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Effect of firm variables on patent price☆

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Abstract In this study, using singleton patent auction price data from Ocean Tomo, LLC, we analyse the effect of firm variables on patent price. Patents owned by small firms attract higher price than patents owned by large firms, if they engage in multi-country filings. The patents owned by small firms get cited more than the patents owned by large firms. The patents owned by individual inventors attract a higher price than the patents owned by organisations when multi-country filings are not included. We believe that the lack of resources is preventing individual inventors from engaging in multi-country filings and maximising the revenue from their invention. A larger representative data should be used to replicate the results before generalising it.

Introduction

The expected value that a patent might deliver in the market is worthy of indepth study. The lack of public data on patent pricing resulted in theoretical rather than empirical research on understanding the dynamics of patent pricing. Nordhaus (1969) and Scherer (1972) studied the trade-off between benefits and costs of patenting. The benefit of patenting is that it provides impetus to research and development; the social cost incurred due to patenting is the deterrence of competition. Heller and Eisenberg (1998) felt that sometimes patents end up as the 'tragedy of anti-commons'. This happens when a stringent patent regime blocks the free flow of information, thereby inhibiting further innovation. But the commercialisation of technology permits the diffusion of technological know-how and nullifies the inefficiencies generated by the patent system (Serrano, 2008).

Hall and Zeidonis (2001) found evidence on how the technology markets helped the rise of 'fabless' semiconductor design firms. In other words, a well developed market for technology is an important source of innovation for every national economy (Serrano, 2008). Gambardella (2007) argues that the market for patents has the potential to turn into a highly profitable economic activity. Various researchers use the terms technology and patents interchangeably. In this paper as well, market for technology and market for patents are used synonymously.

Commercialisation of patents has become a revenue generation tool for most corporate entities. Patents serve as a bargaining chip for business negotiations, licensing and

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cross-licensing (Arora & Fosfuri, 2003; Reitzig, 2003; Silverthorne, 2008). Small firms license their patents due to the absence of proper production and marketing facilities while large firms tend to engage in cross-licensing (Motohashi, 2008). There is a distinction between transfer and licensing (Serrano, 2008). Transfer refers to a change in ownership, while licensing refers to the permission for the use of technology with the guarantee of not being sued by the owner. Transfer of patent rights is one of the other important methods of commercialising a patent (Serrano, 2005, 2008). However, as opined by Lee and Lee (2010), all these methods of patent commercialisation are inefficient, since the information asymmetry in these practices results in an 'unfair and costly transaction of technology'. An improved mechanism for technology transfer would be a robust market place for patent assets where a transaction deal works out for both the buyers and the sellers (Kremer, 1997; Viscounty, De Vries, & Kennedy, 2006). Such an ideal market for patents would be a patent auctions market. Auctioning has the 'potential to eliminate monopoly price distortions and incentives for rent—stealing duplicative research created by patents, while increasing incentives for original research' (Kremer, 1997).

In a recent paper by Sreekumaran Nair, Mathew, and Nag (2011) it was found that forward citation and foreign filings correlated positively with patent price. To further the body of knowledge, in this study, we analyse whether the auction price of patents varies with two exogenous variables namely, size, (small versus large entities) and assignee type, where we try to study the difference between the prices received by individual inventor owned patents versus organisational inventor owned patents. We have used Ocean Tomo real auction price data to perform our analyses.

This paper is divided into six sections. In the next section, patent auction markets are explained in detail. The third section explains the various proxies for patent value. In sections four and five, we report our data and analyses respectively. In the final section, we conclude the paper.

Auctions for patents

Stigler and Sherwin (1985) define market as '… the area within which price is determined: the market is that set of suppliers and demanders whose trading establishes the price of a good'. Auctions are one of the oldest forms of markets (Varian, 2010, p 314). The bidding structure followed by Ocean Tomo is the English auction (also referred to as open ascending bid auctions). In an English auction, the auctioneer starts with a reserve price, the lowest price at which the seller would be willing to engage in a transaction. Bidders offer higher prices. The commodity is transacted at the highest offer, when no one is willing to further improve the bid (Varian, 2010; pp 311). A well designed auction would discourage collusive, entry deterring and predatory behaviour (Klemperer, 2002).

Lee (2009) state three advantages of a patent auction market. Firstly, it provides a platform for the patent holders to exchange ideas. Secondly, it helps the fragmented patents to be 'consolidate(d) in a traditional patent system'. Packaging and pooling patents together (Shapiro, 2001) and auctioning them as a single entity, results in consolidation. Thirdly, auction markets benefit both buyers and sellers. It fetches sellers with 'true market sale' and also provides visibility to their patents even if they do not get transacted in the market place (Ocean Tomo, accessed in June 2009). The advantages for the buyers are 'informed access' and 'equal opportunity' to purchase patents (Ocean Tomo, accessed in June 2009; Viscounty et al., 2006). Patent auctions provide a new avenue for patent monetisation. Patent auctions 'facilitate innovation by providing the mechanism to realise the intrinsic value' of *sleeping* patents (Viscounty et al., 2006).

Kremer (1997) stated that if the seller has private information about the value of a patent, then the buyers would come up with low bids out of the fear of a winner's curse. Therefore, the seller would be willing to disclose information about the patent so that there will be no adverse selection in the bidding.

Ocean Tomo, LLC, Chicago has been involved in patent auctions since 2006. As IP (intellectual property) brokers, they bridge the supply and demand of intellectual capital and are 'active market makers' (Benassi & Di Minn, 2007). Patent brokers act as intermediaries between buyers and sellers. They help remove information asymmetry in the market (Benassi & Di Minn, 2007). This is important in a technology market, as the commodity to be sold is different from any other commodity. The commodities transacted here (patents) are to be used as inputs and have a shelf life. Without patent brokers, sealing the transaction would be difficult and time consuming for both the buyer and the seller.

Proxies for patent value

In this section, we define the variables used in our study along with describing them as found in prior art.

Price

There have been a limited number of studies on patent valuation using the price of the patent as a proxy for value. Harhoff, Scherer, and Vopel (2003) were probably the first scholars to consider the value of a patent as its asset value. They studied patent valuation using the price at which the patent holder was willing to sell his right over the patent. Harhoff et al. (2003) used 11,471 patents granted initially by the German Patent Office in 1977 as their sample. The sample came from a population of 24,116 patents which were granted, out of 57,782 patent applications. It should be noted that one of the studies on patent valuation with price being assumed as the proxy was published only as late as 2003. This shows that research on valuation using the patent price is in an infant stage.

Gambardella, Harhoff, and Verspagen (2008) used the PatVal-EU survey data for their study. They estimated the economic value of a patent by using the data drawn from a large scale survey of European patents. Data was collected for more than 9000 patents (out of 27,000 questionnaire mailings). These were patents granted by the EPO with a priority date between 1993 and 1997. The survey was carried out by asking the inventor, mentioned in the patent

document, the following question: 'Suppose on the day on which this patent is granted, the applicant had all the information about the value of the patent that is available today. In case the potential competitor of the applicant was interested in buying a patent, what would be the minimum price (in euro) the applicant should demand?'(Gambardella et al., 2008; pp. 70).

Giuri et al. (2007, pp. 1107) explain how the PatVal-EU survey was conducted. The paper provides information about '… the characteristics of European inventors, the sources of their knowledge, the importance of formal and informal collaborations, the motivations to invent, and the actual use and economic value of the patents'.

In the above mentioned studies, patents were valued higher than the value predicted using other approaches like the renewal approach (Pakes, 1986; Schankerman & Pakes, 1986) and the re-assignment approach (Serrano, 2005; 2008). This is because the seller is also foregoing potential returns possible from the patent. When patents are sold to a third party, the third party can prevent the initial owner from using the patent any further. And if the patent happens to be a broad one, the sellers could be at a future risk when they attempt further inventions in that particular field. These would force the seller to appreciate the price of the patent and the transacted price will carry a premium of the potential returns foregone (Gambardella et al., 2008).

Forward citations

Forward citations are defined in our study as the number of patent citations that an auctioned patent received till the Ocean Tomo date of sale. Bessen (2008) studied that self citations improved patent value by 3%. There is extensive literature supporting the positive correlation between forward citations and patent price (Gambardella et al., 2008; Harhoff, Narin, Scherer, & Vopel, 1999, 2003; Reitzig, 2004; Sreekumaran Nair et al., 2011; Trajtenberg, 1990). Hall, Jaffe, and Tratjenberg (2005) found that every extra citation improved patent value by 3%.

Foreign filings

Foreign filings refer to whether a patent auctioned has multi-country filings. Harhoff et al. (2003), Guellec and van Pottelsberghe de la Potterie (2000) and Sreekumaran Nair et al. (2011) found that patent value is higher if a patent has multi-country filings. Bessen and Meurer (2008) also found supporting evidence that international filings improve the value of a patent.

Entity size of patent owner

The United States Patent and Trademark Office (USPTO) designates every patent as belonging to either a small entity or a large entity. Individual inventors, small business concerns (with less than 500 employees) and non profit organisations are small entities. For the small entities, the renewal fees are almost halved by the USPTO.

Bessen (2008) found that patents belonging to small firms realise less value than patents belonging to large firms. According to him, this is so because small firms maximise the utility from their patents through alternative means like 'lead-time advantage' or 'because they occupy profitable niches'. Mogee (2003) indicated that patents of small firms have more 'public value' (more forward citations) than patents owned by large firms. She also added that small firms do not patent in foreign countries to the extent that they could, thus missing commercial advantages. Serrano (2008) found that small innovators are active sellers of patents than large inventors.

Assignee type

The ownership (assignee) details of the patent can be identified from the website of the USPTO (Serrano, 2005; 2008; Bessen, 2008). According to Serrano (2005; 2008) and Bessen (2008), patents are assigned to individual inventors if they are not assigned at issue. The patent can be assigned either to inventor(s) or to an organisation. If there is no mention of the assignee in the front page of the patent document, then the inventor is the assignee. Bessen (2008) found that patents belonging to individual inventors have a lower value than the ones owned by organisations. Bessen's study mainly had US assignees.

Data

Ocean Tomo, LLC, a leading intellectual capital merchant bank, describes itself as providing 'financial products and services related to intellectual property, including expert testimony, valuation, research, ratings, investments, risk management and transactions' (Ocean Tomo, accessed on May 2011). The company has been dealing with patent auctions since 2006. Ocean Tomo's is not the only auction format (Landers, 2006). Landers (2006) explains various formats of auctioning: 'bankruptcy proceedings designed to raise funds to pay off creditors, do-it-yourself auctions on eBay.com and a free patent auction website (freepatents.com)'. But none of them have been more successful than Ocean Tomo.

Between 2006 and 2009, Ocean Tomo generated $114.6 million in revenue. In June 2009, Intercapital (ICAP) acquired the transactions division of Ocean Tomo and started a new company ICAP Ocean Tomo. Some firms like Hewlett Packard sell their portfolio of patents themselves. But it is difficult to judge which one is a better avenue for technology transfer — approaching a firm directly or approaching a patent broker for alternative technologies.

Between 2006 and 2008, Ocean Tomo listed 635 patent lots for sale. Out of the 635, 268 patent lots were successfully auctioned. The patent lots consisted of singleton patent lots and multiple patent lots (portfolios). Singleton patent lots have only one United States Patent and Trademark Office (USPTO) *granted* patent in that lot. Multiple patent lots have more than one USPTO *granted* patent. In this paper, we consider only singleton patent lots. We believe that multiple patent lots deserve to be studied separately. Since multiple patent lots have more than one patent in the lot, taking the average of the price of patents in a multiple patents lot would either overvalue a patent or undervalue it. Arriving at average price requires

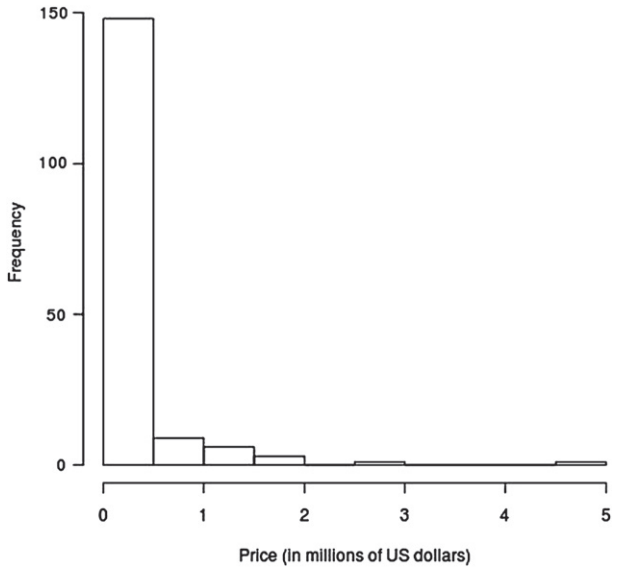

Figure 1 Histogram showing distribution of patent price.

a well researched model. Therefore, we did not consider them in our study.

Out of the 635 patent lots listed for auction, 349 lots were that of singleton patents. From the 349 lots, 167 singleton lots were successfully auctioned by Ocean Tomo. The following types of lots were considered as singleton patent: First, lots which had a single USPTO granted patent. Second, lots which had a single USPTO granted patent and its foreign rights. Third, lots which had a single USPTO granted patent along with pending patent applications. Fourth, lots which had a single USPTO granted patent, its foreign rights and some pending patent applications. We ignored the pending patent applications as it was difficult to get information about them. The entity status of the patent owner and assignee details of the patent was obtained from the website of USPTO. Singleton patent lots form the sample for our study.

Analyses and discussion

All the statistical analyses in our paper were carried out using the statistical package 'R' (R Development core team, 2005). The price of the patents varied from a minimum of USD 2200 to a maximum of USD 4,895,550. The mean price (USD 282,214) is much higher than the median price (USD 132,000). The histogram shown in Fig. 1, describes the distribution of patent price. From Fig. 1, we observe that the price data is skewed and has a long right tail. The skewness of the price means that most of the patents sold are of less value while a few of them are highly valuable (Bessen & Meurer, 2008, p 101). To quote Bessen and Meurer (2008, p. 101), '… no single number can represent the value of patents for all the possible inquiries we might want to make about patent value'. The mean price being higher than median price is the result of skewness in price data.

Classifying patent prices based on foreign filings

We classified the successfully auctioned patent lots into two — lots which had USPTO patent and no foreign filings and lots which had USPTO patent along with its foreign rights. The lots with USPTO patent along with foreign filings turned out to be 68 in number and lots which had USPTO patent and no foreign rights turned out to be 99 in number.

We used the two sample Mann—Whitney test (Table 1) to analyse whether there is any statistically significant difference between the price attracted by the two groups. The Mann—Whitney test showed that both the groups follow different distribution. Lots where a patent is sold along with its foreign rights attract a higher price than the lots with a patent and no foreign rights. Our results are consistent with the work done by Harhoff et al. (2003) and Sreekumaran Nair et al. (2011).

Classifying patent prices on the basis of entity size

We categorised the patents as, either belonging to a large firm or a small firm in order to understand whether patents belonging to large firms have more value than that of small firms (Bessen, 2008). This classification was based on the entity size of the patent owner as on the Ocean Tomo date of sale. One hundred and six patents belonging to small firms were successfully auctioned. The remaining 61 patents that got auctioned belonged to large firms. The descriptive statistics and results of the two sample Mann—Whitney tests are shown in Table 2.

Using the Mann—Whitney test, we analysed whether patents belonging to larger firms were valued more. We found that the price of the patents belonging to both the groups were not statistically different. Patents belonging to smaller firms have more forward citations than the patents belonging to large firms. This is consistent with the commentary by Mogee (2003). Patents owned by smaller firms, 'represent a higher percentage of both the top one percent and top 10% of the patents most often cited in other patent applications' and thereby enjoy a higher public value (Mogee, 2003).

We further divided the patent lots belonging to small and large firms into two, depending on whether the lots included foreign filings or not (Table 3). We found that the

Table 1 Mann—Whitney for testing whether patents auctioned with their foreign rights carry a higher price.

	Lots without foreign rights ($N = 99$)		Lots with foreign rights ($N = 68$)		P value
	Mean	Median	Mean	Median	
Price	243,206	110,000	354,587	206,250	0.00***

Signif. Codes: 0 '***' 0.001 '**' 0.01 '*' 0.05.

Table 2 Mann–Whitney tests for large and small entities.

Variable	Large firm ($N = 61$)		Small firm ($N = 106$)		P value
	Mean	Median	Mean	Median	
Price	205,947	110,000	336,100	164,407	0.106
Forward citations	13.44	5	37.12	13	0.005***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05.

patent prices of both, the small firms and the large firms followed the same distribution when the lots sold did not include any foreign filings. But the patents from small firms carried higher prices when the lots were sold along with their foreign rights. Small firm patents had a higher average and median (USD 473,062 and USD 233,750 respectively) than large firm patents (USD 221,302 and USD 124,792 respectively) when the lots included foreign rights.

Classifying patent prices based on ownership of patents

We investigated the effect of ownership on price. We classified the patents based on whether they were inventor owned or organisation owned. There were 83 inventor owned patents and 84 organisation owned patents. The results of the two sample Mann–Whitney test based on ownership are presented in Table 4.

Bessen (2008) found that the patents owned by individual assignees 'have the lowest patent value' while 'patent values from organisational inventors (mostly firms) are larger'. But in our study, we found that the price of the patents belonging to the two groups were not statistically different. In other words, we could not establish that the patents owned by inventors are less valuable than the patents owned by organisations.

We further divided the price of patent lots classified on the basis of inventor owned and organisation owned into two, depending on whether the lots included foreign filings or not (Table 5). The prices of both categories (inventor owned patents and organisation owned patents) followed different distributions when the lot did not include foreign rights. Inventor owned patents had a higher mean and median price (USD 306,761 and USD 126,500 respectively) than organisation owned patents (USD 144,544 and USD 107,250 respectively) when the lots did not include foreign rights. The price of both categories followed the same distribution, when the lots had foreign filings.

Exogenous variables and patent price

Using Ordinary Least Squares, we tried to verify whether there exists any statistically significant relationship between the price of a patent and the exogenous variables considered in the study. Since, the price data was skewed to the right and non normal, we transformed it to its log value before performing the analysis. The transformed price data was an approximation of the lognormal distribution. The exogenous variables were introduced into the model as dummy variables. Patents belonging to small firms were labelled 'one', and others as 'zero'. Patents owned by organisations were labelled 'one', and others as 'zero'. We took the logarithmic value of patent price as the outcome variable and the exogenous variables as the predictor variables. The results of the regression analyses are presented in Table 6.

In Model 1, presented in Table 6, we regressed the price of the entire sample (N observations = 167) on the exogenous variables. The model was non significant. Both entity size and ownership did not have a statistically significant relationship with price. Since foreign filings have an influence on the price of the patent, we divided the patent lots into lots with foreign filings and lots without foreign filings.

In Model 2 of Table 6, we regressed log-price of patents with no foreign filings on the exogenous variables. The F

Table 3 Mann–Whitney tests for large and small entities categorising them into lots with foreign filings and lots without foreign filings.

Variable	Large firm			Small firm			P value
	N	Mean	Median	N	Mean	Median	
Price (without foreign filings)	29	189,002	88,000	70	265,662	110,000	0.261
Price (with foreign filings)	32	221,302	124,792	36	473,062	233,750	0.007***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05.

Table 4 Descriptive statistics and Mann–Whitney tests for inventor owned and organisation owned patents.

Variable	Inventor owned ($N = 83$)		Assignee owned ($N = 84$)		P value
	Mean	Median	Mean	Median	
Price	306,439	132,000	270,892	132,000	0.77
Forward citations	31.23	12.5	25.68	6	0.205

Table 5 Mann–Whitney tests for inventor owned patents and organisation owned patents further categorising them into lots with foreign filings and lots without foreign filings.

Variable	Inventor owned			Assignee owned			*P* value
	N	Mean	Median	*N*	Mean	Median	
Price (without foreign filings)	60	306,761	126,500	39	145,430	104,500	0.024*
Price (with foreign filings)	23	305,598	220,000	45	379,625	198,000	0.57

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05.

statistic was non significant. We observed that the inventor owned patents attracted a higher price than organisation owned patents when multi-country filings were not included.

In Model 3 of Table 6, we regressed the log-price of patents with foreign filings on the exogenous variables. The model was significant ($F = 3.9$, $p = 0.02$). We found that the patents belonging to small firms attracted a higher price than patents belonging to large firms when multi-country filings were included.

We used Heckman's two-stage sample selection model (or Heckit model) in Models 4 and 5 as seen in Table 6 to check for sample bias. In Model 4, we considered those patents which did not have foreign filings. For the first stage, i.e., the selection model stage, we used entity size and ownership as the covariates to run the Probit. In the second stage, i.e., the regression model stage, we regressed the log of price on ownership and Inverse Mills ratio. A non significant Inverse Mills ratio revealed that the selection bias was absent. But we found that the ownership did not correlate positively with the log of price.

In Model 5, we considered patents which had foreign filings. In the selection model, we used entity size and ownership as the covariates to run the Probit. In the regression model, we regressed the log of price on entity size and Inverse Mills ratio. A non significant Inverse Mills ratio revealed that the selection bias is absent. But we found that the entity size did not correlate positively with the log of price.

We do not have much evidence to conclude on the causal relationship between exogenous variables (entity size and ownership) and the price of the patent. But we noticed that the correlation between the exogenous variables and the price is different in Model 2 (lots without foreign filings) and Model 3 (lots with foreign filings). Patents of small firms attract a higher price than patents of larger firms when both sets of patents have multi-country filings. Mogee (2003) argued that the low 'private' value of patents owned by small firms was due to the lack of their foreign filing behaviour. We observed that as small firms improve their foreign filing behaviour, the private value of their patent also increases.

We found that inventor owned patents attract a higher price than organisation owned patents when both sets of patents do not have multi-country filings. From our data, we noticed that organisations engage in multi-country filings more than individual inventors. Forty five lots out of a total of 85 organisation owned patents had foreign filings, as against 23 out of a total of 83 for inventor owned patents. It is the lack of resources and awareness that may be preventing individual inventors to engage in multi-country filings and maximise the revenue from their patents. Multicollinearity and heteroscedasticity were tested for all models using Variance Inflation Factor test and Breusch Pagan test respectively.

The F statistic in both Models one and two turned out to be statistically non significant. We are therefore cautious in concluding whether patents of individual inventors attract a higher price than patents belonging to organisations when the patents do not have foreign filings. Arora, Fosfuri, and Gambardella (2001), highlight the fact that organisations like Boeing, IBM, Du Pont, Procter and Gamble, Union Carbide and Philips put up their patents for licensing in their web portals. Some of these companies have also used Ocean Tomo to sell their patents. A larger data size is required to generalise whether organisation owned patents indeed attract a lower price, with or without foreign filings. Obtaining such data is very difficult as the most valuable

Table 6 Models of patent pricing for singleton patents (outcome variable: log of patent price).

	Model 1 OLS	Model 2 (without foreign filings) OLS	Model 3 (with foreign filings) OLS	Model 4 (without foreign filings) Heckit	Model 5 (with foreign filings) Heckit
Intercept	5.066*** (0.097)	5.108*** (0.133)	5.035*** (0.119)	5.170*** (0.971)	6.054*** (1.048)
Entity size	0.097 (0.095)	−0.002 (0.135)	0.279* (0.108)	—	0.576 (0.479)
Ownership	−0.002 (0.091)	−0.278* (0.127)	0.193 (0.113)	−0.248 (0.459)	—
Multiple R^2	0.007	0.053	0.106	0.052	0.104
Adjusted R^2	−0.004	0.033	0.078	0.032	0.076
Standard error	0.5608	0.5852	0.4258	—	—
Inverse mills ratio	—	—	—	−0.090 (1.372)	−1.364 (1.636)
F statistic	0.603	2.661	3.865*	—	—
N observations	167	99	68	349	349

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05. The standard errors are shown in the parentheses.

patents of organisations may not always come to the market. The same problem persists when we analyse the relationship between patent price and entity size.

The Heckman model used in Models 4 and 5 does not replicate the results obtained in Models 2 and 3, even though we found sampling bias to be absent. The lack of covariance between selection and regression may also be due to the small sample size and hence is not to be generalised. Replicating this study with a larger representative sample may help confirm the results obtained in this study. Nevertheless, this study takes the knowledge body of patent pricing a step further.

Conclusion

Knowing the value that a patent would deliver in the market is important, but it involves a high degree of uncertainty. Therefore, the decision to patent or not is a difficult one to make for top managements of any organisation, conscious of its financial resources. A detailed study of patent price dynamics is crucial for solving the mystery of patent value. Researchers find it difficult to work on patent value as there is very little publicly available data on patent price for making a breakthrough. Researchers have started focussing on patent auction pricing as a suitable way of determining patent value.

In this paper, we have used real auction price data obtained from Ocean Tomo, LLC. The following objectives are attempted — (i) whether patents owned by larger firms attract a higher price and (ii) whether organisation owned patents attract a higher price.

We found that the patents sold along with their foreign rights fetched a higher price than patents which had no multi-country filings. From our data, we observe that patents owned by small entities get a higher price than the patents owned by large entities, if they engage in multi-country filing. We also observe that patents of smaller firms get cited more. We find that price attracted by patents owned by individual inventors are statistically not different from the price attracted by patents owned by organisations. But inventor owned patents attract a higher price when multi-country filings are not considered. We believe that the individual inventors may be lacking the resources to file in multiple countries and maximise the returns for their invention. Since, the data used for analysis may suffer from sampling bias, replicating these results using large representative data is ideal before generalising the results.

All the above results require more rigorous study using larger data sets, to be accepted with complete certainty. This important shortcoming needs to be addressed in the future by having a larger sample size. The price data of patents is difficult to obtain and this is a challenge for researchers. This paper describes an exploratory empirical study to improve our understanding on patent price. Although many authors have attempted to theoretically describe the phenomena of patent pricing, empirical evidence was scarce. Apart from the variable forward citations, there are only a few studies which validate the relationship between patent latent variables and patent value. We believe that, after addressing the limitations mentioned above, at least partially, framing a theoretical model or hypotheses could be considered. Hence, we have refrained from building a theoretical model for the paper.

An event study of stock prices of assignees around the time the patents were granted and re-assigned would have been interesting. Around two—thirds of our sample consists of patents belonging to small entities. Most of these entities are not publicly listed and hence, doing an event study for this sample was not feasible. An event study can be attempted after collecting more data on the price attracted by the patents belonging to larger firms.

Studying the impact of re-assignments on the price would have captured how small firms license/sell their patents. Unfortunately, a vast majority of the patents are still live at this time of the study and capturing their effect on the price is difficult and may not be exact. Hence, we leave that for future studies. The effect of the role played by the examiner in determining the price of a patent could also be attempted in the future to enhance the understanding of price dynamics.

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