

# **Patent infringement in Australia: Results from a survey\***

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## **Abstract**

One of the great unknowns of patent policy is how much infringement actually goes on, and how much of that infringement leads to enforcement of an informal or formal kind. We conducted a representative survey of over 3700 Australian inventors in order to obtain population estimates for these activities. We estimate that copying occurred for 28 per cent of inventions which were the subject of a patent application between 1986 and 2005. In half of these cases, a letter alleging infringement was issued. This letter succeeded in stopping the (alleged) infringing behaviour about 40 per cent of the time. We estimate a court filing rate of about  $\frac{1}{2}$  a per cent (filings per stock of patents in-force in any year). This confirms what we knew anecdotally – that a great deal of copying and enforcement activity occurs outside the court system. A surprisingly large number of incidents of copying were not pursued even with a letter, due to concerns about costs: a result which raises questions about the efficacy of patents for some applicants. Policy implications of the results are discussed.

## Introduction

Enforcement matters: unless patents confer economic power on their owners – through permitting rightsholders to take mitigating action in the event of infringement – patents will not effectively perform their public role of stimulating innovation. From an economic perspective, one critical issue is how useful patents are to small businesses.<sup>1</sup> Ideally, an inventive system should encourage the creation and development of the most valuable ideas regardless of their origin. From this perspective, intellectual property (IP) rights should serve both small economic players and large corporations equally. If the decision to grant a patent and the ability of the owner to enforce their rights depends solely on the calibre of the invention, and not the economic resources of the firm, then the patent system will disperse monopoly power and promote competition. However, if access to enforcement depends on the economic power of the parties, then IP laws will perpetuate rather than counter the concentration of market power: IP will strengthen the already-strong.

Enforceability matters; even if the invention is not being directly commercialised by the inventing organisation. An IP owner will not be able to license, cross-license, sell its IP rights, enter into joint ventures *inter alia*, if there is no confidence that the IP right confers exclusivity to brands, idea or creation.

A patent confers value on an invention simply because people believe it can be enforced. Enforcement does not need to actually occur. Whether people believe the owner will pursue enforcement to the point of legal retribution is likely to depend on their assessment of the owner's financial resources and determination; the costs of owner

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<sup>1</sup> The moral rights argument – that is whether small investors should have equal access to the patent system on *moral* grounds – is a larger and more complicated question. From the perspective of prevailing custom and practice, economic moral rights are far more circumscribed than human moral rights. That is, there is a fairly low minimum level of rights accorded to individuals on purely moral grounds in the economic system. Individuals, impecunious or otherwise, do not have the moral right to get a bank loan, float a company on the share market, to operate in licensed professions and trades, to dig a hole anywhere they desire or build any thing on their land etc. Whether these existing practices are desirable is of course a large issue. Hence we avoid the question of whether a cheap and efficient patent enforcement system is desirable from a moral perspective and limit ourselves to the economic issues.

enforcement and the propensity of the final arbitrator to side with the patent owner. It has sometimes been argued that the value of patents to the owner is attributable to the patents power to signal to third parties that a firm or individual possesses a novel and valuable invention (Haeussler et al 2009). That is, patents provide third-party endorsement for the merit of an invention. However, if the patent system did not exist, it is possible that another, perhaps cheaper system of third-party endorsement may arise and it is therefore not clear that ‘signaling’ is a value-adding attribute of the patent system.

Despite the pivotal importance of enforcement little is known about how pervasive copying and infringement actually are. While there is a great deal of discussion about the infringement of intellectual property (IP) rights, there are few studies offering objective data on how much (potential) infringement occurs, or how inventors and owners respond to such incidents, particularly in those cases where parties do not proceed to legal action.

This paper seeks to fill this gap in our knowledge of the scale and scope of infringement and copying of patented inventions in Australia. There are few systematic records across the world of the occurrence of IP imitation and enforcement. Where data exists, it is not easy to know how representative it is of the experience of all innovators. One currently popular data source is extrapolations drawn from data on seizures of infringing goods by customs authorities (OECD 2008). This data source gives estimates of counterfeiting and infringement in international trade, mostly relating to trade mark and copyright rather than patents. However, because we do not know whether these seizures represent 1 or 99 per cent of all infringements, nor whether they over-represent certain products or locations, these data cannot be generalised to the whole sector. Other data are sourced from industry associations, many of which publish reports on piracy rates. However, few relate to patent infringement, and the reports themselves are suspect for being self-serving: they tend to rely on estimates produced by from industry participants, and there is, after all, no incentive for industry players or peak bodies to underestimate rates of infringement (AiC 2008).

Another source of information is surveys of lawyers who advise inventors (ACIP 1999; Dent and Weatherall 2006). If these surveys comprise respondents who are representative of the whole population of legal advisors, they should produce reasonable estimates of overall enforcement activity rising to the level that external lawyers are

involved.<sup>2</sup> However, rightsholders will not always consult their lawyers when they detect copying – infringement may stop at or even prior to the point of a letter or phone call – these surveys will not provide evidence of copying *per se*.<sup>3</sup>

The number of infringement cases filed with the courts is another common form of information on enforcement activity (Lanjouw and Schankerman 2003; Lunney 2004; Bessen and Meurer 2008; Rotstein and Weatherall 2007). While these data usually represent population counts of court filings, common sense tells us, and conversations with lawyers confirm anecdotally, that many cases of apparent infringement will never reach a court registry: patent rights may be turned to account not just via the courts, but, for example, through licensing or cross-licensing. Litigation data captures only one extreme part of the enforcement picture.

A preferred means of obtaining information on infringement is to conduct a statistically representative survey of firms or inventors directly. Prior to our survey the best source of information was from Kingston (2000) who conducted a representative survey of 3660 Small-and-Medium Enterprises (SMEs) with EU-originating patents granted at the United States Patent and Trademark Office (USPTO) or European Patent Office (EPO). He received 549 replies (15 per cent response rate). This study found that 67 per cent of SMEs believed that another party had copied their inventions despite being patented. In addition, a small survey of 143 firms, with an undisclosed bias and response rate, was undertaken by (Rodwell et al 2007) for the EU Directorate-General for Enterprise and Industry. The study, which only included SMEs in certain industries (auto

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<sup>2</sup> For example, lawyers may be able to offer an estimate from their files of the number of cases where a patent holder comes to them having noticed copying of their invention, and the proportion of those situations which end up with court proceedings being filed. If a sufficiently representative set of estimates can be obtained, this information could be combined with information about filed legal proceedings to get some sense of the amount of copying going on outside formal legal proceedings. There are difficulties, however, in framing such a study: for example, in identifying the appropriate sample of lawyers for survey. If, for example, patent litigation specialists are surveyed, the data may not capture information about complaints from small businesses, who are likely to turn at least in the first instance to their patent attorney or general commercial lawyer rather than a patent litigation specialist.

<sup>3</sup> A ‘back of the envelope’ calculation supports this hypothesis. Dent and Weatherall (2006) note that a majority of respondents to a survey of lawyers (78 per cent) responded that between 0 and 20 per cent of cases of copying that came to lawyers resulted in court proceedings being filed. This however was a small survey, and did not involve detailed review of lawyers’ files. The ‘filing rate’ for patent cases for the period 1995-2005 found by Weatherall and Rotstein was an average of 22 contentious proceedings filed per year in Australian Federal Courts, or 242 cases over the course of 11 years. If that represents, say, 10 per cent of all cases notified to lawyers (which may be a high estimate or a low one, given that lawyers reported only within a range of 0-20 per cent), that would mean 2,420 cases of ‘copying’ notified to lawyers over that period. As will be seen, this number seems lower than the number we have found in this study.

parts, mechanical engineering, textiles, and toys), found 27 per cent of firms believed they had been ‘affected’ by patent infringement.

As the Kingston survey was only of SMEs, we believe it is reasonable to conclude that there are no representative surveys measuring patent infringement in the world and our picture therefore of the whole spectrum of infringement activity is patchy. To redress this deficiency, we undertook two surveys of Australian inventors who submitted patent applications to the Australian patent office between 1986 and 2005. Common to other surveys concerning patents, we targeted the survey at inventors, as they are considered most likely to be interested in the invention and its fate.<sup>4</sup> The first survey was a mail-out questionnaire of the whole population of named inventors on patent applications. The results were adjusted for response rate bias to enable us to extrapolate from the results to the population of all inventors (named on patent applications) in Australia. Inventors were asked questions about themselves and the invention, whether they were aware of third parties copying their inventions, their responses to this copying, the reasons for choosing the actions they did, as well as issues relating to costs.<sup>5</sup> The second survey was a follow-up telephone survey of respondents who indicated on the first survey that they were aware of copying of their invention. To the best of our knowledge, no similar studies have has previously been attempted in the world.

Some of our findings are consistent with common intuitions about patents and patent enforcement: an invention is more likely to be copied the more valuable the underlying invention; many inventors adopt rather passive methods to detect infringement by relying significantly on information ‘coming to them’; decisions not to enforce were influenced by a range of factors including costs, the size of the infringer and their location (i.e. whether they were overseas or not). Some of our findings, however, are more surprising.

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<sup>4</sup> See Gonzalez (2006) and the special issue of *Research Policy* in October 2007 (volume 36(8)) for examples of applications of the PatVal-EU survey

<sup>5</sup> ‘Copying’ here is a shorthand for ‘conduct that the inventor/firm perceives as copying’. As the subjects of the survey were inventors, and not people legally trained or necessarily dealing with legal issues on a regular basis, the survey was deliberately framed to avoid using too much technical legal language to increase its accessibility. Thus the terminology in the telephone survey and original mail-out survey referred to ‘copying’ and ‘infringement’ without too much care taken over technical legal accuracy. In addition, it is worth noting that we were surveying inventors rather than alleged infringers; the inventor would not know whether there was actual copying (or whether another person had hit on the same invention without copying). This article reflects the same approach: thus when we talk about ‘copying’ we are referring to actions perceived by the inventor to involve copying (ie, conduct the inventor perceives as involving use of their idea/invention) rather than ‘infringement’ or ‘conduct involving actual copying’.

For example, uncertainty about the validity of patents is less important in people's decision-making than is generally assumed in the law reform literature, and letters appear to be a surprisingly effective mechanism for asserting rights to an invention, leading to a successful outcome (cessation of copying or a license) in 4 out of 10 cases where a letter was sent. These findings raise some very interesting questions concerning the proper priorities for reform in Australia, and elsewhere: they suggest that some of the issues on which lawyers and legal academics tend to focus may not be the most important.

Overall, we estimate that 28 per cent of inventors who submitted a patent application between 1986 and 2005, and 30 per cent of those who received a patent, were aware of copying at some level. We estimate a litigation filing rate of about ½ a per cent (filings per stock of patents in-force in any year). Only about half of the 28 per cent of cases where there was awareness of copying led to some moves towards enforcement. Some of the copying was trivial, but extrapolating from our results to the population as a whole, there are an estimated 1000 cases over this period (4 per cent of the granted and pending applications) where there was non-trivial potential infringement but the patentee was not able to pursue their monopoly right, beyond sending a legal letter, because of the further costs of enforcement. More worryingly, there are a further 2600 inventions (11 per cent of granted and pending applications) whose owners did not even believe they had the resources to send a letter alleging infringement. These results represent an objective estimate of the extent of detected infringement of inventions – including that which is never pursued – and how people respond.

## **Methodology**

As mentioned, the data reported here has been drawn from two surveys of named Australian inventors on Australian patent applications.<sup>6</sup> Inventors were chosen as the subjects of the survey rather than patents owners because it was felt that, due to their personal involvement in the creative process, they were the most likely to know about the commercial outcome of the invention even if the patent had been licensed or sold. By contrast applicants (i.e. owners) are often organisations and organisational memory can

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<sup>6</sup> The application was deemed Australian if the country of origin of the applicant was Australian based. Further details of the population/survey method are provided in Appendix 1.

be far from complete in large entities: by the time employees in an organisation are surveyed about the infringement experience relating to a patent taken out 20 years prior, any people involved in any enforcement are likely to have moved up or moved on, and even for more recent inventions, knowledge may be spread across a number of people in an organisation, making it hard to access via a survey instrument.<sup>7</sup> We recognise that surveying inventors about enforcement issues requires us to assume that inventors have knowledge about their employer's, or even former employer's actions and motivations in enforcement. However, we think it is likely that they do have such information (as inventors are likely to be consulted in the event of a potential infringement); our confidence is also bolstered by pilot surveys done in previous inventor studies.<sup>8</sup> Overall, although inventors are not a perfect source of information, they are a better source than the alternatives, the benefits of obtaining information from a person who has a connection with the invention rather than a potentially random employee in a large firm outweigh other concerns.

The subject of both surveys comprised all inventors who applied for patents, not just those inventors whose patent applications were successful.<sup>9</sup> Thus, our data relate to a mix of patentable inventions, some of which passed the novelty and non-obviousness tests imposed by the patent office, some of which did not and some of which had not been examined.

The first survey was a mail-out survey sent to every inventor who submitted a patent application to the Australian Patent Office between 1986 and 2005 (one survey per patent application).<sup>10</sup> We received completed questionnaires relating to 3,736 unique inventions

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<sup>7</sup> It is also worth noting that surveys sent to businesses generally have a lower response rate than was obtained in this survey.

<sup>8</sup> Giuri et al (2007), discussing the inventor-survey methodology and pilot surveys done in that project to support the view that inventors were a good source of information. Giuri et al conducted pilots in which they tested inventors' confidence in answering various questions about their employer or the firms' actions and motivations; finding, on the whole that inventors were confident that they could answer the questions. While Giuri et al did not ask questions about enforcement, there is no reason to think that inventors are less well informed about such matters.

<sup>9</sup> This is the major point of departure from other inventor surveys from around the world (such as the PatVal-EU survey. See Gonzalez (2006) and the special issue of *Research Policy* in 2007 (Volume 36, Issue 8) for examples of applications of the PatVal-EU survey.

<sup>10</sup> In total, there were 43,200 inventor-application pairs in the population which had a complete address and inventor name. These applications related to 31,313 unique patent applications (i.e. inventions). On the basis of the number of surveys returned to us unopened (and a post-enumeration survey of non-respondents), we estimate that there are 5,446 inventions with still valid addresses.

giving us a response rate of 68.6 percent for inventors with valid addresses.<sup>11</sup> Our responses cover a range of inventors and technologies. Survey responses came from inventors in a wide range of employment arrangements: the largest group of inventors were employed in a small-or-medium-sized enterprise (SME)<sup>12</sup> (36.4 per cent); with smaller groups from large companies (10.5 per cent) and public research organisations (6.6 per cent). The residual (46.6 per cent) were individual inventors.<sup>13</sup> The inventions relating to our survey respondents covered a broad cross-section of different technology areas, which were classified using the OST-IPC technology concordance.<sup>14</sup> The distribution by technology area was: electricity and electronics (10.4 per cent), instruments (10.4 per cent), chemicals and pharmaceuticals (9.9 per cent), mechanical engineering (27.9 per cent), process engineering (11.1 per cent), and ‘other’ (30.3 per cent). The sample also contains a mix of those applications that were granted a patent (54.9 per cent) and those that were not (45.1 per cent).

In order to consider any potential response bias, the population in-scope (that is, the population of all patent application inventors) was compared with the sample of survey respondents by the following characteristics: year of application; organisation type; whether the patent was granted (at the end of 2007); and technology area. In all cases, the chi-squared test rejected the hypothesis of independence (at the 5 per cent level) between those that did and did not respond to the survey. A thorough analysis of the response bias issue is presented in the Appendix. Given this bias, we weighted our descriptive statistics by year of application; organisation type; whether the patent was granted (at the end of 2007); and technology area, and, applied the conventional Heckman selection technique in our estimations.

In the first (mail-out) survey, inventors were asked a series of questions relating to demographic information (age and qualifications), motivation for undertaking inventive activity, source of research funding and use of different sources of knowledge. The survey also asked questions about the nature of the invention itself – for example,

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<sup>11</sup> More information on the population and the survey method is provided in the Appendix.

<sup>12</sup> A company is ‘large’ where it, or its highest Australian-located parent company, has a turnover greater than A\$50m per annum. Otherwise the company is defined as an SME. Definitions of variables are found in Appendix 2.

<sup>13</sup> Organisation status was determined by the name of the applicant.

<sup>14</sup> OST refers to the UK Office of Science and Technology classification. IPC is the International Patent Classification.

whether the invention was radical or incremental – and the stage of commercialization that had been attempted. This information from the first survey has been used in some of the analysis below. To obtain more in-depth knowledge about the enforcement experience, a second telephone survey was conducted. From the sample of 3,736 responses, 954 indicated that they were aware of another party copying their inventions. However, we were only able to locate 354 through the telephone book and these 354 formed the basis of the second telephone survey. Questions from this second survey are the basis for the later analyses in this paper.

## Findings

### How common is copying?

When considering patent infringement and enforcement, the most basic questions are how often infringement occurs, or rather, since the subjects of the survey were non-lawyers, how often copying occurs, and how serious that copying is.<sup>15</sup> As discussed in the introduction, we have few estimates of infringement that occurs ‘out there in the real world’. The extent of infringement cannot be estimated from information about the institution of formal legal proceedings, as in some proportion of cases the matter is not pursued because the infringement is considered unimportant or marginal to the patent owner’s activities, or the injured party does not have the resources to pursue a legal action.

To explore these issues, we therefore asked inventors in the first mail-out survey whether they were aware of another party copying the idea embodied in their invention and subsequently, whether they had sent a letter to the person or organisation doing the copying.<sup>16</sup> The sending of a letter is likely to be a first stage of enforcement, indicating some willingness to pursue the infringement. Table 1 presents the mail-out survey responses on the extent of perceived copying and whether or not this was followed up

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<sup>15</sup> Actual infringement, strictly speaking, can only be known once a court judgment has been rendered. It should be noted too that our survey asked about copying and responses to copying; the questions were drafted to avoid engaging in too much detail about technical legal matters; see above n5.

<sup>16</sup> For a discussion of the use of ‘copying’ rather than ‘infringement’ in the questions to inventors, see above n5.

with a letter to the possible infringer. Responses are also disaggregated by whether or not the patent had been granted (as of April 2007).

**Table 1: Incidence of (alleged) copying by application status at April 2007, patent applications lodged between 1986 to 2005.**

Copying status	Withdrawn (%)	Pending (%)	Reject (%)	Grant (%)	Total (%)
Not aware of copying	76.8	84.1	74.2	67.3	71.3
Aware of copying	22.9	15.9	24.8	32.3	28.3
Sent infringement letter	6.2	6.2	6.8	18.1	14.1
Not sent letter	16.8	10.5	17.1	13.0	13.5
Unsure	0.4	0.3	1.3	1.0	0.9
Total	100.0	100.0	100.0	100.0	100.0
<i>Est. number (scaled up to represent the population)</i>	<i>3,737</i>	<i>4,089</i>	<i>2,975</i>	<i>20,512</i>	<i>31,313</i>

Notes: Estimates are weighted by year of application, major technology area and organisational type. Withdrawn includes those that lapse before an examination is requested and those that withdraw before an examination decision is made. Source: Mailout survey

Table 1 shows that overall 28.3 per cent of inventors believed that some level of copying had occurred. While not all of these cases will represent conduct a court would find infringing, this does represent an upper estimate on the amount of detected infringement over the period studied. While there appears to be no other representative survey data on the prevalence of patent infringement activity in the world, the only other comparable data we have actually reports a similar incidence.<sup>17</sup> The latter was based on a survey conducted in 2000 of Japanese-owned subsidiaries in China by You and Katayama (2005). They reported that 30 per cent of companies believed their patents were being infringed locally. Assuming that our figure is representative of the whole population of inventors who filed applications between 1986 and 2005, this means that 8862 inventors have experienced some copying of their invention; just over 6,000 of them held a patent (an overall summary of the level of infringement, and responses, may be found below in Table 16).

<sup>17</sup> The Kingston study (Kingston 2000) cited above gives different figures. However, that study focused only on SMEs and hence is not comparable; in addition, there are other issues with the study including the low response rate of 15 per cent. A further potential weakness of the Kingston study is the potential respondent bias introduced by surveying businesses only on issues of enforcement. While this keeps the survey instrument short (maximizing the chances of a good response rate) it makes it difficult to assess how representative the respondents are of the population of all patent holders. Kingston assumed that ‘most of the patentees who received a questionnaire but did not return it had little or nothing to report’. There is no way however to distinguish between those with ‘nothing to report’ because their patent is not valuable, and those with ‘nothing to report’ because they have experienced no serious issues of infringement

Breaking down these results between patents granted, withdrawn, rejected and pending reveals something interesting: it was in fact *more* likely that copying would be detected for inventions covered by a granted patent than not. About a third of inventions covered by a patent were the subject of alleged copying compared with a quarter for those which had been examined and rejected, and one in five for those that had been withdrawn. Superficially this suggests a patented invention is *more* likely to be copied than one where a patent application has been filed but the invention is not protected, but this conclusion cannot be drawn for several reasons. First, we do not know when the alleged copying occurred. We therefore cannot say whether they are more or less likely to have been copied before or after a withdrawal or the decision on examination: copying may have occurred at a time when there was at least the prospect of patent protection. Secondly, it is probable that the inventions under patent are more economically valuable than those without a patent, and are thus more desirable targets for copying, *ceteris paribus*. It is also possible that, because these inventions are more economically valuable, inventors and firms are more conscientious about monitoring for infringement. Thirdly, we have not controlled in this table for the year of application. We expect that more recent applications will be both less likely to have received an examination outcome and to have had less time with which to be copied (this is reflected in the low copying rate for pending applications – those most likely to be recent). Hence, we will have a natural correlation between non-grant and not-copied for reasons which have nothing to do with the efficacy of the grant in forestalling imitation.

Another counterintuitive result from Table 1 is that letters alleging infringement were sent in the case of both applications which were withdrawn (6.2 per cent) and rejected (6.8 per cent). Again, this result is partly explicable by the absence of fine-grained information on the timing of events: letters may have been sent prior to the withdrawal or rejection of the patent. It suggests however that the lack of a granted patent is not a bar to taking some steps to protect one's innovation.<sup>18</sup>

The next question is how successful initial steps towards enforcement are. Table 2, which presents the copyists' responses to letters of infringement by application status,

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<sup>18</sup> Of course, there is good reason for an infringer not to wait until a patent is granted: damages for patent infringement are calculated from the date that the complete specification is open to public inspection or the date of the infringing conduct, whichever is later: *Patents Act* 1990 (Cth), s 57(1).

shows that of the letters sent, those relating to granted applications are unsurprisingly more successful in licensing or stopping the copying (38.5 per cent) compared with withdrawn, pending and rejected applications (34.0, 31.0 and 31.7 per cent respectively). Nevertheless, once again it is striking that the numbers are so high in these cases where there is no final granted patent.

**Table 2: Response(s) to letter of infringement by application status at April 2007, patent applications lodged between 1986 to 2005.**

Response to letter	Withdrawn (%)	Pending (%)	Reject (%)	Grant (%)	Total (%)
Agreed to license/cross license, Stopped copying	34.0	31.0	31.7	38.5	37.4
Temporarily stopped copying, Ignored our letter(s), Alleged our patent was invalid	66.0	63.1	68.3	60.0	60.8
<i>Percentage sending letter</i>	<i>100.0</i>	<i>100.0</i>	<i>100.0</i>	<i>100.0</i>	<i>100.0</i>

Notes: Estimates are weighted by year of application, major technology area and organisational type.  
Source: Mailout survey

### Who and what is being copied?

Table 3 presents descriptive information on what types of patent applicant, and what types of inventions (that is, what technology class) are being copied, together with the proportion of inventors who responded to the perceived copying by sending a letter alleging infringement.

**Table 3: Characteristics of inventor by copying status, patent applications lodged between 1986 to 2005.**

Characteristic		Aware of copying (% of all inventors)	Sent letter claiming infringement (% of all inventors)
Organisational type	Large company	21.2	9.8
	SME	31.4	18.5
	Public research <sup>a</sup>	18.1	4.7
	Individual	28.7	11.6
Technology area	I Electricity and electronics	30.5	12.8
	II Instruments	23.8	9.3
	III Chemicals, pharmaceuticals	18.7	5.2
	IV Process engineering	26.7	16.2
	V Mechanical engineering	29.9	14.4
	VI Other	31.6	17.8
Year of application	1986-1990	36.1	22.4
	1991-1995	33.9	18.4
	1996-2000	28.6	13.1
	2001-2005	21.1	8.4
<i>Total all inventors</i>		<i>28.4</i>	<i>14.1</i>

Notes: <sup>a</sup> applicants with the word institute, university, department or Commonwealth in their name.  
Estimates are weighted by year of application, major technology area and organisational type. Source: Mailout survey

In relation to organisational type, the most striking point is the low percentage of inventors employed in a public research organisation who were aware of copying of their invention, and the low percentage of such copying which led to letter alleging infringement. About one in four inventors in public research organisations who were aware of copying were aware that a letter of infringement had been issued. The explanation may lie in the role of these inventors: it is possible that they are not aware of enforcement issues generally, since it may be that neither they nor their employer are directly involved in exploitation of their inventions. It seems likely that the motivations for obtaining patents in these entities are likely to be quite different than for other inventors. A university researcher may seek patents in order to elevate their personal prestige, or in order to show tangible results from funded research, and thus have sufficient reason to obtain a patent without being in any way interested in commercialising or enforcing that patent.<sup>19</sup> In addition, it may be that public sector bodies (whether university-based or not) have a less aggressive attitude towards imitators.

The second notable point is that while individual inventors are most likely to be aware of copying, it is inventors from SMEs that are most likely to send a letter claiming infringement. The ‘letter rate’ was about one in three for individuals but two in three for SMEs. However, further analysis below reveals that once other factors such as the technology area and the value of the underlying invention are accounted for, organisational type does not affect either the incidence of copying or the incidence of letter sending, given copying has been detected.

### **How do patent owners find out about, and respond to, perceived copying?**

The foregoing tables are based on the 3,736 mail-out responses from the first survey. In order to probe further the reasons behind applicants’ behaviour, we refer to data collected from the telephone survey of the 354 contactable inventors who had indicated that copying had occurred. Specifically, we asked how they found out about the copying; which regular monitoring activities they (or their organisation) use; reasons they did or

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<sup>19</sup> Under current university rules in Australia, it is common to ask university researchers to report, among their annual performance reporting, any patents obtained relating to their research; patents count as ‘outputs’ (like research papers and publications) for the purposes of performance and promotion of academic researchers.

did not send a letter claiming infringement; the cost of the letter and the response of the other party to the letter.

Table 4 presents patent applicants' sources of information about copying, showing the proportion of times these 354 respondents nominated one or more of five different sources (multiple responses to this question were allowed).

**Table 4: Source(s) of information about the copying, patent applications lodged between 1986 to 2005. (n=354)**

	<b>Responses (multiple responses permitted) (%)</b>
Sale by someone else	36.8
Someone else's catalogue	23.0
From a colleague	34.6
See at a trade fair	8.8
From customers and suppliers	37.9
Other	27.0
<i>Total (who reported copying)</i>	<i>100.0</i>

Notes: Estimates are weighted by year of application, major technology area and organisational type.  
Source: Telephone survey

Essentially, the data shows that inventors use a diversity of sources of information to find out about possible copying. Notably, these results suggest that customers and suppliers are just as important, as a source of information, as direct observation of a sale; discussion in the industry (information from colleagues) is also important.

Table 5 presents the main activities the inventors' organisation uses to monitor copying. Again, this shows that companies who detect copying are using a variety of methods, and in many cases more than one method. Similar to their main sources of information, indirect sources via employees and customers are relied upon the most. While the proportion using patent office databases is the least used method, at one in four, it suggests an active engagement with the system by this group.

**Table 5: Activities to monitor copying by those who reported copying, patent applications lodged between 1986 and 2005. Multiple responses permitted (n=354)**

	Responses (multiple responses permitted) (%)
Search patent office site	23.5
Employ patent attorney to monitor	25.0
Read trade or technology journals	39.0
Rely on employees	50.1
Rely on customers or suppliers	51.6
<i>Total (who reported copying)</i>	<i>100.0</i>

Notes: Estimates are weighted by year of application, major technology area and organisational type.  
Source: Telephone survey

One possible interpretation of these results is to distinguish between ‘active’ strategies for monitoring (seeking out information) and ‘passive’ strategies (waiting for the information to come to you). Broadly, we could characterise searching the patent office website and employing a patent attorney to monitor matters as active, since they involve taking positive steps and expenditure of resources to detect the activities of others, and the remaining three as more passive. Passive strategies were more commonly cited by our inventors than active ones. This is consistent with the 1999 findings of the Advisory Council on Industrial Property (ACIP)<sup>20</sup> inquiry into patent enforcement in Australia, and commentary in much of the IP academic and management literature, that many management decisions regarding IP enforcement are *ad hoc*, with managers preferring to avoid or ignore enforcement where possible (ACIP 1999). ACIP noted that around seven per cent of industrial property owners believed that IP Australia monitored industrial property infringement and undertook enforcement action on behalf of the owner. Notably too, our result relates to inventions where copying was detected, which is scarcely encouraging. The question was not asked in the broader mail-out survey: the proportion actively monitoring infringement may be even lower among the more than 70 per cent of patent applicants who did not detect copying. It is important not to over-emphasise this interpretation without knowing more about the internal systems that companies in particular have for encouraging employees to seek out and report infringement. It is possible that the strategy of ‘relying on employees’ could be a very active, involving

<sup>20</sup> Prior to 1994, ACIP was called the Intellectual Property Advisory Council. (IPAC).

bonuses or rewards for detection – however, we doubt that the proportion of companies with such active internal strategies is high.

Our results above indicate that no action was taken to enforce patents in a significant proportion of cases where copying was detected. This does not, however, tell us whether patents are achieving their policy goals: in order to make that judgment we need to know *why* some people choose not to take action. Table 6 reports the reasons given by the 150 inventors (or their organisations) who had detected copying, but did not follow through even to the relatively early stage response of sending with a letter concerning the alleged infringement.

**Table 6: Reason(s) not to send letter re infringement, patent applications lodged between 1986 to 2005. Multiple responses permitted. (n=150)**

	Large company	SME	Public research organisation	Individual	Total responses
	(multiple responses permitted)				
	(%)	(%)	(%)	(%)	(%)
Infringement trivial	12.1	3.6	15.4	14.4	11.2
Uncertain about patent's validity	7.7	0.0	0.0	5.6	4.0
Thought would be too costly	20.3	26.5	40.0	55.1	44.1
Used other enforcement strategy	0.0	6.3	0.0	6.5	5.9
Advised not to by lawyer/ patent attorney	0.0	8.3	41.5	16.6	13.6
The infringer was too big	7.7	13.9	0.0	18.3	15.9
The infringer was overseas	10.6	31.4	41.5	21.6	24.3
Thought would be difficult to prove	0.0	9.0	21.5	28.1	20.5
Other	0.0	44.8	30.8	6.2	17.5
No response	67.6	24.5	23.1	9.6	18.1
<i>Total (who reported copying but did not send letter)</i>	<i>100.0</i>	<i>100.0</i>	<i>100.0</i>	<i>100.0</i>	<i>100.0</i>

Notes: a weighted by year of application, major technology area and organisational type.  
Source: Telephone survey

A number of observations may be made about these results. First, it confirms that a range of concerns are involved: lack of follow through is not due to one single cause. This suggests that ‘quick fixes’ directed at one or other of these issues will not be sufficient to overcome any reluctance to use IP rights. This is particularly true of individual inventors, who cited multiple reasons with relative frequency. Interestingly, in the case of inventors in a corporate environment, three dominant reasons emerge as most often cited, which all seem to coalesce around the nature of the fight that would be provoked: cost, that the infringer was overseas, and that the infringer was too big.

Secondly, cost is the main reason overall for not sending a letter, especially for individual applicants. However, it was the most cited reason for large companies as well.

Thirdly, the ‘triviality’ of the copying was the reason for about one in eight cases, except for SMEs where it was only cited by one in 25 companies.. This may suggest that where SMEs hold patents, those patents are more likely to be central to their business than would be the case for large corporations.<sup>21</sup>

Fourthly, a significant number of inventors cited the fact that the infringer was overseas as being a reason for not sending a letter regarding infringement: one in four overall, with this being the reason most often cited by inventors working in a corporate environment. From a policy perspective this is a particularly difficult issue to address. Patents are local: an Australian patent covers only conduct which involves exploitation of the patent in Australia. An Australian patent holder has the right to prevent importation of patented products,<sup>22</sup> but Australian patent law, unlike Australian trade mark or copyright law,<sup>23</sup> does not provide for a system whereby customs officers can intercept alleged infringements. Australia is not unusual in this respect; many other developed countries also draw this distinction between trade mark and copyright on the one hand and patent on the other, no doubt because patent infringements are, in many cases, more difficult to identify on the face of a product.<sup>24</sup> However, some countries do have special methods for responding to importation of patent infringements. These are discussed further below.

The final observation, and one which caused us some surprise, is that concerns about patent validity are not a particularly significant barrier at this stage. This is coupled, particularly in the case of inventors in a corporate environment, with the fact that concern about proof of infringement was also cited rarely. This is interesting because patent law reformers have often presumed that uncertainty about validity of the patent was a significant problem for Australian patent owners contemplating enforcement, particularly

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<sup>21</sup> For other evidence to this effect, see Giuri et al (2007). In this inventor survey conducted in Europe, the researchers found, for example, that small firms use 80.2% of their patents (of which they license out 26%) and leave 18% unused. By contrast, in large firms, 58.9% of patents are used internally (Gambardella et al 2006: 12) but less than 10% are traded: and about 40% are not exploited, more than half of which are blocking competitors (Giuri et al 2007).

<sup>22</sup> The patent owner has the exclusive right to exploit their invention: see *Patents Act* 1990 (Cth) s 13. ‘Exploit’ includes ‘import’ under the definition in the Schedule to the *Patents Act*.

<sup>23</sup> *Copyright Act* 1968 (Cth) Part V Div 7; *Trade Marks Act* 1995 (Cth) Part 13.

<sup>24</sup> International IP treaties also draw this distinction, requiring customs procedures for interception of infringements only in the case of ‘counterfeit trademark or pirated copyright goods’: Agreement on Trade-Related Aspects of Intellectual Property Rights (1994), Article 51.

in light of the fact that there is no presumption of validity in Australian law. On the basis that uncertainty about validity was an issue for patent owners contemplating enforcement action, in 1999 ACIP recommended that the Act be amended to state that a patent is presumed valid (ACIP 1999, Recommendation 3), although the government rejected this recommendation, based partly on the contrary conclusions reached by the *Intellectual Property and Competition Review* (IPCRC 2000). Such issues may take on greater importance later once the alleged infringer starts to raise counterclaims or possible defences – that is, at later stages in proceedings than the letter.

Table 7 gives the main reasons the 186 inventors (or their organisations) *did* send a letter(s) alleging infringement. While it is unsurprising that defending a potentially lucrative market is the key reason given, this number was highest for inventors from SMEs: again supporting the hypothesis that SMEs’ patents are more central to their business. ‘Defending as a matter of principle’ is also important – particularly for inventors in a large corporate environment. This result may reflect the fact that we interviewed inventors, and not just holders/owners of patents.

**Table 7: Reason(s) sent a letter regarding copying/infringement, patent applications lodged between 1986 to 2005. (n=186)**

	Large company	SME	Public research organisation	Individual	Total responses
	(multiple responses permitted)				
	(%)	(%)	(%)	(%)	(%)
Defend potentially lucrative market	73.4	88.4	29.9	72.0	82.0
Start negotiations on licensing agreement	16.7	28.3	0.0	25.5	26.1
Defend patent as matter of principle	79.5	65.3	70.1	67.3	67.2
Maintain reputation as aggressive competitor	39.7	35.4	50.7	13.6	30.7
<i>Total (who reported copying and sent letter)</i>	<i>100.0</i>	<i>100.0</i>	<i>100.0</i>	<i>100.0</i>	<i>100.0</i>

Notes: Estimates are weighted by year of application, major technology area and organisational type.

Source: Telephone survey

We also asked inventors about the estimated costs of getting legal advice and legal letters concerning infringement. The results, shown in Table 8, displayed a wide variation in

costs. Differences may be due to the frequency with which the organisation seeks such services and the complexity of the situation.

**Table 8: Estimated cost of advice on legal rights and drafting letter (A\$), patent applications lodged between 1986 to 2005. (n=138)**

Organisation	10th percentile (A\$)	Median (A\$)	90th percentile (A\$)
Large company	15	2,000	12,500
SME	0	1,500	10,000
Public research organisation	100	100	100
Individual	0	500	5,000
<i>Total (who reported copying and sent letter)</i>	<i>0</i>	<i>1,000</i>	<i>10,000</i>

Notes: a weighted by year of application, major technology area and organisational type.  
Source: Telephone survey

In our larger mail-out survey, we asked those inventors who did report sending a letter alleging infringement how the other party responded; their responses are reported in Table 9.

**Table 9: Main response of the other party to letter by organization type, patent applications lodged between 1986 to 2005. (n=416)**

	Large company	SME	Public research organisation	Individual	Total
	(multiple responses permitted)				
	(%)	(%)	(%)	(%)	(%)
Agreed to license/cross license	18.7	15.3	21.3	4.7	12.3
Stopped copying	32.3	43.8	33.3	47.0	43.7
Temporarily stopped copying	13.3	21.7	8.0	12.4	17.9
Ignored our letter(s)	20.5	31.8	70.7	40.0	34.1
Alleged our patent was invalid	31.4	28.5	8.0	26.3	27.7
<i>Total (who reported copying and sent letter)</i>	<i>100.0</i>	<i>100.0</i>	<i>100.0</i>	<i>100.0</i>	<i>100.0</i>

Notes: a weighted by year of application, major technology area and organisational type.  
Source: Mailout survey

The responses to letters of infringement appear to be quite polarised. According to Table 9, the initial letter seems to be relatively successful in a large minority of cases (43.7 per cent); this was true for both individual inventors and those employed in a corporate environment, including those in SMEs. It is equally striking that about a third ‘ignored our letter’ and a further quarter received an immediate response that their patent was invalid – meaning that very early on the patentee is confronted with the possibility that

they may face losing their patent if they persist: although, of course, it may simply be a tactic. Ignoring the letter appeared to be related to how persistent one thought the aggrieved may be. The rates of ignoring letters fell from about 70 per cent of public research organisations' letters to about 20 per cent of large companies' letters. On average, inventors who reported that the letter was successful also reported that it took 2-3 months to have the alleged infringer cease the complained of activity.

Respondents who send a letter, which was ignored (81 responses), were also asked to conjecture why they were ignored. This is relevant because inventors who experience disillusionment, arising from the ineffectiveness of protection, are unlikely to treat patents as an incentive for innovation in the future. The results are reported in Table 10.

**Table 10: Reason(s) inventor believes letter was ignored, patent applications lodged between 1986 to 2005. (n=81)**

	Company	SME	Public research organisation	Individual	Total responses
	(multiple responses permitted)				
	(%)	(%)	(%)	(%)	(%)
They didn't think were infringing	94.4	32.0	na	32.9	36.3
They thought you were too small to be threat	0.0	79.4	na	59.8	69.0
They believed your patent invalid	0.0	20.2	na	46.8	13.4
Don't know	6.3	3.6	na	87.9	14.2
<i>Total (who reported copying, sent letter but it was ignored)</i>	<i>100.0</i>	<i>100.0</i>	<i>na</i>	<i>100.0</i>	<i>100.0</i>

Source: Telephone survey

The majority of respondents (not being from large companies) thought that they were ignored for being too small. It was however interesting one in three individual and SME inventors acknowledged that the person *they* see as copying might well think that they were not in fact copying. Acknowledgement on the part of patent owners of some uncertainty about the infringement or room for doubt suggests a certain sophistication in the individuals involved; it also suggests that people sending letters are not confined to those cases where they think that the infringement is clear-cut. This may, of course, also hint at a further explanation for the apparent lack of importance of the size of the infringer in making a decision not to send a letter, discussed above in relation to Table 6: that is, the size of the infringer is not a reason not to send a letter – after all, a party has

effectively nothing to lose provided they are careful to avoid making unjustified threats<sup>25</sup>: the real decisions must be made at a later point, where the accused party persists.

### **Court proceedings**

A further series of questions were asked about instances of copying that went to the stage of filing proceedings with the court. Using our survey weights, we estimate that of the 31,313 inventions made during the period 1986 to 2005, 792 were the subject of a filing. This estimated number of 792 represents 2.5 per cent of all applications ( $=792/31313$ ), 8.9 per cent of applications over which an allegation of copying had been made ( $=792/8861$ , see Table 1) and 0.53 per cent of the sum of patents in-force each year ( $=792/149756$ ). The figure of 2.5 per cent of all applications cannot be compared with estimates of the rate of court filings data per patents in-force *in any given* year: first because the court proceedings may have been local (ie Australian) or overseas,<sup>26</sup> and secondly, because 792 filings represent an accumulation over 20 years.<sup>27</sup> The filing rate per stock of patents in-force (0.53 per cent) is an order of magnitude greater than the rate estimated by ACIP in 1999 of 0.036 per cent. The ACIP figures were based on an analysis of cases filed in the Federal Court of Australia. Our figures may include proceedings overseas in relation to overseas patents, as inventors were not asked to specify the jurisdiction in which court proceedings were brought. Another explanation that cannot be ruled out is that inventors believed court proceedings were filed in some cases where they were not in fact filed. An inventor might be asked to participate in the process of preparing a case for filing, or be aware of such preparations, without being absolutely certain whether the case was actually commenced (a case could settle after drafting of the initial claim but before filing with the court registry).

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<sup>25</sup> *Patents Act* 1990 (Cth) s 128.

<sup>26</sup> While an Australian patent cannot be the subject of overseas proceedings, the invention might be the subject of rights overseas. It was thought that entering into too much detail on these points with non-legally-trained inventors would lead to uncertainty and difficulty in completing the telephone survey.

<sup>27</sup> It is also worth noting that another small set of inventors (eight of those who indicated that proceedings were not filed) indicated that they had reached the stage of drafting, but not filing proceedings in court. Note that our data are for the number of patents which were the subject of a filing. Litigation numbers differ as several patents may be involved in a given case. In the US there are 1.5 patents per case (Bessen and Meurer 2005).

Table 11, which presents our estimate of this number disaggregated by organisational type, shows that two-thirds were company applicants and almost all of the remaining third were individuals. The public sector contributed a negligible amount.

**Table 11: Estimated number of applications which were the subject of court proceedings, patent applications lodged between 1986 to 2005 (n=430)**

	Est. number	%
Large company	84	11
SME	450	57
Public research organisation	12	2
Individual	246	31
<i>Total</i>	792	100.0

Notes: Estimates are weighted by year of application, major technology area and organisational type.  
Source: Mailout survey

The larger mail-out survey also included a question on the outcome of any court proceedings in relation to the patent. The results are reported in Table 12.

**Table 12: Outcome of the court proceedings, patent applications lodged between 1986 to 2005. (n=86)**

	Est. number	%	% of resolved cases
Case still pending	340	43	
Court judgement(s) in our favour	150	19	25
Court judgement(s) not in our favour	261	33	44
Out-of-court settlement(s)	183	23	31
<i>Total</i>	792	100	100

Notes: Estimates are weighted by year of application, major technology area and organisational type.  
Source: Mailout survey

The figure of 25 per cent for a judgment in favour is lower than the findings of Weatherall and Jensen (2005) that patentees were successful overall in 38 per cent of court judgments. However, statistics drawn from court databases have previously indicated that something like 85 per cent of patent cases settle (Rotstein and Weatherall 2007), but only 31 per cent of our respondents reported an out of court settlement. It is possible that inventors are less aware of proceedings which settle or have misinterpreted information (for example, interpreting a favourable settlement as a 'win'), but on the whole, this result strikes us as anomalous. In the US, patent holders win slightly more than half of their cases (Bessen and Meurer 2005). The rate of out-of-court settlement is significantly lower than the rate in the US. Bessen and Meurer (2005) report that only 1.9 per cent of federal cases in the US in year 2000 went to trial. This may however reflect

higher filing rate in the US. Our survey figures on the settlement rate are anomalous: explicable perhaps because either (a) people thinking there's a win when the case in fact settled or (b) overseas proceedings being counted.

We used the smaller telephone survey to probe further into the reasons surrounding the decision to file proceedings or not. Note that due to the small numbers, population weightings are not used in these tables. Table 13 presents the reasons given by inventors who detected copying for not filing patent infringement proceedings.

**Table 13: Reason(s) not file in court, patent applications lodged between 1986 to 2005. (n=159)**

	Number of responses (multiple responses permitted)	%
Potential gains didn't justify the cost	88	56
Not worth damaging the relationship	4	3
Would take too long	33	19
Uncertain the patent's validity would be upheld	12	7
No response	62	
<i>Total (who reported copying and did not file in court)</i>	<i>159</i>	<i>100</i>

Source: Telephone survey, unweighted.

Unsurprisingly, the key issue was the cost/benefit analysis (dominant despite the fact that, according to Table 7, one of the reasons for pursuing an infringement was the 'principle'). A more interesting observation is that delay was cited by one in five inventors who responded. The delay from start to finish on litigation in Australia has previously been analysed as being on average 2.7 years from filing to the first instance decision, with a further 1.1 years if the matter goes on appeal – giving a total if it goes on appeal of 3.8 years (Weatherall and Jensen 2005). But many cases settle – according to Rotstein and Weatherall (2007) approximately 85 per cent of patent cases settle in Australia, with peaks in settlements occurring within the first 100 days, then again between 200 to 300 days. It is possible that the results in Table 13 indicate that people are being turned off by the time a full proceeding will take in court without thinking about the possibility that a result may (and in many cases will) be achieved much more rapidly.

A third striking feature of the results from Table 13 is the very small proportion for whom concern about whether the validity of the patent would be upheld was considered a reason not to file proceedings in court. We have commented above on the relative lack of

concern about validity issues in the decision whether to pursue an alleged copying to the extent of sending a letter to an alleged copyist, there noting that one possible explanation was that at the point of sending a letter such concerns were not likely to be important. However, the *continuing* lack of importance of this issue to the point when proceedings are filed is a stronger suggestion that uncertainty over validity is not a significant issue in patent litigation for most inventors. By this stage an inventor, or their company, will have had the issue of invalidity assessed, either by the alleged infringer or at the very least their own lawyers. One explanation is that this result is an artefact of surveying inventors – who may believe strongly that their invention is valuable and the patent valid. However, we do not think that this is a likely explanation: if there were concerns about validity, we would expect that these concerns, and the science surrounding such concerns, would have been at least raised with the inventor. Assuming the result is *not* merely an artefact of the research design, this further suggests that the Australian government’s decision not to accept ACIP’s recommendation to introduce a presumption of validity may well have been the correct one. The relatively low level of concern about the validity of the patent is also striking in light of the fact that of the patents which do go to court, forty-four percent are revoked in part or in whole (Jensen and Weatherall 2005). It may be that patent owners know instinctively what legal theorists have argued: that we should hesitate to draw too much from statistics on ‘court win rates’ owing to the selection bias inherent in the cases that go all the way to trial: it tends to be the borderline cases which end up in court (Priest and Klein 1984).

Of those who reported filing court proceedings we also asked the length and cost of the proceedings. Given the small numbers involved, and the fact that some of these proceedings may have been filed in overseas courts, it is difficult to draw any strong conclusions. However, it is perhaps worth noting that in terms of timing, the findings, reported in Table 14, are broadly consistent with previous analysis which found that the vast majority of court proceedings are concluded within the first year (Rotstein and Weatherall 2007). The median time to resolution is 12 months which is slightly longer than a comparable estimate for the US (Kesan and Ball 2006, Table 11). The median reported cost of the court proceedings was \$160,000 which, while high, is perhaps not as

high as some people imagine. US patent suits with less than USD 1 million at risk have an estimated median litigation cost for both parties of USD 0.6 million (AIPLA 2007).<sup>28</sup>

**Table 14: Length of court proceedings (months), patent applications lodged between 1986 and 2005. (n=29)**

	Number of responses	%
Less than 6 months	10	34
6 to 12 months	6	21
1 to 2 years	5	17
2 to 5 years	6	21
More than 5 years	1	3
No response	1	3
<i>Total (who filed in court)</i>	29	100

Source: Telephone survey, unweighted.

## Factors associated with copying and enforcement

To investigate analytically the effects of single characteristics of the patent application on the propensity to encounter infringement and enforcement issues, we undertook a regression analysis where the issue being examined is alternatively the propensity to be aware of copying, the propensity to send a letter alleging infringement and the propensity to file court proceedings. Regression analysis is essentially a statistical technique which is used to estimate what effect one factor has on the issue being examined, *while holding constant other factors*. Accordingly, this enables us to estimate the effect, say, being an individual inventor has on the propensity to have your invention copied, once we remove the effects of differences in technology and invention value, *inter alia*. This process is called economic modelling.

In our model, we estimate the effects of five categories of ‘explanatory’ factors on our three issues (copying, sending a letter and filing court proceedings).<sup>29</sup> These explanatory five categories comprise:

<sup>28</sup> ‘Total costs’ is defined to include all costs, including outside legal and paralegal services, local counsel, associates, paralegals, travel and living expenses, fees and costs for court reporters, photocopies, courier services, exhibit preparation, analytical testing, expert witnesses, translators, surveys, jury advisors and similar expenses. Estimates were requested for one IP asset (one patent or one trade mark).

<sup>29</sup> These characteristics are not comprehensive: there are others we could have looked at, such as the complexity of the patent or the number of claims. There are also factors which are no doubt relevant to decision-making on enforcement but which cannot be measured: the personality of people within the firm, for example. However, we have chosen to test what we saw as the most important measurable variables: the nature of the invention, grant status, ownership, technology, and value.

- the size of the technological inventive step. We measure this through a mail-out survey question which asks inventors whether the invention was an incremental or a radical improvement and factual data on whether or not the application was made through the PCT route;
- the grant status of the application at April 2007. These comprise granted, withdrawn (lapsed before examination or withdrawn before grant), rejected and still pending;
- the ownership of the patent: whether SME, large firm, individual, or public research organisation;
- six major technology groups – as defined in Appendix 3;
- the economic value of the underlying invention. This includes a series of seven questions from the mail-out survey on the value of sales from products and processes which embody the invention; and whether or not attempts have been made to develop, license, spin-off, ‘make and sell’, mass produce or export the embodied invention.

To accommodate the fact that some of these questions are truncated – that is, more recent applications will not have had the same opportunity to make sales and spend time in-force as earlier applications – we included a measure of the time since the application was made, because by definition, the longer the invention has been in existence, the more potential it has to be copied and enforced. Also, as previously indicated we use a Heckman selection estimation technique for the equation on the probability of copying to account for any bias in the response rates by year, grant status, *inter alia*. A full definition of the variables can be found in Appendix 2.

The results from the three regression estimations are presented below in Table 15. The first column of estimated coefficients (i.e. numbers) presents the estimated importance of the factors on the propensity to be copied. Coefficients with asterisks indicate whether the estimated coefficient is statistically significant (the more asterisks the more significant). A positive coefficient means that as that factor increases, it increases the probability that the event being modelled will occur. So for example, in the first column of numbers we find that being a radical rather than an incremental invention will raise the index which mimics the probability of the inventor being aware of copying

by 0.134 percentage points. From a mathematical point of view, an index is formed from an algorithm that connects the factor (i.e. being radical versus incremental) and whether or not the inventor is aware of being copied. We cannot place a literal interpretation on the size of the coefficient. As such, we confine our interpretation to whether the coefficient was significant or not and whether it is positive or negative.

Essentially, the results from this regression show that being copied is related to the size of the technological inventive step (the higher the step, i.e. the more radical or innovative the invention, the more copying); the grant status (copying is highest for examined applications and lowest for applications withdrawn and still pending); the technological area (instruments, chemical and pharmaceuticals have the lowest rate of copying); and the value of the underlying invention (generally, the greater the value the more likely the invention is to be copied).<sup>30</sup> Ownership status – that is, the type of firm or entity which owns the patent – a does not appear to matter, once other factors are accounted for. In other words, we did not find evidence that SME inventions are more likely to experience copying of their inventions.

The second column of numbers gives estimates of factors affecting the propensity to send a letter claiming infringement *given* that the inventor is aware that infringement may be occurring. This reveals that whether or not the owner sends a letter is largely influenced by the similar factors as being aware of copying. As expected, applications that eventually are withdrawn or lapse, are less likely to be the subject of a letter of infringement, even though their inventors believed copying was occurring. The technology area matters: applications in the area of process engineering are most likely to have sent a letter and chemicals and pharmaceuticals the least. There is also clear evidence that the more economically value the underlying invention, the more likely the owner is to act on a perceived infringement, *ceteris paribus*. Similar to the propensity to be aware of copying, the type of organisation the inventor was employed in had no effect on the propensity to send a letter. This pattern of enforcement by invention quality echos the characteristics of litigants in the US and Germany (Lanjouw and Schankerman 2004, Cremers 2004). While there was a similar variation in enforcement rates by technology

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<sup>30</sup> The negative coefficient on the development factor is odd but may be explained by the fact that over 90 per cent of inventions proceeded to the development stage. As such, being developed is not a good indicator of the commercial potential of the invention.

areas between Australia and Germany (Cremers 2004) this was not true for Australia and the US. While chemicals has the lowest filing rate in the US (similar to Australia), drugs in the US has a high rate and mechanical in the US has a below average rate.

Finally, the last column of numbers presents the determinants of whether or not the owner filed court proceedings, give he or she had already sent a letter to desist. The asterisked coefficients indicate that the economic value (as measured by estimated sales to date) and technology area were most significant. Proceedings were least likely to have been filed in the technological areas of Electricity and Electronics, and Instruments compared with other areas, once other factors are accounted for.

**Table 15: Regression estimates of factors determining copying, sending a letter and filing in court, patent applications lodged between 1986 to 2005.**

Factors	Aware of copying	Sent letter claiming infringement <i>given</i> aware of copying	Filed court proceedings <i>given</i> sent letter claiming infringement
Inventive step			
• Radical invention	0.134** (2.491)	0.099 (0.955)	0.145 (0.783)
• PCT	-0.150** (-2.500)	-0.155 (-1.431)	
Patent status (April 2007)			
• grant	0.229** (2.248)	0.305 (1.563)	
• withdrawn	0.14 (1.377)	-0.373* (-1.794)	
• reject	0.249** (2.147)	-0.09 (-0.387)	
Patent ownership			
• SME	0.106 (1.149)	0.034 (0.188)	-0.162 (-0.528)
• Public research organisation	-0.039 (-0.274)	-0.345 (-1.119)	0.136 (0.217)
• Individual	0.074 (0.688)	-0.26 (-1.390)	-0.206 (-0.626)
Technology area			
• I Electricity and electronics	0.072 (0.748)	-0.305* (-1.728)	-0.989** (-2.467)
• II Instruments	-0.223** (-2.325)	-0.474** (-2.575)	-0.815* (-1.954)
• III Chemicals, pharmaceuticals	-0.269** (-2.443)	-0.650*** (-2.849)	-0.655 (-1.412)
• IV Process engineering	-0.122 (-1.334)	0.166 (1.020)	-0.188 (-0.784)
• V Mechanical engineering	-0.095 (-1.406)	-0.261** (-2.126)	-0.111 (-0.579)
<i>Ex post</i> estimates of value			
• Estimated sales revenue to date	0.000*** (5.344)	0.000* (1.732)	0.000*** (2.816)
• Attempted license or spinoff	0.297*** (5.588)	0.221** (2.202)	0.207 (1.181)
• Attempted development	-0.085 (-0.767)	-0.421* (-1.959)	-0.171 (-0.486)
• Attempted make and sell stage	0.360*** (4.691)	-0.078 (-0.491)	0.283 (0.835)
• Exported	0.233*** (3.206)	0.502*** (4.058)	-0.165 (-0.817)
• Attempted mass production	0.195*** (2.981)	0.225* (1.922)	0.279 (1.281)
Time since application	0.200*** (2.615)	0.033 (0.303)	-0.06 (-0.426)
Constant	-1.627***	-0.061	-1.042*

	(-4.296)	(-0.190)	(-1.865)
Observations	30,661	789	361
Censored observations	27,593		
Uncensored observations	3,068		
Estimation method	ML Probit with selection	Probit	Probit

Notes: <sup>a</sup> Days from lodgement date to end patent or April 2007.

If a stage was not attempted we did not require the respondent to answer questions about further stages. The exception was for licensing and spin-off activities which we asked for all respondents since this activity was mutually exclusive from the others.

Absolute value of z statistics in brackets \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%. The LR test indicated that the selection effects are not significant at the 5 % level.

Selection variables: year (5-year groups), OST technology (7 groups), organisational type (3 groups), patent grant status (grant, non-grant), number of years patent in-force (at end 2007).

## Pulling it all together: just how much of a problem is patent enforcement?

As we noted at the outset, the goal of the patent system is to enhance the incentive to invest in innovative activity. For the system to achieve this end, the prospective patentee must have confidence that the patent will enhance their ability to appropriate profits from innovation. The efficacy of the legal system to deliver just decisions on disputes, at a proportional cost to both parties, is a cornerstone of this confidence.<sup>31</sup> Outcomes from disputes, public or otherwise, colour the expectations of businesses and influence their decision making. If people feel they cannot afford to defend their patent from copying or invalidity counterclaims and hence do not invest in innovation, society as a whole is worse off. Equally, if the use of the patent system is biased towards those with market power and the most resources, then the patent system will support prices that are over and above those needed to stimulate the innovation.

Given this, it is useful to estimate the number of inventions that were not protected as intended due to the cost of enforcement. Table 16 below presents a summary of the results we have discussed above as population estimates of the number of inventions which have experienced copying issues and whether or not the owner was unable to enforce their monopoly rights for cost reasons. From a policy perspective, the key, it seems to us, is to identify the set or sets of cases where non-trivial copying occurred but where action/follow up did not occur owing to some factor which should not, in an ideal

<sup>31</sup> As IPAC noted, an important issue in costs is proportionality: we expect more to be spent when more is at stake (IPAC 2003: 17). We note that policymakers are only able to address the issue of litigation costs in part: much depends on the behaviour of the parties (see generally Starr 1987, 75). The traditional 'accusatorial' litigation system in the UK, where litigation is led by the parties, which decide what issues are relevant, and what evidence should be investigated, is partly responsible for the high costs of patent litigation in the UK: Llewellyn and Cornish (2000), 630; see also *Research in Motion v Visto Corporation* [2008] EWHC 819 (Pat). In that case one side (RIM) outspent the other by a factor of four or five.

system, prevent enforcement, such as cost or relative size of the parties. Essentially, Table 16 shows that of the total 24,000 granted or pending Australian patent applications applied for over the period 1986-2005, for an estimated 7300, the inventor believed that copying was occurring. While not all of these cases will have involved conduct that a court would hold infringing, this represents the highest estimate of the amount of detected infringement occurring in the relevant period. Of these, letters alleging infringement were sent in relation to 4000 inventions. In just over a third of these cases the letter was successful as either a licensing agreement took place or the other party stopped copying. Of those cases where copying did not cease, there were an estimated 1000 cases where the inventor assessed the situation as non-trivial but believed that they were too small to make a credible threat. These are the cases of potential concern: we should not be worried about cases where the inventor themselves thought the copying was trivial, or that the copyist might believe the patent was invalid or there was no infringement – such reasons do not imply a deficiency in the patent enforcement system.

There were a further 3300 cases where copying was believed to have taken place but a letter was not sent. In 600 cases, this was because the degree of copying was trivial and in this case the optimal response from a social welfare perspective is to ignore the copying (as stopping the copying is unlikely to have a positive effect on the incentive to innovate). However, in 2600 cases however, a letter was not sent for cost reasons. While this may look like a cost of enforcement issue, one can question whether the patent system is a suitable vehicle for an entity which cannot afford the cost of a lawyers' letter. We note that the firm, or individual, may be entirely rational in this situation, in deciding not to follow up a non-trivial infringement, having made their own cost-benefit analysis of doing so. Nevertheless, there is still reason to be concerned about these cases from a policy perspective: they still represent situations where the cost of accessing enforcement has prevented the patent from fulfilling its role of providing actual exclusivity; they also raise the question whether the original decision to apply for the patent was rational.<sup>32</sup>

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<sup>32</sup> It is possible that patents hold a deterrent effect on copying/infringement, such that it is worthwhile obtaining a patent for its deterrent effect even if a firm is aware that it could not afford or would not pay to enforce the patent. That is, the firm may be acting rationally in choosing to pay a certain amount in the hope that it will reduce the chance of infringement. The deterrent effect of patents is not something we can readily measure: it is hard to see how we could get a measure of how frequently firms have been deterred from a particular course of development by the existence of a patent. Alternatively, a firm may hope to be

In sum, in about a third of all cases leading to the initial step of sending a letter, that letter was sufficient to either stop the copying or bring about licensing. However, in about a quarter of cases, the infringement was not trivial but the patentee was not able to pursue their monopoly right, beyond sending a legal letter, because of the further costs. Taking the numbers at their highest, there are a further 2,600 inventions whose owners did not even send a letter of infringement due to cost concerns. While these were mainly individual inventors (see Table 6), a substantial minority were companies and public research organisations. Given a total of 24,000 granted or pending Australian patent applications, these numbers are not insignificant.

**Table 16: Number of inventions subject to copying and enforcement processes by reason**

	<b>Approx. number</b>	<b>% of granted or pending applications</b>
Total Australian inventions 1986-2005	31,000	
Granted or pending (by April 2007)	24,600	100
Aware of copying	7,300	30
Sent a letter	4,000	16
Licensed or stopped copying	1,500	6
Not stop copying	2,400	10
Think too small <sup>a</sup>	1,000	4
Think patent invalid /not think infringing	1,200	5
Don't know	300	1
Not send letter	3,300	13
Thought it would be too costly/infringer too big	2,600	11
Infringement trivial/used other enforcement strategy	600	2
Other	50	0

Note: a where multiple reasons were given, we have only allocated the invention to 'Think too small' if they did not indicate 'Think patent invalid/not think infringing'. b where multiple reasons were given, we have only allocated the invention to 'Thought it would be too costly/infringer too big' if they did not indicate 'Infringement trivial/used other enforcement strategy'.

approached for a license without ever having to actively enforce or write a letter first. Further, circumstances may have changed between when the patent was applied for and the time enforcement issues arise: an invention previously important to the firm may have become less so if development approaches have changed. All in all, we cannot categorically say, on the basis of the information from the survey, that these firms who have chosen not to enforce or even send a letter were acting irrationally at the point where they applied for the patent. Nevertheless, we can say that these findings at least raise the question whether the firm was well-advised in seeking expensive legal rights that it did not subsequently take steps to enforce.

## Conclusions and future policy directions

The findings of our surveys raise a number of possibilities in terms of future policy directions in patent and patent enforcement, both at an immediate, practical level, but also more ambitious possibilities to be considered in the longer term.

The first point arising from the survey is that contrary to the assumptions of reports like the 1999 ACIP report, and occasional comments in law reform discussions, we did not find evidence that uncertainty about the validity of a patent was a significant factor in decision-making over whether to enforce the patent or not. This finding cannot be put down to ignorance: it remains a relatively unimportant factor even when making decisions about the institution of patent proceedings in court: at a point when patent holders have, it is assumed, received legal advice. This research suggests that recommendations aimed at increasing certainty in litigation by changing to the weight to be given to validity of the patent, for example, by presuming a patent to be valid, are less important than other issues.

At a very practical level, one of the most striking findings of the survey is the large set of 2600 inventors (over the period examined, and extrapolated to the entire population) who were aware of non-trivial copying, but who did not send any kind of letter concerning an alleged copying, because they thought it would be too costly, or that the infringer was too large to take on. This is striking because while it makes perfect sense to decide not to pursue patent litigation owing to the expense, it makes a lot less sense not to even raise a query via a letter to an apparent copier. It raises an important question of policy: why are people expending their resources in applying for patents if when they discover a possible, and non-trivial infringement, they cannot (or do not find it worthwhile to) extend their resources to the point of sending a letter? It is of course possible that at least some of these inventors are uninterested in enforcement – for example, because they obtained a patent for its prestige value. Further, as we have noted earlier in the paper, *individual* decisions not to take enforcement action may be entirely rational on a cost-benefit analysis. But there is a broader policy issue raised: another important possibility which must be considered is that people are being encouraged to

take out patents when it may not, in fact, be the best option for them.<sup>33</sup> There is not a great deal of point spending money to acquire rights which one is not prepared to spend relatively small amounts of money to enforce even through any attempt to license the rights.

This particular finding is all the more striking in light of the fact that where letters *are* sent, it turns out that they are relatively successful. It would be incorrect to assume that the inventors who are currently taking no action would achieve similar levels of success: those currently succeeding may involve more evenly-resourced parties or more clear infringement cases than those where no letter was sent. But this result raises the possibility that at least some of these inventors may be missing out on potential benefits. Addressing this issue might mean a combination of strategies. One is better education of inventors at the point of applying for patents: in particular, education in making the assessment of whether a standard patent is the right option – as opposed to other, informal means of protection including being first to market, developing a community of loyal customers and users, or trade secret (Cohen, Nelson and Walsh 2000). Perhaps, too, some of these inventors should be using the innovation patent system, which provides shorter-term patents without upfront examination (examination only occurs in the event that enforcement action is to be taken). The innovation patent system at least bears lower upfront costs even if the costs at the enforcement stage are higher. Our survey, it should be noted, did not include any inventors who had applied for an innovation patent. Alternatively, better education about the steps that may be taken short of litigation and the potential for settlement could also be considered.

Aside from this group of inventors, there remains a significant number who feel they incur substantial economic loss from infringement but do not have the resources to pursue the matter through the courts. The cost of enforcing legal rights is, of course, a perennial problem, and not unique to IP, nor to Australia. Nevertheless, there are a number of options that could be considered here. First, mediation services could provide a step towards enforcement of patent rights short of (expensive and intimidating) patent litigation. At present, mediation is available through the Federal Court following the

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<sup>33</sup> Another possibility is that patents are being granted more broadly than the innovators in fact need or want to use. From a policy perspective that is also undesirable, since the broader rights may be blocking developments by other parties.

institution of patent proceedings: but it may be that patent owners are unwilling to commence litigation due to the fear of resulting costs. Mediation *outside* the court system with some official support or imprimatur may be a more attractive option. It is notable that the UK Intellectual Property Office has in recent years introduced its own mediation service for IP disputes using trained IPO staff (UK IPO 2007), and the possibility of IP Australia providing a similar mediation service was raised in ACIP's review of post-grant enforcement mechanisms.<sup>34</sup> There has been no study of which we are aware which has assessed the effectiveness of the UK system.

The other, oft-canvassed alternative would be to create a specialist patent lower court or appoint specialist judges to a lower court. The purpose of such a move would be to establish a lower-cost venue for smaller patent disputes – one which would be more accessible to our hesitant inventors. This of course would have to involve some truncation of procedures and perhaps financial penalties for parties seeking appeal to a higher court.<sup>35</sup> This is not a new suggestion. A similar innovation was attempted in the UK via the establishment of the Patents County Court back in 1989; this experiment has not been considered a success.<sup>36</sup> In its 2004 report, ACIP recommended that the jurisdiction of the FMC should be extended to include patent, trade mark and designs matters, concurrent with the Federal Court (ACIP 2004). In addition, ACIP proposed that each of the courts should have the power to transfer matters to the other where it became apparent that the matter could be dealt with more appropriately by the other court. In

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<sup>34</sup> ACIP 2006, at 16-17. The response from practitioners was not overwhelmingly positive. The Australian Federation of Intellectual Property Attorneys (FICPI Australia) in their submission stated that IP Australia's 'primary focus should be on the quality examination of patent applications', and that FICPI would be wholly against IP Australia providing mediation if it would detract from that focus. It further noted that mediation is 'already provided outside of the Court system, by independent ADR specialists', whereas IP Australia is not 'independent', as the body responsible for the initial grant of rights: Submission of FICPI Australia, dated 1 May 2007, available at <http://www.acip.gov.au/enforcesubs/FICPI%202007.pdf>. For a summary of solicitor opinions on the issue of mediation generally in patent cases, see the submission of the Intellectual Property Research Institute of Australia, dated May 2007 and available at <http://www.acip.gov.au/enforcesubs/ACIP%20-%20Post-Grant%20Enforcement%20IPRIA%20Submission.pdf>. These opinions do not bear on whether *IP Australia* should offer mediation – only whether it is useful to IP cases generally.

<sup>35</sup> Kingston (2001) suggests using public funds to pay for the legal costs of the defendant in an appeal case.

<sup>36</sup> Although a consolidated set of statistics is not available for direct comparison, commentators assert that most cases are still filed with the High Court, which, apparently spurred by the competition, made amendments to its rules and procedures to increase efficiency, particularly by requiring parties to prepare documents like summaries and skeletons and provide more information to narrow the case at earlier stages in the litigation. According to Llewellyn and Cornish, '[t]here is now little difference in the cost or speed of litigating in either the PCC or the Patents Court': Llewellyn and Cornish (2000), 629.

order to avoid duplication of proceedings and hearings, ACIP further recommended that appeals from the FMC be heard by the Full Court of the Federal Court of Australia.<sup>37</sup> On 5 April 2007, the then Minister for Industry, Tourism and Resources announced that the Government had agreed to extend the jurisdiction of the FMC to hear trade mark and design matters, but *not* patent cases generally, on the basis that patent cases are longer and more complex, and the FMC was designed for more simple, high volume cases. Under the Minister's approach, a Federal Court Judge *would* be able to transfer a patent matter to the FMC on a request by a party<sup>38</sup> – thus giving access to patent holders to the lower court. At the time the Government indicated that it would give further consideration to conferring more general jurisdiction in patent matters on the FMC in the light of experience gained following the extension of jurisdiction to trade marks and designs, and the operation of the transfer mechanism after two years. *In fact*, the government chose in the end not to extend specific jurisdiction even in trade mark or design matters to the FMC for reasons that are not obvious from the record, but which most likely result from the profession's hostility to the idea.<sup>39</sup> As a compromise, the Government did extend the ability of the Federal Court to transfer matters.<sup>40</sup> Thus, as matters stand, the Federal Court has the power to transfer trade mark, design, or patent matters to the FMC. It does not appear to have done so to date, most likely because professional scepticism concerning the IP qualifications of the magistrates means that no one has requested such a transfer. However, the legal process is still uncertain for both parties, since the plaintiff does not know whether they will be referred to the FMC: the decision depends on the discretion of the judge. All uncertainty is *prima facie* bad for business confidence and investment. Subsequent to all these developments, the Semple Review in 2008 proposed abolition of the Federal Magistrates' Court and absorption of the current Magistrates into the Federal and Family Courts in order to create a lower

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<sup>37</sup> *Federal Court of Australia Act 1976* (Cth) s 24.

<sup>38</sup> Minister for Industry, Tourism and Resources, Government Response to the Advisory Council on Intellectual Property Recommendations: Should the Jurisdiction of the Federal Magistrates' Service be Extended to Include Patent, Trade Mark and Design Matters? Available at <http://www.acip.gov.au/library/Brief%20Release%20Gov%20response%20ACIP%20FMS%20.pdf>.

<sup>39</sup> For a summary of some responses in interviews, see the IPRIA Submission above n34. The responses were generally negative, stating (inter alia) that such a move would be an 'absolute disaster', 'crazy' or 'just wouldn't work' – with most of the concern focusing on the issue of expertise.

<sup>40</sup> This was implemented via the *Jurisdiction of the Federal Magistrates Court Legislation Amendment Act 2006* (Cth). As to the transfer mechanism see *Federal Court of Australia Act 1976* (Cth) s 32AB(8A). As to the conferral of jurisdiction on trade mark and design matters, see

division in both of the Federal Court Systems (Attorney-General's Department, 2008). In early May 2009, the Attorney-General announced that the government would restructure the Federal Courts system essentially in the way Semple proposed: by merging the Federal Magistrates Court into the Family Court and Federal Court and creating a lower division of the Federal Court.<sup>41</sup>

Most concern in the profession about taking patent cases to the FMC (or, presumably, to a lower division of the Federal Court made up of former magistrates) appears to centre on the magistrates' lack of expertise in patent. ACIP proposed that this could be addressed through specialised appointment of patent and trade mark attorneys to the FMC. However, the numbers we have produced suggest that there would not be sufficient work to justify such an appointment. If we assume that there were, over the period 1986-2005 or so, as calculated above, 1000 cases where the inventor/firm was concerned enough about infringement to write a letter, but abandoned efforts thereafter due to concerns about cost, and if we say (in a 'back of the envelope' way) that 20 per cent of these *might* have gone to the FMC over that period if an expert magistrate were available and the process was genuinely less expensive, that is only 8 cases being filed *per year*. The number might in fact be higher because some cases move from the Federal Court to the FMC owing to the lower costs – say, 10 per cent of the 22 or so contentious proceedings filed in that court per year.<sup>42</sup> The total caseload of approximately 10 new proceedings filed per year would also be reduced by settlement of perhaps as many as 80 per cent of these filings (Rotstein and Weatherall 2007). Even adding in trade mark to the caseload, and assuming a higher number of trade mark cases, this caseload is not enough to support even one full-time wholly specialised FMC (or lower Federal Court division) position. Even if 50 per cent of our unserved innovators chose the FMC or lower division there would not be sufficient work.<sup>43</sup>

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<sup>41</sup> Attorney General Robert McLelland, 'Rudd Government to reform Federal Courts', Press Release dated 5 May 2009.

<sup>42</sup> This figure comes from the work reflected in Rotstein and Weatherall (2007) (relating only to 1995-2005, but the numbers in this period are likely, if anything, to be higher than figures for the older period, meaning our 'back of the envelope' calculation may overstate the number of cases see also IPRIA Submission, above n34.

<sup>43</sup> During 2007-08, 84 173 matters overall were filed in the Federal Magistrates Court and 82 689 matters were finalised: *Federal Magistrates' Court Annual Report 2007-2008*, at 24. The overwhelming majority of these cases relate to family law. There are 53 Federal Magistrates: *ibid* at 14.

This perhaps suggests that a patent tribunal, as discussed in ACIP's 2006 report on post-grant enforcement, may in fact be more feasible – to the extent that it, like the Copyright Tribunal, could involve members with technical and legal training sitting in a part-time capacity. The role of such a tribunal would need to be carefully drafted to comply with the requirement under Article 71 of the Constitution that the judicial power of the Commonwealth must be exercised by federal courts invested with federal jurisdiction.<sup>44</sup>

Even if the FMC, lower division of the Federal Court or a patent tribunal were able to provide a low cost venue, however, the results of the surveys suggest there may still be a subset of inventors not well-served by the patent system, who cannot take the first steps towards enforcement: if you cannot afford to send (or cannot justify the cost of sending) even a letter alleging copying, then creating a lower cost enforcement venue is not likely to be of assistance. In theory, at least, it might therefore be useful, especially for smaller businesses and individuals to consider options to support innovation which do not require enforcement steps by the patent holder itself. Reichman (2000) has suggested a compensatory liability regime (or 'modified liability regime' Samuelson et al, 1994) with a centralised collecting society, perhaps limited to smaller innovations (covered in Australia by innovation patents) – many of which are from SMEs. Patent owners who chose to participate would get royalties from other parties who use their ideas, similar to an automatic license. Such a system would entitle small inventors to some compensation for smaller innovations without providing exclusive rights. While obviously there would be costs to such a system, and while it would have to be a voluntary system for those innovations which meet the usual international thresholds for a standard patent in order to be compliant with international law (TRIPS, Article 27.1),<sup>45</sup> it would also have the

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<sup>44</sup> The FMC does not suffer this issue: it is established under Chapter III of the *Constitution*, is a court of record and a court of law and equity. Its members are justices appointed under Chapter III and they enjoy the same tenure as judges of the High Court, Federal Court and Family Court. See generally Dent (2006).

<sup>45</sup> There is no rule under TRIPS which prevents a country from introducing *new* IP systems in addition to the basic systems dealt with in TRIPS (patent, copyright, trade mark, geographical indications, designs): the standards in TRIPS are *minima*, not maxima: TRIPS Article 1.1. Australia, indeed, relied on the flexibility in TRIPS to introduce the innovation patents system into Australian law. Australia could not, however, introduce limitations which would prevent a person with an invention meeting the standards of patentability set out in Article 27 of TRIPS from applying for a standard patent. Thus a system aimed at small innovations or small business would need to be framed as voluntary rather than compulsory, or compulsory only for small innovations falling below the threshold set in TRIPS.

potential benefit of widening the number of inventors and innovators who could follow a research and invention trajectory.

However, there are significant problems with contemplating such a system in Australia. First, our numbers suggest that the set of inventors about which we are talking is numerically small: perhaps 2500 over the course of 20 years, plus some group of inventors who would join such a system although they did not apply for a patent. Second, there would be no way to enforce an obligation to pay against overseas companies and individuals said to be infringing, and as we have seen, the overseas location of the infringer is a significant factor tending against enforcement particularly by corporate patent holders (one in four cited this as an issue). Third, there is the question of how such a system would overlap with the innovation patent system. It would not seem to be an efficient use of government resources to support both a compensatory liability system and an innovation patent system aimed at, in essence, the same set of innovations and inventions.

In the absence of other clear possibilities for increasing access to patent enforcement, it seems imperative to us that those involved in supporting and advising inventors consider the full range of options outside patents and formal IP rights. Our figures indicate there is a large subset of people who get patents but cannot or do not enforce them in the case of non-trivial enforcement, even to the extent of seeking to license the innovation. The discussion above suggests that many of the options discussed for reducing costs and increasing access to enforcement may not be feasible in the Australian environment in part due to the small numbers of cases involved. Other mechanisms for supporting these innovators, therefore, need to be considered: whether that be in the form of better education about other means for appropriating innovation (trade secret, lead-time advantage, innovation patent and the like) and advice which steers them away from patents in those cases where patents are not a suitable vehicle, to better education about exploiting patents (via licensing and the like) and support for global exploitation (by subsidizing advisors and means for introducing venture capitalists and smaller innovators) or direct support for innovation and research in the form of government grants and subsidies, reducing reliance on the incentives provided by patent.

Whether IP Australia, which receives income from patent applications and grants, is the best placed body to offer such advice is not a question we consider here.

Another set of policy issues is raised by the fact that the most important reason for corporate patent applicants not to take steps towards enforcement was the fact that the infringer was based overseas. No amount of Australian domestic law reform or cost reduction is going to be of assistance in facilitating enforcement overseas. It is therefore worth considering whether there are any steps which may be taken locally, for example, to address infringing products which are brought into Australia from overseas. In IP more generally, there are a number of mechanisms used to address infringement in international trade, two key ones being systems for interception of goods at customs, and the International Trade Commission (ITC) mechanism in the US.

Both copyright and trade mark law in Australia have systems whereby customs officers have the power to detain infringing goods.<sup>46</sup> Copyright and trade mark owners can lodge Notices of Objection, which object to the importation of goods which they claim infringes their rights. Customs detains the goods, giving rightsholders the opportunity to file legal proceedings with the Federal Court. There is no equivalent system under the *Patents Act* 1990 (Cth), although the introduction of such provisions was recommended by ACIP in 1999 – a recommendation actually accepted by the government but not, at this point, acted upon. It was again canvassed in an ACIP Issues Paper issued in 2006 on post-grant enforcement of patents (ACIP 2006); as yet the final report from that study has not been published.

At first glance, it would appear to be more difficult to institute such procedures for patent. Many copyright- and trade mark-infringing goods for which the customs procedures are presently used in Australia are likely to be counterfeit: where the infringing nature of the goods will be clear on the face of the goods in question. Patent infringement, on the other hand, may be less obvious. However, such a system is in place in a number of countries, including in the region covered by the European Union.<sup>47</sup> Under that system, a patent owner (or owner of other specified IP rights) may lodge a

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<sup>46</sup> *Copyright Act* 1968 (Cth) s 135; *Trade Marks Act* 1995 (Cth) Part 13.

<sup>47</sup> As a result of *Council Regulation (EC) No 1383/2003 of 22 July 2003 concerning customs action against goods suspected of infringing certain intellectual property rights and the measures to be taken against goods found to have infringed such rights*. For an incorporation of these provisions into domestic law see the UK: *Goods Infringing Intellectual Property Rights (Customs) Regulations* 2004 No. 1473.

written application with the customs authorities, including an accurate and detailed technical description of the goods in question, any information concerning the nature of the alleged fraud and the name and address of the contact person appointed by the rightsholder; customs officers may then detain the goods on importation and notify the rightsholder, giving them a chance to institute proceedings to prevent the importation permanently. Institution of such a system perhaps has the potential to constitute a relatively straightforward means to address one of the more important enforcement barriers cited by inventors working in a corporate environment.

A more formal system for addressing infringement in international trade is to be found in the United States in the form of the International Trade Commission (ITC). According to the information on its own website, the ITC ‘is an independent, quasi-judicial [US] Federal agency with broad investigative responsibilities on matters of trade’, which investigates certain trade-related disputes such as the effects of dumped and subsidized imports and global safeguard investigations. Among other powers, then, the ITC has jurisdiction to hear patent infringement actions with a view to issuing orders preventing importation of patent-infringing goods.<sup>48</sup> The chief benefit of using the ITC rather than US District Courts in importation cases lies in the system’s strict time limits and abbreviated proceedings: it is designed to enable rapid decision-making.<sup>49</sup> While it is hard to imagine actions against importation (of patent-infringing goods, or trade-law infringing goods more generally) justifying the creation of a whole separate jurisdiction or court, the ITC does offer some illustration of the potential benefits of accelerated procedures for a subset of cases. However, it is not clear that the attempt to institute such a system in Australia would offer sufficient benefits above and beyond those potentially offered by a customs objection scheme coupled with recourse to the Federal Court system and active case management of resulting Federal Court cases.

For obvious reasons, the policy discussion above has focused on that set of cases where patents have not, it would appear, obviously served their stated role. There is, however, another take-away message from this study: that in some cases, inventors are able to enforce their rights, at relatively low cost and without involving the courts. In fact,

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<sup>48</sup> 19 U.S.C. §1337.

<sup>49</sup> The ITC is also said to be biased in favour of complainants according to a number of studies: see Hahn and Singer (2008).

they seem to be surprisingly successful in doing so, which means that the mere presence of patent or patent applications is, in some cases, operating as a deterrent to copying. Whether the set of cases where this happens is sufficient (together with any other benefits the patent system offers) to justify all the costs of the system is not something we can address here. But we do hope that we have been able to offer some window into the extent to which the patent system contributes to the prevention of copying of innovation 'out there', beyond the court system.

## Appendix 1: Australian Inventor Survey

The Australian Inventor Survey was mailed out in two waves between July and December 2007 by the Melbourne Institute of Applied Economic and Social Research at the University of Melbourne. The recipients of the survey constituted the population of Australian inventors who filed a patent application at the Australian Patent office – IP Australia – during the period 1986-2005. The survey recipients were identified by the country of applicant (Australia) and their postal address.

The inventor-invention relationship is a many-to-many relationship. That is, one inventor can have many patent applications, and one patent application can have many inventors. In total, there were 43,200 inventor-application pairs in the population with a complete inventor name and address. Of the 31,313 applications, 76.2 per cent had only one inventor and almost all (99.3 per cent) had 5 or less inventors (see Table 17). Of the 31,947 inventors, the vast majority (82.5 per cent) had only filed one application between 1986 and 2005 (see Table 18). To avoid administrative burden, inventors were asked about each invention, up to a maximum of 5 patent applications.

**Table 17: Number inventors per application, 1986 to 2005**

Inventors per application	Number of applications	%
1	23,866	76.2
2-5	7,225	23.1
6-10	218	0.7
>10	4	0.0
Total applications	31,313	100.0

**Table 18: Number of applications per inventor, 1986 to 2005**

Applications per inventor	Number of inventors	%
1	26,360	82.5
2-10	5,506	17.2
11-20	66	0.2
>20	15	0.0
Total inventors	31,947	100.0

There was no initial screening of applications and 47.0 percent of surveys were returned to us (as “return to sender”) unopened, presumably because the address was no longer valid. To estimate the number of non-responses which also had invalid addresses, we selected a random sample of 600 non-respondents and manually looked the applicant up by name and address in both the telephone book and internet. This search revealed that only 11.7 percent of the sample of non-respondents had a complete address and were still at the listed address (some had moved while others had apparently disappeared). Assuming that this is representative of all non-respondents, we can infer that we had a valid inventor address for 5,446 of our original population of inventions. Given we received completed questionnaires for 3,736 inventions, our effective response rate was 68.6 percent.

The following four tables show the pattern of survey response by year of application across various characteristics. According to Table 19, there is a clearly defined rise in the percentage of completions over time. Response rates also varied according to whether the inventor was employed by a large company (63.2 per cent), SME (64.3 per cent), public research organisation (71.2 per cent), or filed as an individual (73.5 per cent), as demonstrated

in

Table 20.

**Table 19: Number of inventions with a complete survey response by year, patent applications 1986 to 2005**

Year	Number of patent applications			
	Complete	Estimated non-complete <sup>a</sup>	Total	% Completed
1986-1990	254	245	499	50.9
1991-1995	553	385	938	58.9
1996-2000	1124	541	1665	67.5
2001-2005	1805	538	2343	77.0
Total	3736	1710	5446	68.6

Note: <sup>a</sup> Number of non-completes exclude surveys that were returned as 'return to sender' and the estimated 65.7% of non-responses which we estimated, through a post-enumeration survey, to have had an invalid address.

**Table 20: Number of inventions with a complete survey response by organisation type, patent applications 1986 to 2005**

Organisation	Number of patent applications			
	Complete	Estimated non-complete <sup>a</sup>	Total	% Completed
Large company <sup>b</sup>	391	228	619	63.2
SME <sup>b</sup>	1361	756	2117	64.3
Public sector research	247	100	347	71.2
Individual	1737	626	2363	73.5
Total	3736	1710	5446	68.6

Note: <sup>a</sup> Number of non-completes exclude surveys that were returned as 'return to sender' and the estimated 65.7% of non-responses which we estimated, though a post-enumeration survey to have had an invalid address. <sup>b</sup> A company is 'Large' where it, or its highest Australian-located parent company, has a turnover greater than A\$50m per annum. Otherwise the company is defined as an SME.

The grant rate (as of the end of 2007) for the entire population of applications lodged at the Australian Patent Office between 1989 and 2000 was 68.4 percent.<sup>50</sup> In Table 21, a simple comparison of the patent grant rates between those that completed the survey and the population in-scope is presented. This shows that the response rate was highest (81.2 per cent) for pending patents (presumably because they are more recent), followed by granted (67.6 per cent), rejected (61.9 per cent) and withdrawn (63.3 per cent) respectively.<sup>51</sup> Finally, Table 22 presents the response rate by technology area. It shows that there is a modest level of variation in the response rate across technology groups. There was a slightly lower response rate from the electricity and electronics area and 'Other'.

**Table 21: Number of inventions with a complete survey response by patent grant status, patent applications 1986 to 2005**

Patent grant status	Number of patent applications			
	Complete	Estimated non-complete <sup>a</sup>	Total	% Completed
Withdrawn	572	331	904	63.3
Pending	731	167	900	81.2
Rejected	382	232	617	61.9
Granted	2051	979	3034	67.6
Total	3736	1710	5446	68.6

Note: <sup>a</sup> Number of non-completes exclude surveys that were returned as 'return to sender' and the estimated 65.7% of non-responses which we estimated, though a post-enumeration survey to have had an invalid address.

<sup>50</sup> We exclude applications lodged between 1986 and 1988 as the high percentage of grants suggests that some non-granted applications are missing from the database.

<sup>51</sup> However, this is partly due to the fact that recent applications have not yet been examined. For applications lodged between 1989 and 2000, the response rate is 12.6 percent for non-grants and 18.6 percent for granted applications.

**Table 22: Number of inventions with a complete response by technology area, patent applications 1986 to 2005**

OST technology area <sup>b</sup>	Number of patent applications			
	Complete	Estimated non-complete <sup>a</sup>	Total	% Completed
I Electricity and electronics	329	181	511	64.4
II Instruments	440	175	617	71.3
III Chemicals, pharmaceuticals	410	166	579	70.8
IV Process engineering	447	187	638	70.1
V Mechanical engineering	1061	476	1542	68.8
VI Other	1048	524	1578	66.4
Total	3736	1710	5446	68.6

Note: <sup>a</sup> Number of non-completes exclude surveys that were returned as 'return to sender' and the estimated 65.7% of non-responses which we estimated, though a post-enumeration survey to have had an invalid address. <sup>b</sup> OST refers to the Office of Science and Technology classification which is based on the International Patent Classification system

**Table 23: Characteristics of the inventions, patent applications 1986 to 2005**

Characteristic of invention	Freq.	Percent
Relative to state of art at time of application, the invention was...		
Incremental improvement	1,158	31.3
Radical improvement	2,240	60.5
Unsure	307	8.3
Did the invention underlying the patent relate to a new or improved...		
Good or product	2,189	59.1
Way of manufacture	1,016	27.4
Both	499	13.5
PCT status		
Paris Convention (non-PCT)	2306	61.7
Patent Cooperation Treaty (PCT)	1,430	38.3
Number of other patents also used to develop product		
None	2,476	66.8
1 to 5	1,101	29.7
6 to 10	86	2.3
11 to 20	22	0.6
20+	23	0.6
Number of prior patent applications by organisation since 1986		
None	1,688	45.5
More than none to 10	1,349	36.4
More than 10 to 50	344	9.3
More than 50 to 100	68	1.8
More than 100	259	7.0
Total	3,736	100.0

Note: the sum of each section may not add to 3,736 if some observations are missing a reported characteristic.

## Appendix 2: Description of the variables

Radical invention	<i>Radical</i> =1 if the inventor described the invention as radical versus incremental.
Patent status	<i>Grant</i> =1 if the patent application was granted, <i>withdrawn</i> =1 if the application had been withdrawn, lapsed or was filed before 2003 and not examined, <i>Pending</i> =1 if filed on or after 2003 and not granted or rejected, <i>Rejected</i> =1 if rejected. Information on the status of the patent was extracted from the official patent office database in April 2007
Patent ownership	<i>Large Company</i> =highest Australian-located parent company, has a turnover greater than A\$50m per annum. Otherwise the company is defined as an <i>SME</i> , <i>Public Research Organization</i> =applicant has institute, department, university or Commonwealth in its name and <i>Individual</i> =identified on the patent office database.
Technology area <i>Ex post</i> estimates of value	See appendix 3 below. <i>Estimated sales revenue to date</i> as described by the inventor, <i>time patent in-force</i> estimated from the patent office database, <i>License or spin-off</i> = 1 if the inventor said that there had been an attempt to licence, sell or transfer the patent to a spin-off company, and 0 otherwise. <i>Make and sell</i> =1 if the inventor indicated that either gathering market intelligence, validate commercial opportunities, trialling the manufacturing process or market launch had been attempted and 0 if otherwise. <i>Mass production</i> =1 if the inventor indicated that an attempt had been made to mass produce the invention and 0 otherwise. <i>Export</i> =1 if the inventor indicated that the invention was exported and 0 otherwise.

## Appendix 3: OST Technology & IPC

OST code	OST technology class	IPC sub-class
	<b>I Electricity - Electronics</b>	
1	Electrical devices - electrical engineering	F21;G05F;H01B,C,F,G,H,J,K,M,R,T;H02;H05B,C;F,K
2	Audiovisual technology	G09F,F;G11B;H03F,G,J;H04,-003,-005,-009,-013,-015,-017,R,S
3	Telecommunications	G08C;H01P,Q;H03B,C,D,H,K,I,M;H04B,H,J,K,L,M;H04B,H,J, K,L,M,N -001,-007,-011,Q
4	Information technology	G06;G11C;G10L
5	Semiconductors	H01L
	<b>II Instruments</b>	
6	Optics	G02;G03B,C,D,F,G,H;H01S
7	Analysis, measurement, control	G01B,C,D,F,G,H,J,K,L,M,N,P,R,S,V,W;G04;G05B,D;G07;G08B,G;G09B,C,D;;G12
8	Medical engineering	A61B,C,D,F,G,H,J,L,M,N
	<b>III Chemicals, pharmaceuticals</b>	
9	Organic fine chemicals	C07C,D,F,H,J,K

10	Macromolecular chemistry, polymers	C08B,F,G,H,K,L;C09D,J
11	Pharmaceuticals, cosmetics	A61K
12	Biotechnology	C07G;C12M,N,P,Q,R,S
13	Materials, metallurgy	C01;C03C;C04;C21,C22,B22
14	Agriculture, food	A01H;A21D;A23B,C,D,F,G,J,K,L;C12C,F,G,H,J;C13D,F,J,K
<b>IV Process engineering</b>		
15	General processes	B01B,D (without -046 to -053), F,J,L; B02C;B03;B04;B05B;B06;B07;B08,B81B,C,B82B,F25J;F26
16	Surfaces, coatings	B05C,D;B32;C23;C25;C30
17	Material processing	A41H;143D;A46D;B02B;B26;B28A-Z,B29;B31;C03B;C08J;C14;D01; D02;D03;D04B,C,G,H,J,L,M,P,Q;D05B,C;D21
18	Thermal techniques	F22;F23B,C,D,H,K,L,M,N,Q;F24,F25B,C,J;27;F28
19	Basic chemical processing, petrol	A01N;C05;C07B;C08C;C09B;C,F,G,H,K;C10B,C,F,G,H,J,K,L,M,N;C11B,C,D
20	Environment, pollution	A62D;B01D -046 to -053;B09;C02;F01N;F23G,J77
<b>V Mechanical engineering</b>		
21	Mechanical tools	B21;B23;B24;B26D,F;B27;B30
22	Engines, pumps, turbines	F01B,C,D,K,L,M,P;F02;F03;F04;F23R
23	Mechanical elements	F15;F16,F17,G05G
24	Handling, printing	B25J;B41;B65B,C,D,F,G,H;B66;B67
25	Agriculture/food machinery	A01B,C,D,F,G,J,K,L,M;A21B,C;A22;A23N,P;B02B;C12L;C13C,G,H
26	Transport	B60;B61;B62;B63B,C,H,J;B64B,C,D,F
27	Nuclear engineering	G01T;G21;H05G,H
28	Space technology, weapons	B63G;B64G;C06;F41;F42
<b>VI Other</b>		
29	Consumer goods & equipment	A24;A41B,C,D,F,G;A42;A43B,C;A44;A45;A46B;A47;A62B,C; A63;B25B,C,D,F,G,H;B26B;B42;B43;B44;B68;D04D;D06F,N; D07;F25D;G10B,C,D,F,G,H,K
30	Civil engineering, building, mining	E01;E02;E03;E04;E05;E06;E21,78
99	Misc	

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Copyright Laws – *Sony* in the High Court

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