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# Measuring, Explaining and Addressing Patent Quality Issues in China

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# Measuring, explaining and addressing patent quality issues in China

Although China became the world's leading patent filer in 2011, patent quality is still a serious issue. Is the country's network of patent-related policies and practices actually contributing to these problems and hampering innovation?

By **Dan Prud'homme**

China has three different types of patents – invention patents, utility model patents and design patents – which can be associated with different types of innovation, namely breakthrough and incremental innovation. Breakthrough innovations, also called 'radical' or 'discontinuous' innovations, are cutting edge and completely new, whereas incremental innovations are small improvements on existing inventions. A healthy mix of both types is important to an economy, but breakthrough innovations typically confer a higher level of competitiveness.

Given their relatively lower threshold for inventive step, utility model patents in China are often associated with incremental innovations. Invention patents may also be associated with incremental innovations, although given that they have a higher threshold for inventive step, which is confirmed by a substantive examination (a far more rigorous examination than that required of utility models), they have a higher potential than utility models of also being associated with breakthrough innovations.

So-called 'quality' patents, as defined hereafter, must meet the statutory threshold for patentability in China, and be associated with an invention that has a reasonable potential of being transformed

into something useful (ie, contributing to economic, social or environmental progress, which includes – but is not limited to – being commercialised). Highest-quality patents are those that meet these aforementioned criteria and in addition have a reasonable potential of being associated with a breakthrough innovation. Low-quality patents are those that do not meet the definition of quality (or highest-quality) patents.

**Critique 1. Utility models in China have a higher risk than invention patents of being low quality. This is supported by invalidation figures and evidence of patents being filed in bad faith and used in malicious prosecution actions.**

While some utility models inevitably meet the standard for quality patents, according to invalidation figures, there appear to be more low-quality utility models than invention patents. Utility models in China typically face invalidation rates over twice as high as invention patents (ie, 47% as opposed to 21% of those patents that are challenged in front of the Patent Re-Examination Board). It is likely that these figures for utility models would be even higher if patent enforcement procedures were improved in certain ways. That said, as a percentage of total patents granted and in terms of absolute numbers, China's invalidation rates for invention patents and utility models, as well as design patents, are relatively low even compared to international standards. Thus, these numbers alone do not suggest that China has a significant absolute number of low-quality utility model patents.

Utility models appear to run a higher risk than invention patents of being filed in bad faith and used in malicious prosecution

actions, and so are more likely to be of lower quality than invention patents. Given that utility models are cheaper and easier to obtain than invention patents (because utility models have lower patentability thresholds and do not undergo a rigorous mandatory examination), in principle it makes more sense for applicants to apply for utility models if they intend to utilise patents for the sole purpose of malicious prosecution actions. Applicants are also more likely to choose utility model patents for bad-faith filings for this same reason. While it is not possible to assess fully the extent to which patents are being filed for and used in such ways (although some news articles suggest that up to 50% of patents in China are used as such), a number of sources confirm that there have been concerning cases in China where utility model patents in particular were filed on inventions that were already part of the prior art and were used as harassment tools, barriers to entry and restrictions on freedom to operate.

**Critique 2. Many patents in China – particularly those filed by domestic applicants – appear not to be transformed into something useful, or at least could be transformed into something more useful. As such, they do not meet or could better meet the second criterion in the definition of quality (and highest-quality) patents. Patents in force and lifespans of patents are some of the best available metrics to assess this trend.**

Patents in force, which are patents that are granted and valid, are one useful metric of the value of patents, as they measure patents that have not been invalidated or abandoned by the owner and thus are ostensibly serving some commercial or other use. Of the 2,216,082 patents in force in China in 2010, 82.4% were owned by domestic filers and 17.6% by foreign filers.

On average, patents in China – particularly those owned by domestic entities – are maintained only for a relatively short time. A 2011 study by Gao, Li and Cheng of the Beijing IP Rights Institute found that the average lifespan for invention patents awarded to domestic Chinese entities is only five years, whereas it is nine years for foreign-owned invention patents. Other data shows that as of 2010, only 4.6% of invention patents in China were maintained for more than 10 years. The typical lifespan of utility models owned by Chinese patentees was between two

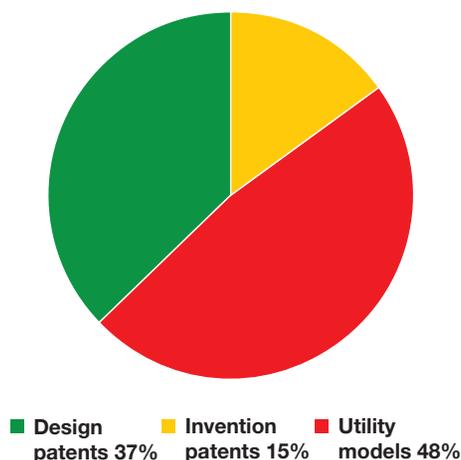
and four years, and between two and seven years for those owned by foreign patentees. The lifespan of design patents owned by Chinese patentees was between one and four years, and between two and seven years for those owned by foreign patentees. These figures raise serious concerns that many patents in China – particularly those filed by domestic applicants – are not being transformed into innovations, or at least not particularly useful innovations.

By way of comparison, the lifespans of invention patents in China are substantially shorter than the average life of an equivalent patent in a variety of developed countries. For example, the median lifespan of patents in the United States is around 12 years. German patents typically have a lifespan of just over 12 years. The typical lifespan of Japanese patents is around 17 years. Patent lifespans on patents granted by the Finnish Patent Office in recent years are over 11 years. While a number of factors not necessarily related to patent quality partially explain these trends, the figures still indicate that the number of quality and highest-quality patents in China is, on average, comparatively lower than in these other countries.

Further, it is strikingly clear that foreigners hold a much higher ratio of invention patents in force than domestic entities as a proportion of their individual filings, while Chinese entities hold a higher ratio of utility models and design patents in force. As illustrated in Chart 1, between 2006 and 2011, out of all patents in force owned by domestic entities, 85% were not invention patents (ie, 48% were utility models and 37% were design patents), whereas only 15% of patents in force owned by domestic entities were invention patents. In contrast, as illustrated in Chart 2, during the same time period, out of all foreign patents in force in China, 79% were for invention patents and only 21% were for utility models and design patents (2% and 19%, respectively). These numbers show low rates of invention patents in force held by domestic filers, which make up the vast majority of patent holdings in China. This suggests that despite China's patent filing explosion, many patents filed in China are not of the highest quality.

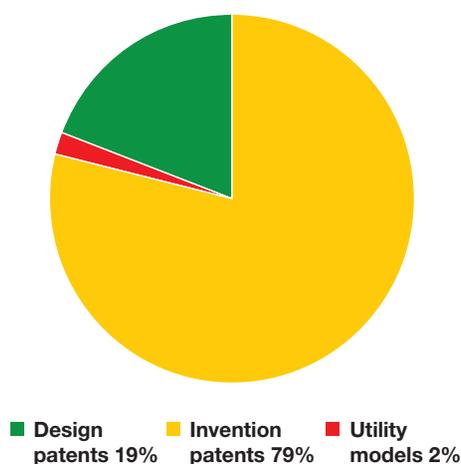
That said, there has been a recent uptick in the number of invention patents in force out of total patents in force owned by domestic entities in China. Specifically, domestic entities owned slightly more than 50% of all invention patents in force in 2011 – a change from the past trend of foreign enterprises owning more.

Chart 1. Domestic patents in force in China (avg 2006-2011)



Source: SIPO statistics; calculations

Chart 2. Foreign patents in force in China (avg 2006-2011)



Source: SIPO statistics; calculations

**Critique 3. Relative to certain benchmarks, there likely could, and thus should, be more quality and highest-quality patents filed by Chinese entities and by foreign entities in China. A non-exhaustive list of tools for gauging these trends includes patent citations, empirical research on foreign firms' patenting decisions and ratios of utility model filings to invention patent filings.**

#### Patent citations

The frequency of patent citations in patent application literature and also in non-patent application literature can be used as a gauge of the significance of a patent (inclusive of its contribution to economic, social or environmental progress), and thus its quality. The idea is that particularly significant patented inventions will be cited more often in such documents.

The Organisation for Economic Cooperation and Development (OECD) has constructed a Patent Quality Index, which focuses heavily on patent citations. This ranks China quite low. According to the 2011 index, China's performance from 2000-2010 is ranked below the world average, the OECD average and the EU27 average. It also ranked second lowest out of 25 individual countries highlighted in an OECD report featuring the index, including ranking lower than Brazil (which is a developing country, like China). The index is a composite indicator using six criteria:

- Forward citations (number of citations of a patent).
- Backward citations (number of patents and scientific papers cited by a patent).
- Patent family size (number of countries in which that patent is taken).
- Number of claims.
- Generality index (dispersion of patent citations over technology classes).
- Grant lag.

These scores generally reflect that China has a way to go in producing more quality and highest-quality patents.

#### Empirical research on foreign firms' patenting decisions in China

Patent quality in China could be more impressive if it included more patents on breakthrough technologies developed by foreigners. A number of empirical analyses by Albert Guangzhou Hu of the National University of Singapore show that weaknesses in China's institutional and regulatory system for IP rights, in addition to other factors, deter foreign firms from developing and filing highest-quality patents

in China. Hu finds that strengthening IP rights enforcement in China should lessen risk and encourage foreign firms to patent in China. He also finds that recent surges in patent activity by foreign firms in China largely take the form of "patenting existing intellectual property that they created elsewhere". As such, if China further improved its IP rights environment, it would likely attract more highest-quality patents from foreign entities.

#### Ratios of utility model filings to invention patent filings

Statistical analysis shows that China is witnessing a disproportionately small filing of highest-quality patents (ie, more filings of less than highest-quality patents than highest-quality patents). Utility model filings are outpacing filings of invention patents in recent years, which is a trend led by domestic filers. Table 1 illustrates that in terms of absolute numbers, in 2004, for the first time during the sample period of 1996-2011, more total invention patents were filed than total utility models. However, in 2010 and 2011 more total utility models were filed than total invention patents. Chart 3 shows how this translates into the ratios of invention patents to utility models filings recently shifting to pre-2004 ratios.

Although this is not an indication that aggregate patent quality in China is declining, there are reasonable concerns that this shift is less than optimal for patent quality and innovation. It raises the following questions:

- Why is there such a rise in utility model applications and what type of government resources and policies might be (intentionally or unintentionally) supporting this growth?
- Are any risks associated with this proliferation?
- What does this mean with regard to the direction of innovation that the government desires and that China's economy deserves?

Although difficult to answer fully, some responses highlight the downsides of this proliferation of utility models:

- Some utility models might be increasingly filed only because certain Chinese policies and practices are providing perverse incentives for the filing of low-quality and less than highest-quality patents.
- There are higher risks of utility models being low quality than invention patents (as mentioned previously).

- The proliferation of utility models in China, if sustained or magnified (eg, as might be the case in 2015, according to projections from *Dulling the Cutting Edge* depicted in Chart 4), might reflect a less-than-optimal balance in the country between incremental innovation and breakthrough innovation.

That said, of course, not all utility models (and design patents) in China are of inherently low quality. This is because some of both types of patent inevitably meet the standard for quality patents. Moreover, it is because a variety of evidence debunks the idea that utility model patents are always of low value, whereas a range of empirical studies show that the utility model system in certain countries successfully enables movement from relatively low levels of innovation and competitiveness, and poor diffusion of technology, to higher levels.

**What is causing these problems?**

A significant amount of China’s patent quality problems are caused by a system of patent-related policies and practices that hampers patent quality and innovation. Although, given their intertwined nature, it is not always possible clearly to separate their impacts on patent quality as distinct from those on innovation at large, these policies and practices collectively create a vicious circle. They hamper patent quality, which then hampers related innovation and vice versa (ie, they hamper components of innovation, which then hampers patent quality, which then again further hampers innovation). *Dulling the Cutting Edge* devotes the majority of its 229 pages to describing these policies and practices. The study divides them into three categories, which are briefly summarised here.

**Government-set patent targets and indicators**

There appears to be an overly heavy focus on quantitative patent targets in China. *Dulling the Cutting Edge* uncovers 10 national-level quantitative patent targets and over 150 municipal/provincial targets, mostly to be met by 2015. This overshadows the type of benchmarking that better reflects the nuances underlying creativity – a fundamental building block of quality patents, and highest-quality patents in particular.

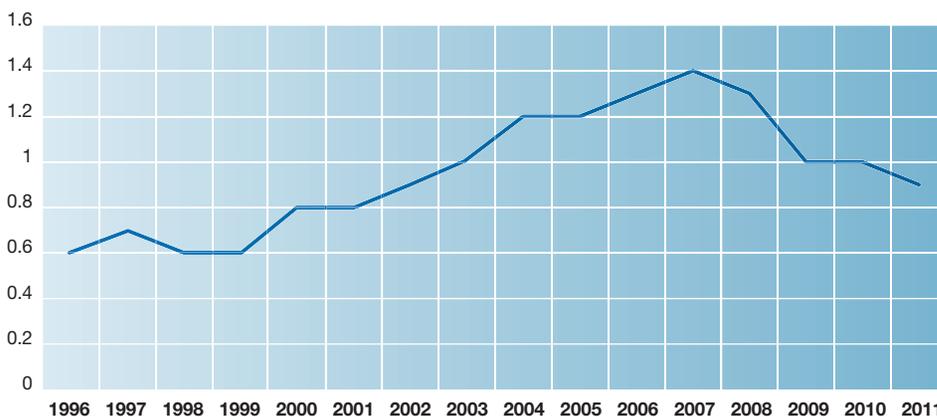
Moreover, absolute numbers of patent applications, or even patents granted, are an imperfect single indicator of the actual economic relevance of inventions (ie, their

Table 1. Total (by domestic and foreign filers) invention patent versus utility model apps in China (1996-2011)

Year	Invention patents	Utility models	Ratio*
1996	28,517	49,604	0.6:1
1997	33,666	50,129	0.7:1
1998	35,960	51,397	0.6:1
1999	36,694	57,492	0.6:1
2000	51,747	68,815	0.8:1
2001	63,204	79,722	0.8:1
2002	80,232	93,139	0.9:1
2003	105,318	109,115	1:1
2004	130,133	112,825	1.2:1
2005	173,327	139,566	1.2:1
2006	210,490	161,366	1.3:1
2007	245,161	181,324	1.4:1
2008	289,838	225,586	1.3:1
2009	314,573	310,771	1:1
2010	391,177	409,836	1:1
2011	526,412	585,467	0.9:1

Source: SIPO statistics database; calculations. \*Ratios are approximations.

Chart 3. Total invention patent versus utility model applications in China by ratio



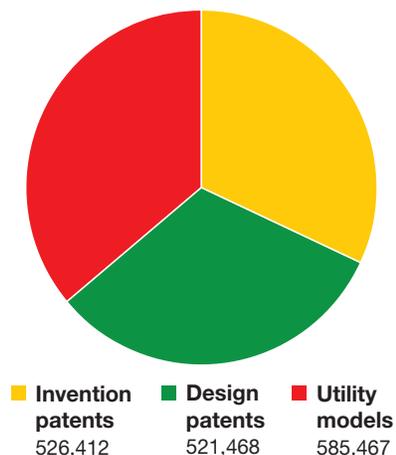
Source: SIPO statistics; calculations. Ratios are approximations

ability to be transformed into something useful and thus constitute innovation), and what appears to be China’s overly heavy focus on these patent targets instead of a more dynamic gauging of a range of innovation-relevant targets (eg, those involving educational capacity, R&D returns, products to market and patent quality metrics) may not optimally, or at worst distortedly, foster innovation in China.

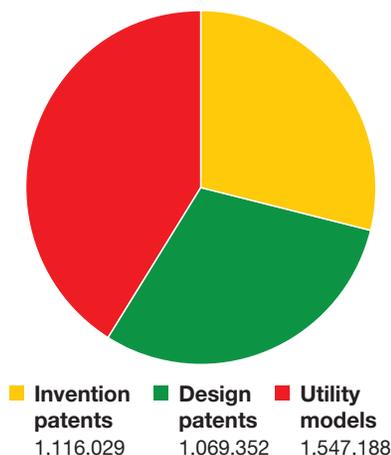
Also, given the still-developing nature of China’s regulatory and institutional framework – for example, in comparison to developed European countries – it is easier for lone patent targets as opposed to a composite of innovation targets to

Chart 4. Total (foreign + domestic) patent applications in China in 2011 versus 2015 estimates\*

Total (domestic + foreign) patent applications in China (2011)



Estimated total (domestic + foreign) patent applications in China in 2015



**Source:** SIPO statistics; calculations; 2015 estimates using methodological Approach A from *Dulling the Cutting Edge* (which is based upon recent past growth rates and with all else held constant)

be reached through skirting appropriate monitoring and evaluation, IP rights enforcement and other quality control mechanisms. As such, overemphasis on quantitative patent targets in China undermines the ostensible underlying policy of sustainably building quality patents and encouraging innovation.

On a related note, there is uncertainty that the variety of patent-based performance evaluation mechanisms in China sufficiently discourages low-quality patents. These evaluation mechanisms apply to:

- Chinese state-owned enterprises (SOEs) and other enterprises.
- Experts/academics and managers, and research institutes and universities.
- Party officials and government ministries, including State Intellectual Property Office (SIPO) examiners.
- Performance reviews for patent application writers/intermediaries.

#### Policies and other measures designed to promote patents

China has a wide range of patent-specific and otherwise patent-related policies, as well as other measures meant to encourage quality patents and highest-quality patents in particular. However, some of these can actually discourage patents and innovation.

Disconcertingly, several measures contain requirements for indigenous IP rights, which are usually defined as IP rights owned by a Chinese entity that are linked to financial incentives. These initiatives include certain government procurement preferences, despite 2011

decrees abolishing such practices, as well as other financial incentives (ie, outside government procurement preferences).

Some incentives come from:

- Subsidies in China's Central Foreign Trade Development Fund, which is worth over Rmb37.7 billion according to some estimates.
- Financial support from funds meant to build domestic standards.
- Various science and technology funds and other invention-specific funds.
- Tax deductions in the high and new technology enterprise scheme.

This policy approach to innovation appears less than optimal, as it does not seem predicated on rigorously proven economic analysis.

There are a number of other concerns surrounding government incentives for patent development and/or with patent-related requirements. These include certain approaches to subsidising official fees for patent-application processing and related attorney fees that, despite some recent reforms, need further improvement. There are a wide range of other incentives for employers to motivate their employees to invent, but not necessarily to innovate. Also, many state funds designed to encourage innovation (eg, via the 973 Programme and Torch Programme) are tied up with overly broad restrictions, which can lessen their effectiveness in building quality patents.

Discriminatory standardisation approaches and raw deals can hamper patent quality in China. *De jure* and *de facto* discrimination in the creation and application of standards may actively encourage standardisation initiatives that will ultimately fail domestically and/or during international expansion attempts, thus wasting resources and detracting from healthy innovation. Among other negative effects, relying on raw deals (eg, forced technology transfer as a precondition for market access) to push foreign companies to contribute to innovation in China may lessen certain domestic companies' incentives to innovate, and deter foreign enterprises from contributing valuable knowledge to building highest-quality patents and linked innovation in China.

Other policies and practices also hamper patent quality and innovation in China. These include ambiguities in the rules on technology import and export and export. They include serious concerns with the recently drafted Service Invention Regulations, which appear to outline overly restrictive

provisions for inventor remuneration. There are also inappropriate incremental innovation-centric indigenous innovation policies. A wide variety of other Chinese policies are additionally mentioned in *Dulling the Cutting Edge* that collectively create a notable drag on patent quality and innovation in China.

### Rules and procedures for reviewing patent applications and enforcing patents

There are concerns surrounding rules and procedures for patent application review and for enforcement of patent disputes that discourage building of quality patents in China. Patent application review issues include:

- An overly burdensome confidentiality review, which is required before filing patents abroad.
- Concerns over regulations on the green channel for patents.
- The fact that genetically modified plants and other genetic material are unreasonably excluded from patentability.

The effectively lower inventive step requirement for utility models is also mentioned by some as inhibiting patent quality – an issue that is mentioned in the annex of *Dulling the Cutting Edge*.

Patent enforcement issues include:

- Cases of abuse of patent rights, including abuse of right of action and malicious prosecution actions.
- Difficulties in invalidating utility models, given limits on the submission of prior art.
- Overly narrow consideration of prior art for utility models in pre-enforcement searches, and instances where patent evaluation reports are not given appropriate weight in judicial infringement proceedings.
- Lack of mandatory suspension of utility model infringement cases pending the outcome of validity proceedings.
- Anti-monopoly Law concerns, including ambiguous regulation of patent pools.
- Difficulty in enforcing process patents.
- Potentially overly strict limitations on granting preliminary injunctions in patent cases.

Other factors listed in *Dulling the Cutting Edge* also make it difficult to enforce patents in China.

### What negative effects are these policies and practices having?

There are a number of often inter-related consequences of these policies and practices

and the sub-optimal patent quality they create (collectively, the vicious circle):

- First and foremost, given that a concerning number of patents in China are likely low quality because they involve inventions that are never properly exploited, their proliferation represents an increase in time and resources spent on initiatives that lack innovation (in contrast, an increased number of quality patents reflects a growth in innovation).
- Second, the vicious circle inhibits innovators from preparing properly for international competition.
- Third, it raises business transaction costs (eg, given uncertainty about the validity of granted patents, the scope of granted patents, whether an invention is patentable and/or whether a patent will be fully enforced).
- Fourth, it can unnecessarily encourage patent disputes.
- Fifth, it reinforces the low-quality components of the patent ecosystem; whereas the response of a rational firm to a patent system with a sizeable number of low-quality patents – which, more so than a system with better-quality patents, results in increased litigation, strategic increased litigation, strategic behaviour and generally increased uncertainty – is to seek more patents regardless of their quality.
- Sixth, it wastes government resources, including those intended to encourage innovation and patents; this money could be better spent encouraging innovation and the development of quality patents.

On a macro level, these policies and practices, and the sub-optimal patent quality ecosystem they create, harm innovation – particularly breakthrough innovation – as well as overall development of science and technology in China. This should be of concern to Chinese policy makers, businesses and other innovation institutions, and consumers.

Why is all this concerning for foreign businesses in China? One answer is that many of the negative impacts mentioned above – particularly the third, fourth and fifth – negatively affect both foreign and domestic companies in China.

There are other reasons that foreign businesses should be concerned, although these are not exclusively related to the main issues discussed in this article. One is that factors inhibiting innovation restrain foreign companies from fully capitalising

## Action plan

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Patent quality in China deserves improvement. Utility models in China have a higher risk than invention patents of being low quality. Many patents in China – particularly those filed by domestic applicants – are likely not being transformed into something useful or otherwise being exploited to their fullest potential. Relative to certain benchmarks, there should be more quality and highest-quality patents filed by Chinese entities and by foreign entities in China.

A complex system of patent-related policies and practices creates a vicious circle that hampers patent quality and innovation in China. This includes certain government-set patent targets and indicators, policies and other measures intended to promote patents, and rules and procedures for reviewing patent applications and for enforcing patents.

These policies and practices, and the sub-optimal patent quality ecosystem they

create, not only affect Chinese entities, but also harm foreign business interests in China.

These negative effects can be overcome through practical reforms. Such reforms should also be accompanied by ongoing efforts to address the deep-seated factors that hamper innovation in China.

Reform will help to sharpen China's patent and larger innovation ecosystem into one that will sustainably drive its economy and provide for its people, as well as attract foreign businesses.

There are lessons to be learned from the causes of China's patent quality situation:

- Familiarise yourself with the rules and procedures for reviewing patent applications and for enforcing patents. It is essential to know these rules and procedures to prepare yourself for possible hurdles when filing and enforcing patents in China.

- Familiarise yourself with certain patent-related policies and other measures that can adversely impact on your innovation operations in China. By reviewing how these instruments have already impacted on innovation and patenting, you will become more familiar with problems experienced by other firms and can plan accordingly.
- Familiarise yourself with how Chinese entities (eg, universities, research institutes and companies) might appear innovative without actually innovating. Understand that patents in China may not be filed with the intention of protecting an innovation, but rather in response to sometimes perverse government policies and practices. This is something to keep in mind when assessing a partner for research and/or development, or otherwise seeking an investment target in China.

on the prospect of rising consumption in the Chinese market. Specifically, without further economic growth in China, which is increasingly contingent on widespread (genuine) innovation – which for many reasons, will not and cannot be sustained solely by foreign companies and requires significant contributions by domestic companies – the level of consumption in China will never rise to the level that foreign companies hope it will.

### How can these negative effects be overcome?

These negative effects can be overcome through practical reforms. The Chinese government, and SIPO in particular, realise that China has a patent-quality problem that needs fixing and are open to suggestions. *Dulling the Cutting Edge* provides over 50 specific and practical recommendations which, with the right buy-in, can help to address the issues mentioned in the study. The European Chamber of Commerce in China has already started discussing some of these recommendations with SIPO, provincial IP bureaux and other authorities. Feedback so far has overall been positive.

In order to have an optimal impact, these reforms should be accompanied by ongoing efforts to address deep-seated factors that hamper innovation in China. These include:

- Improving China's sub-optimal education system and credit system for financing innovations.
- Better addressing certain factors that restrain consumer demand for more innovations.
- Where feasible, working to change a culture that is risk averse.

### What positive impacts will these changes have?

Reform will help to sharpen China's patent and larger innovation ecosystem. There is no mandatory sequence of first improving patent quality in order to improve innovation, although this is one possible way that things might play out. However, introducing reforms will, over time, undoubtedly improve both areas. Developing quality patents will help to minimise the negative consequences of current patent quality problems discussed in this article. More generally, it will also encourage more valuable innovation, which will more sustainably drive China's economy and provide for its people, as well as attract foreign businesses. **iam**

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