent that China’s index score lags behind that of most OECD peers, including the U.S.

191 Id.
192 See infra Figure 12.
Another data point, and one that is most puzzling, is the low number of invalidity challenges that are filed at SIPO. One would expect the number of

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193 See, e.g., 2010 ANNUAL REPORT, supra note 124 (documenting 2411 invalidation requests, of which 509 referred to invention patents).
invalidity challenges filed each year to dramatically increase over time for a number of reasons. First, the number of patents granted each year has grown at 22 percent each year, thereby increasing the supply of patents that can be challenged. Patent quality and all other factors being equal, the number of invalidity challenges would presumably grow at the same rate. Second, as other data points suggest, the thoroughness of the patent examination process has probably declined. In other words, there are not only more patents out there that can be challenged, a higher proportion of these patents are also of questionable quality and could therefore be more successfully challenged. Third, filing an invalidity challenge is cheap; cost should not be a barrier.

![Figure 13](image)

Invalidity Proceedings

Yet since 2005, the number of requested invalidity reexaminations has leveled off at between 2000 and 2500 per year. This holding pattern, superficially suggests that the quality of patents has increased as a smaller and smaller percentage of patents are being challenged—superficial because all other metrics discussed thus far lead to the opposite conclusion.

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194 See infra Figure 13.
195 Id.
196 See supra Figure 7 and accompanying text.
198 See supra Figure 13. Data collected from SIPO annual reports of from 2001 to 2010. These annual reports are all located at http://english.sipo.gov.cn/laws/.
199 See supra Figure 7, and accompanying text.
Although the number of invention patents being challenged annually has increased, the rate of increase—about 6 percent each year since 2001—is tepid as compared to the increase in invention patent grants each year. It’s also surprising that challenges of invention patents constitute less than 20 percent of all challenges given that invention patents are expected to withstand more scrutiny.

A final useful measure is the number of patent practitioners in China. The more patent practitioners there are, the higher the quality of resulting patents as each practitioner would have more time to work on each patent application. Exact and historic figures regarding the number of Chinese patent practitioners who prosecute patents is currently unavailable. A few sources report that China had 6000 to 7000 registered patent agents in 2009.

Given that about 980,000 total patent applications were filed with the SIPO in 2009, it follows that each patent agent produced 140 applications each year, meaning they spent just over 2.5 days on each application. This number is exceedingly low in absolute terms; it’s hard to conceive that even the most able patent agent can draft a quality patent application and handle office actions and other tasks relating to that application in just over two days. The low quality of applications sent to SIPO poses a clear limitation on the quality of resulting issued patents. The number is also troublingly low in relative terms. The U.S. currently has 10,483 PTO-registered patent agents and 31,569 PTO-registered patent attorneys. Assuming that about the same number of applications were filed at the PTO in 2011 as 2010—520,000 total patent applications of any type—and that only about half of PTO-registered attorneys worked on patent prosecution, then each patent agent or attorney worked on twenty applications each year, meaning they spent just over eighteen days on each application. There is thus a seven-fold difference in time and resources invested in each SIPO application as compared to each PTO application.

200 See infra Figure 13.
201 Id.
202 Id.
204 Quality, supra note 169 (stating that there are 10,000 agents, but only 7000 actually practice).
207 See id. (stating the total number of persons registered to prosecute patents); U.S. Patent Statistics Chart Calendar Years 1963 to 2011, supra note 17 (detailing total number of applications at the USPTO).
B. Metrics for Further Investigation

1. SIPO’s Allowance Rates

A patent office’s allowance rate is, simply speaking, the percentage of patent applications that are ultimately granted. A lower allowance rate indicates a more rigorous patent examination process. Thus a lower allowance rate should correlate with higher quality patents. As a point of reference, between 2000 and 2010, the PTO’s allowance rate plummeted from 70 percent to 45 percent, which was viewed by observers as a response to criticisms about thoroughness of the PTO’s review process. Further investigation should collect data on SIPO’s allowance rate, broken down by time frame, national origin of the inventor or assignee, and the type of patent (invention, utility, and design). The allowance rate for invention patents with domestic Chinese inventors would be particularly relevant to assessing the economic and technological value of Chinese patents.

Accurately determining allowance rates requires a great deal of effort and resources. China has not made its allowance rates publicly available. Further, as noted above, it is also a challenge to ensure that the allowance rates computed for various patent systems are comparable given differences in patent examination processes. A European School of Management and Technology (“ESMT”) study computed SIPO’s allowance rates from 1990 to 2002, using raw data on thousands of patent applications stored in the EPO’s Worldwide Patent Statistical Database (“PATSTAT”). During this time frame, SIPO’s allowance rate was 52.7 percent.

There is some dispute, however, over the extent to which allowance rates actually reflect patent quality, or more fundamentally what the “allowance rate” actually represents and how it is calculated. At the PTO, many patent applications are continuations, divisionals, or represent continued examinations of...
other applications. Some rejected applications are appealed and rejections may be overturned. Thus, the allowance rate may not really represent the percentage of applications that are eventually granted. But if consistently calculated across patent offices and accounting for external factors, allowance rates should help provide an approximate comparison of patent quality across patent offices and over time.


In tandem with determining SIPO’s allowance rates, further investigation should determine the allowance rates for invention patent applications with Chinese inventors that were filed at both SIPO and other foreign patent offices. This data would show, among other things, the allowance rate of Chinese-origin applications at the PTO, EPO, and JPO.

This data would reflect the quality of Chinese patents in two ways. First, if allowance rate at the SIPO for these Chinese-origin patent applications exceeds the allowance rate for those same applications at foreign offices, this suggests that SIPO’s review process is relatively less rigorous. For example, if SIPO granted 80 percent of Chinese-origin patent applications that were also filed at the PTO, but the PTO only granted 60 percent of those applications, then SIPO’s review process is probably less rigorous than the PTO’s.

Second, if the allowance rate at a foreign office for patent applications originating from other countries exceeds the allowance rate of Chinese-origin applications, this suggests that Chinese patents are inferior in quality. For example, suppose the EPO grants 70 percent of applications in general, but only 40 percent of applications from China. These results would indicate that patent applications from China are inferior in quality to the norm for all countries at the EPO.

A key caveat to this methodology is that Chinese-origin patent applications that are filed abroad may not reflect an accurate cross-section of all Chinese patent applications. It may be that Chinese inventors only pick out their most promising and valuable inventions for filing abroad. Such a strategy is rational for at least a few reasons. Filing additional foreign applications entails added costs. Inventors will only invest extra time and resources for inventions that they feel are

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worthwhile. In addition, Chinese inventors may be aware that foreign patent offices are more rigorous in evaluating patents, thereby lowering the chances of issuance. With these expectations in mind, Chinese inventors may only file higher quality applications abroad.

3. Abandonment Rate

Another useful metric for assessing patent quality is the percentage of issued patents that are ultimately abandoned. A higher abandonment rate suggests lower patent quality. Patentees will only pay maintenance fees—varying from 143 USD per year and 1268 USD per year—if they are less than the financial benefit of the patent. The financial benefit of a patent in turn, provides an approximation of its value or quality. Presumably “junk” patents with no utility and novelty will not result in financial gain for its holder, and would be abandoned. Abandonment figures would be especially useful in China’s case since the government offers so many incentives merely for filing the patent. Given the rewards are all up-front, with no claw-backs or deferred rewards, applicants have every incentive to file for the patent, immediately receive their short-term benefit such as a tax break, and then abandon their patent if it later issues. Statistics on abandonment of Chinese patents are not publicly available or otherwise easily determinable at present.

As with all other measures, the abandonment rate suffers from flaws. Some patentees may pay maintenance fees for junk patents based on purely subjective valuations. Others may stop paying maintenance fees for valuable patents for strategic reasons, perhaps because of how they are managing their overall patent portfolio.

Another concern with abandonment rates is that they would tend to reflect the quality of patents issued years ago. Abandonment of course can only occur after the patent issues.

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225 Craig P. Opperman, The Elephant in the Room, INTELL. ASSET MGMT. (July/August 2009); Malackowski & Barney, supra note 106.
226 Sara-Jayne Adams, Quality is the Key to a Bright Patent Future, INTELL. ASSET MGMT. April/May 2008, at 55.
227 Id.
228 Opperman, supra note 225.
229 Patents, Yes; Innovation, No, supra note 21.
230 Id.
234 See Schedule of Fees for Chinese Patents, supra note 157 (detailing required maintenance fees, which if not paid would result in abandonment of a patent).
their twenty-year term of protection.\textsuperscript{235} Presumably though, patentees rarely abandon their patents right after issuance.\textsuperscript{236} Instead they wait and evaluate the patent’s “performance”—as measured by value or revenues and profits derived therefrom—for a few years before deciding whether to continue paying maintenance fees.\textsuperscript{237} Thus, the abandonment rate for a given year would not reflect the quality of patents issued in that year or even the few preceding years.\textsuperscript{238}

III. POSSIBLE SOLUTIONS

As is apparent from the data and analysis presented in Section III, the quality of Chinese patents and the SIPO’s examination procedures is in need of improvement.\textsuperscript{239} In fairness, the data is not conclusive. This is in part because the quality of patents and examination procedures are qualitative concepts—any quantitative metrics only provide a proxy.\textsuperscript{240} The data is also incomplete or questionable, or can be explained or qualified by other factors. For example, there are not many substantive examiners at the SIPO, but the SIPO’s self-reported data understates the number of examiners relative to other sources.\textsuperscript{241} As another example, China makes a poor showing in triadic patent family data.\textsuperscript{242} But it may simply be the case that Chinese patent applicants have not applied for international patent protection because of cost or lack of awareness.\textsuperscript{243}

The limited data points that were collected still do point to identifiable areas of improvement. These areas of improvement and other solutions to China’s patent quality problems are discussed below.

A. Increasing Staffing and Pendency at SIPO

The most obvious shortcoming of the SIPO’s examination system is understaffing.\textsuperscript{244} The invention application to examiner ratio in 2010 was 195 to 1.\textsuperscript{245} This compares to a ratio of 80 to 1 at the PTO that same year.\textsuperscript{246} And the PTO has

\begin{itemize}
  \item \textsuperscript{236} See generally Barney, supra note 232, at 325.
  \item \textsuperscript{237} Id.
  \item \textsuperscript{238} Id. at 330.
  \item \textsuperscript{239} See supra Table 1 and Figures 1-13.
  \item \textsuperscript{240} Malackowski & Barney, supra note 106.
  \item \textsuperscript{241} See Applications in 2010, supra note 14 (stating that the total number of Invention patents for 2010 was 391,177); Wild, supra note 58 (estimating that SIPO employs about 5000 examiners).
  \item \textsuperscript{242} OECD, supra note 171, at 183.
  \item \textsuperscript{243} See CHINA IPR GUIDELINES, supra note 185.
  \item \textsuperscript{244} See supra Part II.A.2.
  \item \textsuperscript{245} See ANNUAL REPORT 2010, supra note 124, at 37, 46 (indicating that the amount of patent examiners grew 8% from 2007 to 2010, and further stating that the number of invention patent applications received in 2010 was 391,000).
  \item \textsuperscript{246} See USPTO Issues Record Number of Patents, INVENTIVE STEP (Jan. 17, 2011), http://inventivestep.net/2011/01/17/uspto-issues-record-number-of-patents/ (indicating that there were 6420 patent examiners in 2010).
\end{itemize}
Chinese Patent Quality: Running the Numbers and Possible Remedies

commonly been referred to as understaffed. These numbers assume that the SIPO’s own reported figure of 2000 examiners is accurate. As mentioned, other sources put the figure significantly higher at about 5000, which would put the invention application to examiner ratio at a less concerning 80 to 1. The SIPO’s reported numbers also show that the number of examiners has only risen 12 percent since 2007, whereas the number of applications has risen by 60 percent in the same period. The SIPO therefore needs to quickly hire more examiners. Increased hiring of examiners—particularly within a short time frame—is easier said than done if the SIPO wants to maintain the quality of its examiners, which is just as critical as quantity of examiners for the purpose of ensuring high quality patents.

The SIPO’s understaffing is all the more glaring in light of the office’s remarkably short examination period. The pendency period of twenty-six months suggests, in tandem with the staffing data, that each SIPO examiner reviews one invention application every four days. It is inconceivable that SIPO examiners can thoroughly assess the novelty and inventiveness of applications so quickly, at over three times the efficiency of their counterparts at the PTO.

In addition to increased staffing then, the SIPO should also consider increasing the length of the examination process. Although a longer examination process is sometimes associated with inefficiency, and is inconvenient for applicants, cursory examination is as meaningful as no examination at all. It unfortunately appears that the Beijing government plans to take the opposite approach, aiming to reduce the pendency period to twenty-two months by 2015.

247 Malackowski & Barney, supra note 106, at 124–26 (stating that the USPTO is overburdened due to being “understaffed and ill-equipped to maintain pace with burgeoning new technologies and a perceived flood of new patent filings”).

248 See Applications in 2010, supra note 14 (stating that the total number of Invention patents for 2010 was 391,177); see Wild, supra note 58.

249 See ANNUAL REPORT 2010, supra note 124, at 37, 46 http://english.sipo.gov.cn/laws/annualreports/2010/201104/P020110420372588586402.pdf (indicating that the amount of patent examiners grew 8 percent from 2007 to 2010, and further stating that the number of invention patent applications received in 2010 was 391,000); see also ST. INTELL. PROP. OFF. OF THE P.R.C., ANNUAL REPORT 2007, 26, available at http://english.sipo.gov.cn/laws/annualreports/ndbg2007/200904/P020090409585907998868.pdf (stating that there were 245,161 invention patent applications received in 2007).

250 See Wild, supra note 58 (stating that although the Chinese are bringing in new recruits, they realize there is a need for quality examiners, and that on-going training will be necessary to create effective examiners).

251 See WIPO IP Statistics, Section A: Patents, Utility Models, and Microorganisms, WORLD INTELL. PROP. ORG., at 92 (2011), http://www.wipo.int/export/sites/www/ipstats/en/wipi/pdf/941_2011_section_a.pdf (stating that over the past twenty-five to thirty years, the pendency times for the EPO and USPTO have been increasing, while the KIPO and SIPO pendency times have substantially reduced).

252 See ANNUAL REPORT 2010, supra note 124, at 45 (indicating that the pendency period for substantive examination of invention patents applications was 24 months, 4.3 months for utility models, and 3 months for industrial designs in 2010).

253 See supra Figure 6.

254 Malackowski & Barney, supra note 106.

255 2011 PATENT STRATEGY, supra note 45.
As noted before, the SIPO pendency period may refer to only the substantive examination portion of the review process.\textsuperscript{256} It may exclude the preliminary examination process and other procedures or delays that precede it.\textsuperscript{257} The clock on the PTO’s pendency measure by contrast, starts running right when an application is filed.\textsuperscript{258} Thus a proper comparison would require adding on the time taken for the PTO to conduct its preliminary examinations and any other delays. Given that the preliminary examination process averages 4 months and adding another month to account for other delays, the SIPO’s average pendency period increases to about thirty-one months.\textsuperscript{259} This is closer to the PTO’s pendency period of thirty-four months, but is nevertheless problematic in view of severe understaffing.

\textbf{B. Internal Quality Controls}

The SIPO should adopt internal quality measures and checks to ensure that the patent examination process is working up to prescribed standards. Based on anecdotal reports, the SIPO does evaluate periodic spot checks of the work of its examiners, and even sanctions underperformers with salary reductions.\textsuperscript{260} But there is no evidence of how systematic or consistent these checks are.\textsuperscript{261} More importantly, the SIPO has not adopted any quantifiable metrics for assessing its own performance.\textsuperscript{262} The PTO’s recent adoption of rigorous and quantitative methods of quality control provides an example that the SIPO may borrow and adapt.\textsuperscript{263}

In response to complaints from American commentators and applicants regarding the quality of U.S. Patents, the PTO launched a “patent quality initiative” taking feedback and suggestions from seventy-one entities, including individuals, law firms, and companies, regarding methods for improving the patent review process.\textsuperscript{264} The product of that study was the adoption of a “composite quality metric” at the

\textsuperscript{256} See supra Part II.A.2; See also Weisun Rao, Intellectual Property Laws in China, in \textit{Best Practices for International Business Transactions in China} 4 (Aspatore, 2010) (stating that utility model and design patent applications are examined for formalities but do not undergo substantive search and examination).

\textsuperscript{257} See supra Part II.A.2.

\textsuperscript{258} Malackowski & Barney, supra note 106.

\textsuperscript{259} See supra Figure 7.

\textsuperscript{260} See Wild, supra note 58 (stating that there is a sixty-person task force that monitors the output of examiners, and if work is found to be substandard, sanctions or potential salary reduction may be imposed).


\textsuperscript{262} Id.


\textsuperscript{264} Id. at 2 ("[T]he USPTO received feedback and suggestions from seventy-one entities, including individuals, law firms, corporations, associations, intellectual property organizations, and government agencies.")
The metric is calculated using formulas that take the weighted inputs of seven numeric measures of patent quality. The seven measures are:

1. **Final Disposition Compliance Rate:** measures the propriety of the final disposition of individual applications, meaning whether the final decision of allowance or rejection was proper. The compliance rate equals the number of compliant actions divided by the total number of reviewed actions. Collection of raw data requires random sampling of applications.

2. **In-Process Compliance Rate:** measures the propriety of actions taken during the course of examination, meaning whether first and subsequent non-final actions taken by the examiner were proper. The compliance rate equals the percentage of reviewed actions with no deficiency. Collection of raw data requires random sampling of PTO actions that are not final.

3. **First Action on Merits ("FAOM") Search Review:** measures the extent to which the initial search for prior art performed by the examiner complied with best practices. A score is assigned to individual applications based on compliance with PTO best practices. Collection of raw data again requires a random sampling.

4. **Complete FOAM Review:** measures the quality of the first action taken by a PTO examiner. This is like the in-process compliance rate, but with a more detailed focus on the first Office action, with analysis on a claim-by-claim level. The metric is calculated using the average of individual scores of reviewed applications where scores are based on compliance with best practices.

5. **Quality Index Report ("QIR"):** measures the quality of the examination review process by assigning scores to the occurrence of events in the prosecution process. Some events—such as actions after disposal, requests for continued examination, and reopenings after final—are associated with deficiencies in the examination process.

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265 See id. at 1 (stating that the composite quality metric will be implemented at the start of fiscal year 2011).

266 See id. at 3 (“The composite quality metric combines seven individual metrics, weighted in accordance with their perceived impact and reliability as an indicator of quality, into a single quality indicator.”); see also, David Kappos, August Patents Dashboard Overview, U.S. PAT. & TRADEMARK OFF. (Sept. 23, 2011), http://www.uspto.gov/blog/director/entry/august_patents_dashboard_overview (listing the percentage weighting of each factor).

267 See USPTO ADOPTION OF METRICS FOR 2011, supra note 263, at 3.

268 Id.

269 Id.

270 Id.
process. The QIR uses an algorithm to calculate a final score based
on occurrence and frequency of these events.\textsuperscript{271}

6. External Quality Survey: measures feedback from practitioners and
patent applicants based on quarterly surveys, which include a five
point scale for numeric assessment of experiences.\textsuperscript{272}

7. Internal Quality Survey: measures feedback from PTO staff such as
examiners based on semi-annual surveys, which include a five point
scale for numeric assessment of experiences.\textsuperscript{273}

The PTO’s above-described internal quality control program is not the perfect
one-size-fits-all method of measuring the efficacy of patent examination. It does not
purport to be. But the take-away principle—the use of rigorous methods and
quantitative measures to evaluate patent quality—is praiseworthy and should be
adopted by SIPO. But the take-away principle—the use of rigorous methods and
quantitative measures to evaluate patent quality—should be adopted by the SIPO.
In fact, since implementing the composite quality metric system, the PTO has
reported that the metric score has increased from 25.5 in the second quarter of Fiscal
Year 2011 to 35.2 in the first quarter of Fiscal Year 2012.\textsuperscript{274}

\section*{C. Other SIPO Adjustments}

\subsection*{1. Increase in Fees}

SIPO’s fees are uniformly far lower than comparable PTO, EPO, and JPO
figures. For example, PTO search fees are double the SIPO equivalent, as are the
initial filing fees.\textsuperscript{275} The PTO also tacks additional fees that find no direct
equivalent at the SIPO, such as issue and publication fees.\textsuperscript{276} The SIPO’s lower fees
would tend to result in lower patent quality.\textsuperscript{277} The low cost of Chinese patent
agents and attorneys only amplifies the disparities, providing all the more reason to
increase.

But determining “ideal” SIPO fee levels is problematic. It requires balancing
interests in patent quality against access and economic equality. For example,
pushing fees into the hundreds of thousands of dollars would obviously result high

\begin{footnotesize}
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\item[\textsuperscript{271}] Id.
\item[\textsuperscript{272}] Id. at 4.
\item[\textsuperscript{274}] See \textit{Patent Statistics Dashboard}, U.S. PAT. & TRADEMARK OFF.,
http://www.uspto.gov/dashboards/patents/main.dashxml (last viewed April 4, 2012) (indicating that
the quality composite score increased from 25.5 in FY2011Q2 to 35.2 in FY2012Q1).
\item[\textsuperscript{275}] See supra Table 1 and accompanying text.
\item[\textsuperscript{277}] See Jonathan Masur, \textit{Costly Screens and Patent Examination}, 2 J. LEGAL ANALYSIS, 687,
699 (2010) (indicating that parents of low private value will predominately offer low social value).
\end{itemize}
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quality patents. But such high fees would also prevent anyone but the largest corporations from protecting their ideas, which would probably reduce overall inventive activity. Such high fees also imply that only million-dollar ideas, or expected million-dollar ideas, are worthy of protection.

A few benchmarks could be used to adjust SIPO’s fee schedules. For example, SIPO fees could be calibrated based on average national incomes in China. Based on this measure though, SIPO’s fees are actually higher than the PTO’s. The cost of filing a Chinese invention application represents 17 percent of the average persons’ income in China of 5,184 USD. By comparison, the cost of filing a U.S. utility application represents only 7 percent of the average person’s income the U.S. of 48,147 USD.

Average incomes, however, are a poor input to use for setting fees. Most applications are sought and paid for by companies or institutions, not individuals. Further, the typical “small” or individual inventor is likely wealthier than the average person, especially in China where income disparities are high between the country’s majority rural and minority urban residents. The vast majority of inventors probably fall in the latter category of wealthier urban residents, and they probably also hold university degrees. Borrowing from PTO fee practices and taking into account disparities in means, SIPO should adopt dual schedule fees—one “ordinary” fee schedule and another “small entity” fee schedule. The small entity fee schedule would apply to smaller companies and organizations and all individuals who demonstrate an annual income below some threshold.

SIPO might also adjust its fees such that the office is able to run without a loss. The PTO for example, has generated positive income in past years, including in 2010 and 2011. SIPO’s budget figures are not publicly available. Given a multitude of factors though—the high number of examinations, low fees, low number of examiners, and government’s incentives for filing that further reduce fees—SIPO probably operates at a significant loss each year.

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278 See id. at 702 (stating that patents with high private value result in high social value).
279 See Barney, supra note 232, at 325.
280 Id.
281 See supra Part II.A.2.
283 See supra Section II.A.2, and accompanying text.
284 U.S. GDP Data, supra note 282.
285 See generally 2010 WORLD INTELLECTUAL PROPERTY INDICATORS, supra note 104 at 20 (detailing large increase in research and development budgets).
287 See id.; 2010 WORLD INTELLECTUAL PROPERTY INDICATORS, supra note 104, at 20.
288 See supra Table 1, and accompanying text.
289 Id.
290 See U.S. PAT. & TRADEMARK OFF., STATEMENT OF NET COST 2011, available at http://www.uspto.gov/about/stratplan/ar/2011/mda_06_01_02.html (indicating that the net (cost)/income for 2010 was $94.7 million and $88.3 million for 2011).
2. Increasing Incentives for Filing Invalidity Challenges

Given that the SIPO is now issuing a record number of patents, more than any other national patent office, one would expect that invalidity challenges would rise in proportion and similarly reach record numbers.\(^\text{291}\) But as discussed, rather than reaching new heights, the number of invalidity challenges has oddly peaked at below 2500 per year since 2005.\(^\text{292}\)

The lack of growth is confounding, particularly since current fees for filing invalidity challenges is not high.\(^\text{293}\) Invalidity challenges are not new to the SIPO and their use steadily increased up to 2005.\(^\text{294}\) Further, in 2004, the validity of Pfizer’s popular Viagra product was successfully challenged in SIPO reexamination proceedings, gaining nationwide publicity,\(^\text{295}\) which suggests that lack of awareness of the existence of invalidity challenges is probably not the problem. The SIPO has also been able to resolve invalidity challenges at about the same rate as new challenges arrive—2000 per year—so the process is not slow or inefficient.\(^\text{296}\) Statistics concerning the PRB’s ultimate disposition of challenges have not been published in recent years; an annual report from 2001 stated that 51.3 percent of challenges were fully or partially successful in invalidating the patent.\(^\text{297}\)

Identifying a solution is difficult given that the precise reasons why challenges have been so rare are unknown. In any case, the government should consider reducing fees for filing challenges further. The introduction of an *inter partes* invalidity proceeding should also be considered, though *inter partes* examinations have proven unpopular at the PTO.\(^\text{298}\) Shifting or adjusting any existing burdens of proof used in existing ex *parte* proceedings to be less favorable to patentees should also help encourage greater use of the proceedings.

\(^{291}\) See supra Figure 10 and accompanying text.

\(^{292}\) See ANNUAL REPORT 2010, supra note 124, at 46 (stating that in 2010, the Patent Reexamination Board received 2411 invalidation requests and 1946 invalidation requests were resolved).

\(^{293}\) See supra Table 1 and accompanying text.

\(^{294}\) See supra Figure 13 and accompanying text.

\(^{295}\) See J. Benjamin Bai et al., What Multinational Companies Need to Know About PatentInvalidation and Patent Litigation in China, 5 NW. J. TECH. & INTELL. PROP. 449 (2007) (indicating that the pharmaceutical company Pfizer’s patent over the drug Viagra was challenged on the grounds that it lacked novelty and/or failed to provide a detailed description as required under Article 26 of the Chinese Patent Law).

\(^{296}\) ANNUAL REPORT 2010, supra note 124, at 48 (stating that the Patent Reexamination Board received 2411 invalidation requests and of those, 1946 were resolved in 2010).

\(^{297}\) See ST. INTELL. PROF. OFF. OF THE P.R.C., SIPO ANNUAL REPORT 2001, available at http://english.sipo.gov.cn/laws/annualreports/ndbg2001/2000804t200080416_380289.html (stating that 1480 cases were closed, 41.6 percent were declared invalid, 9.7 percent were partially invalid).

D. Reducing Incentives for Patent Filings

The Beijing government should also dissolve its existing plethora of incentives for filing patents. The motivation underlying these incentives—increasing and improving innovation—is admirable. But there are better and more ingenuous ways to achieve this goal than setting arbitrary benchmarks for patent filings and offering tax breaks, tenure, and housing options that outweigh the costs of filing patents. Such incentives have induced and will continue to induce a flood of utility and design patents, which are often just officious terms for “junk” patents.\(^{299}\)

By offering so many generous incentives, the government’s strategies for increasing innovation through IP may actually backfire and result in less innovation.\(^{300}\) Patents and IP may lose any relation to true innovation.\(^{301}\) Rather than equate patents with novel and useful inventions, companies and individuals will instead perceive patents as a tax break, or some other short-term financial benefit that bears little nexus to ingenuity and utility.\(^{302}\) They will increasingly file and use patents exclusively as tools for acquiring short-term gains.

Many of the incentives currently offered for filing patents should therefore be eliminated. If such incentives are kept in place in some form, they should be modified so that the financial rewards are not garnered unless the application relates to an invention patent and until that application is actually granted. Better yet, any rewards should be deferred, until the patentee presents evidence of the issued patent’s value. Such evidence may include: paying maintenance fees for at least three to five years; issuance at one or all of the PTO, EPO, and JPO; and financial statements demonstrating revenues derived from the patent or patented technology. China’s existing use of the “patent box” tax rate is an example of an incentive for IP that in theory, should encourage high value patents, since the benefit of a reduced tax rate is only realized on revenues that are actually realized from an issued patent.\(^{303}\)

The government should also reduce its innovation agenda’s emphasis on patents and IP. The focus should be reoriented towards funding and encouraging R&D activities, as well as increasing collaboration between public and private sector entities, as well as foreign and domestic companies. This shift in strategy might not involve as many eye-pleasing benchmarks and results, but the shift will result in better patents and technology.

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\(^{299}\) Wild, supra note 58 (stating that patents are often seen as cheap and easy ways to get a tax break, which can result in “junk” patents).

\(^{300}\) See id. (indicating that although the Chinese government believes patents can and should play a major role in the development of China, currently business people in China do not see the practical benefits of spending the time and money necessary to secure quality patents).

\(^{301}\) See id. (stating that the combination of subsidized application processes plus major tax savings create a large incentives to Chinese companies to apply for patents, but may not result in uniformly high patent quality).

\(^{302}\) Id.

\(^{303}\) See Atkinson & Andes, supra note 59.
IV. CONCLUSION

The astronomical growth of patenting activity in China has firmly placed it among the world leaders in innovation.\textsuperscript{304} The feat is impressive given how it occurred mostly within the past decade.\textsuperscript{305} The feat also counteracts perceptions of the country as nothing more than a manufacturing tiger that does not recognize or respect the value of intellectual property.\textsuperscript{306} But while skyrocketing patent filings do indicate significant progress in technological development, there is reason to doubt the quality of the resulting patents and hence, the degree to which the patent data represents real progress in innovation.\textsuperscript{307}

Innovation and patent quality are inherently imprecise concepts.\textsuperscript{308} To the extent these concepts can be measured or quantified, complete and responsive data is also difficult to collect.\textsuperscript{309} Publicly available data points, though, suggest that the quality of Chinese patents and the thoroughness of the SIPO's examination procedures are below international standards and suffer from identifiable problems.\textsuperscript{310} These problems include: (1) understaffing of SIPO examiners; (2) an exceedingly fast examination process; (3) low application fees; and (4) too few patent practitioners.\textsuperscript{311} Last-place survey results and limited recognition of Chinese-origin patents abroad also provide grounds for concern.\textsuperscript{312}

But these concerns and problems are not without remedy. The SIPO’s problems of staffing, pendency periods, and fee levels, have conceptually obvious solutions. More generally, China should reorient its innovation agenda’s focus from cheap patent filings to innovations with long-term value.

\textsuperscript{304} See supra Part I.
\textsuperscript{305} See Applications from 2000-2006, supra note 14 (showing that in 2000, 170,682 applications were filed at the SIPO); see also Applications in 2010, supra note 14 (showing that in 2010, 1,222,286 were filed).
\textsuperscript{306} China Likely to Become World’s Biggest Filer of Patents in 2011, XINHUA GENERAL NEWS SERVICE (Nov. 16, 2011) (explaining that “[t]he rising number of patent filings [in China] showed improvements in protection of intellectual property rights in China.”).
\textsuperscript{307} Patents, Yes; Innovation, No, supra note 21; Tseng, supra note 29.
\textsuperscript{308} Malackowski & Barney, supra note 106.
\textsuperscript{309} See Nin-Hai Tseng, supra note 29 (explaining that China patent information is hindered by a lack of transparency); see also, World Trade Organization: U.S. Companies’ Views on China’s Implementation of Its Commitments, supra note 107 (indicating U.S. companies’ beliefs that it will be extremely difficult for China to implement greater “[t]ransparency of laws, regulations, and practices.”).
\textsuperscript{310} See supra Figure 12.
\textsuperscript{311} See supra Figure 7, Table 1.
\textsuperscript{312} See OECD PATENT QUALITY INDEX BY COUNTRY, supra note 190; see also Wild, supra note 58.