

Professional Perspective

Patent Valuations Across Transaction and Licensing Markets

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Editor's Note: The views expressed in this article are the author's, not those of IPMAP, LLC or the data providers. Except for certain patent transaction samples collected from public sources, data samples analyzed in this study belong to the data providers.

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Patent valuations as reflected by patent sale price and licensing royalty rate have been frequently discussed and sometimes hotly debated in mass media, expert analysis, and scholastic research. However, there have been no studies to examine the relationship, or the lack thereof, among such valuations across the markets of patent transaction and licensing. This study is designed to fill this research gap. By integrating empirical data from the two markets, this article is set to shed light on the relationship between patent transaction valuations and patent licensing valuations.

Economics of Patent Valuation

Assets are claims to probable future economic benefits obtained or controlled by a particular entity as a result of past transactions or events. Similarly, patent assets, a category of intangible assets, are nonphysical and nonfinancial assets that represent claims to probable future economic benefits obtained or controlled by a patent owner as a result of past transactions, R&D, and prosecutions.

Valuation of any an asset is supposed to be represented by the net present value (NPV) of the sum of the expected future cash flow stream generated by the asset, discounted at an appropriate discount rate that reflects the risks associated with the expected future cash flows. Assuming the market is efficient, the fair market price (FMV), which is the amount a buyer is willing to pay and a seller is willing to accept in an arm's length transaction, is supposed to converge with the valuation of the asset.

Such basic economics of valuation applies to patent assets too. However, patent assets do have certain special characteristics that are very different from their physical counterparts, which, in turn, substantially complicate the valuation and pricing process. For example, one can acquire full ownership of a car through a purchase, or only the exclusive rights to use the car through a lease. In other words, while the lessee possesses the car, no other person can simultaneously possess it. By contrast, intangible assets such as patents, software, trademarks, and content (including, e.g., batch reports and expert analyses) can be licensed simultaneously to many different licensees or users. Intangible asset economists refer to the characteristics as nonrivalry attributes or nonrivalry effects.

Therefore, both full patent rights and rights to practice the same patent portfolio have been actively traded in two markets: the patent transaction market in which patent ownerships are sold and bought, and the patent licensing market where the rights to practice the patents are granted and accepted. While the two markets are distinct, the valuation economics are fundamentally identical. Essentially, assuming the market is efficient, the patent price reached in the transaction market reflects the NPV of the sum of the expected future royalty streams from all licenses granted under a patent portfolio, discounted at appropriate discount rates associated with different licensees. By the same token, licensing royalty rate determined in the licensing market can be interpreted as an amortization, benchmarked on the expected dollar sales or profit or units shipped, of the patent price reached in the transaction market.

In efficient markets, the valuations of patents in the transaction market and the licensing market will reflect the same expectation in royalty economics and the associated risks. Accordingly, under the same macroeconomic, legal, and legislative factors, the valuation measures of patent price and royalty rate are expected to comove over time.

The Data

The most pronounced reason why there has been no study to investigate the relationship between the two markets is data availability. Most patent transactions are not disclosed to public. While assignment records with government patent offices will eventually expose a transaction, which has been made much easier and quicker most recently by artificial intelligence and machine learning technologies, the financial terms, such as portfolio price, are usually kept highly confidential. Licensing deals can be even more secretive, as the parties are not required to disclose the licensing itself, much less the financial terms.

This said, publicly traded companies are mandated to report any patent transactions or licenses that would have material impact on companies' financial performance and would affect investors' investment decisions. As a result, financial terms of patent transactions and licenses, as disclosed in companies' filings with the Securities and Exchange Commission, constitute the majority of the data samples available for research in the IP industry. There are concerns that such disclosures may reflect only transactions or licenses with significant financial terms, such that using this financial data to calculate market prices or rates would bias up actual prevailing market valuations. However, since material impact is a relative measure dependent on the size of a reporting company, such an upward bias is actually less than expected.

Patent Price

The patent price data presented in this article stem from a research project started in 2012. The primary purpose of this project is to use actual patent price data to develop an econometric valuation model that would identify major value-contributing factors and decompose the patent prices accordingly, so as to quantify the contribution of such factors. The ultimate goal of the project is to improve the market approach of patent portfolio valuation by creating a multifactor econometric valuation model that will accommodate portfolio-specific factors. These factors include number of patent assets in a portfolio and portfolio characteristics like seller demographics and technology type, deal-specific factors such as backend payment or grant-back, as well as industry-specific factors such as landmark court rulings, new legislation, and USPTO reforms. Please refer to previous studies for details, including the [2015 update](#) published by Licensing Executives Society International.

Currently the project has 377 samples in the database, collected mainly from three sources. The first is online searches of regulatory filings, news releases or news reports, analyst reports, and other public sources. The second source is IP data vendors, including mainly RoyaltySource and ktMINE. An additional source is major patent brokerage firms IPOfferings and Tangible IP, as well as major patent aggregators such as various firms owned by or associated with Erich Spangenberg (IPNav, Marathon Patent Group, and IPWe) and other major non-practicing entities (NPEs).

Table 1. Patent Assets Transaction Samples: A General Description	
	Number of Samples
Patent Sales/Acquisitions	328
Of which: With known counts of issued patents	285
With patent applications only	17
Patent Assets Transactions w Backend Payments	49
Total	377

Among the 377 samples in the database, 328 are straight sales or acquisitions of patent assets. The project defines "patent assets" or "a portfolio of patent assets" to include both issued patents and patent applications. By contrast, "patents" or a "portfolio of patents" includes only issued patents. Of the 328 such transactions, 285 of them have known numbers of issued patents and 17 include only patent applications, which means that 26 deals reported only the aggregate number of patents and patent applications, without separating the two. The database also has 49 deals that are backend or revenue-sharing transactions with no or minimal upfront payment, though such samples are not included in this study.

The most significant difference between the data in this study and those collected by other entities is that ours includes a much wider range of transaction types, seller organization categories, technology fields, and deal structures. For example, AST reports and analyzes some very informative data, but mainly from the Industry Patent Purchase Program (IP3) platform through which they broker deals for large tech companies to buy patents from other brokers, NPEs and individuals. Another example is RPX Corporation, a major patent aggregator that buys patents on behalf of its members, which focuses mainly on certain patents used or likely to be used in litigation against its members in certain highly litigious technology fields.

Royalty Rate

In the licensing market, royalty can be paid in several different forms, including percentage royalty rate based on sales or other profit or cost measures, lump sum payment, milestone payments, or some combination of the aforementioned. According to the 2017 High Tech Deal Term and Royalty Rate Survey [Report](#) of the Licensing Executives Society, USA and Canada (LES USA and Canada), more than half of the licensing deals were executed with sales-based percentage royalty rates. Compared to other prices, a sales-based percentage royalty rate provides a more standardized pricing because it is benchmarked on sales, which makes it more comparable across industries. For this reason, this study will use royalty rate as the valuation measure in the licensing market.

Major royalty data vendors, including RoyaltySource and ktMINE, offer royalty rate data they collected from various sources, mainly SEC filings as discussed above. However, these data sources do not release any annual median and average royalty rate data that are calculated by the method compatible with the method used in this study.

By contrast, the High Tech Deal Term and Royalty Survey of LES USA and Canada is conducted every two to three years, and the questionnaires are sent to mostly LES members with specific questions about the licensing deals entered during the past three years. Based on the data collected from the surveys, LES calculates and releases annual median and average royalty rates. As a result, this study will use royalty rate data from the High Tech Royalty Survey.

The High Tech Sector of LES USA and Canada launched its inaugural High Tech Deal Terms & Royalty Rate Survey in 2011, and has conducted three surveys—2011, 2014, and 2017—since then. The most recent report, the 2017 Survey Report, was released in March 2019. The 2017 Survey Report analyzed the combined samples of 214 transactions with royalty rates from 2008 to 2017, with an average rate of 5.73% and median rate of 5% over the period.

The combined samples cover major technology fields and a wide variety of licensee and licensor organization types. For example, the technology fields include not only typical high tech sectors such as computer and information technology, but also traditional technologies-intensive sectors such as machinery equipment, manufacturing, aerospace, and transportation, as well as certain medical devices, materials, and various others.

Calculation of annual patent prices and royalty rates would largely depend on the numbers of samples that can be collected to the extent time and resources permit. Since the terms of licensing deals and patent transactions are usually kept confidential, especially the financial terms, the numbers of licensing deals or patent transactions for a specific year can be very limited. This, in turn, makes the calculation of annual data highly sensitive to outliers with large number of patent assets or extremely high or low financial payments.

As a result, when calculating annual averages or medians for the valuation measures across markets, assumptions and judgments are made based on the size and distribution of the samples available for a year, so as to make the calculation methodologically correct, fundamentally solid, and factually reasonable. This said, by comparing and contrasting the valuation measures across the markets, the reliability and validity of these datasets can be cross-checked. The existence or lack of the relationships as postulated by valuation economics earlier in this article can reveal information about the reliability and validity of the datasets that otherwise would not be observed.

Patent Price vs. Royalty Rate: Cross-Market Valuation Analysis

Patent Price Data: Descriptive Statistics and the Trend

As shown in Table 1 above, currently there are 328 samples of patent asset portfolio transactions in the database, and 285 of them reported the numbers of issued patents. Each portfolio has at least one patent asset, and a fair number of portfolios actually have only one issued patent. The largest portfolio has nearly 25,000 assets. While the earliest sample dated back to 1990, most samples were from the post-2005 period, with 2011 to 2015 accounting for the largest chunk. To calculate median and average price per asset or per patent, all portfolio prices have been adjusted by inflation to the values in the first quarter of 2020. The maximum portfolio price among the 328 portfolios transacted is computed to be \$6.3 billion, and the minimum, \$3,600. Table 2 reports the average and median prices per asset and per patent.

Table 2. Market Transaction Prices: Per Patent vs. Per Asset			
US\$ in '000	Sample size	Median	Weighted Average
Patent asset portfolios	N=328	\$207	\$241
Patent portfolios	N=285	\$266	\$388

Median price per patent asset is estimated to be \$207,000, while the weighted average price per asset, weighted by the number of assets in an asset portfolio and the portfolio price, is \$241,000. Similarly, for the 285 portfolios with known numbers of issued patents, the median price per issued patent is \$266,000, and the weighted average, \$388,000.

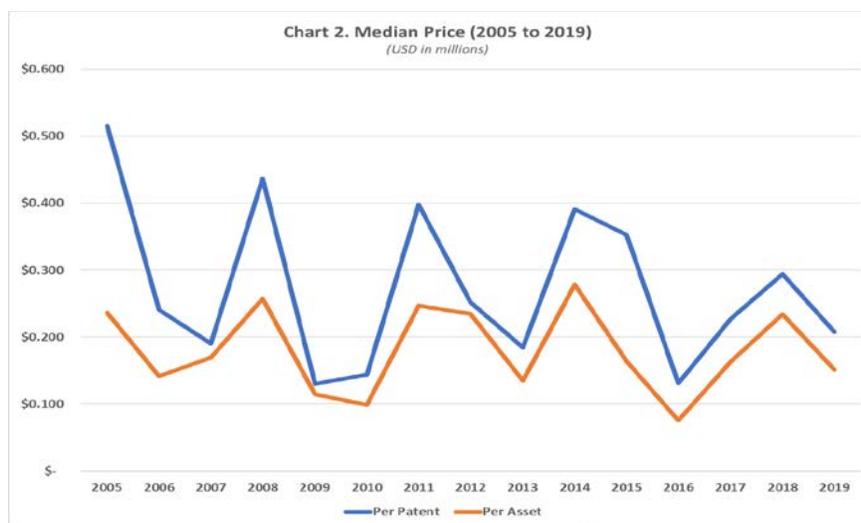
Table 3 presents the price data for portfolios with one issued patent only and with no issued patent, such as portfolios with patent applications only. Portfolios with one issued patent, with or without patent applications, have a median price of \$338,000 and a weighted average price of more than \$1 million. By contrast, the portfolios with only one issued patent, without any patent applications, have a median price of \$225,000 and an average of \$757,000.

Table 3. Market Transaction Prices: Portfolios with 0 or 1 Issued Patent			
US\$ in '000	Sample size	Median	Weighted Average
Portfolios with 1 Issued Patent	N=61	\$338	\$1,093
Of which: Only 1 issued patent (no applications)	N=44	\$225	\$757
Patent Applications Only (no issued patent)	N=17	\$79	\$209
Of which: Excl. 3 pharm deals with highest prices	N=14	\$53	\$162

Table 3 also reports that portfolios with only patent applications have a median price of \$53,000 to \$79,000, depending on whether including the outliers in pharmaceutical assets with the highest prices. The weighted average price of such portfolios has a range of \$162,000 to \$209,000.

The Trend from 2005 to 2019

Charts 1 and 2 illustrate the annual median and average price for patent assets or patents over the 15-year period from 2005 to 2019. First, as expected, the weighted average prices per asset and per patent in Chart 1 are more volatile than the median prices shown in Chart 2, as the average prices are prone to be skewed by large portfolios with extremely high or low transaction prices. Also, median prices seem to be more cyclical, with each cycle spanning about three years. However, by and large, the troughs and peaks of average and median prices coincide across the two charts over the years.



Second, while both charts indicate a largely downward trend since 2005, the trend is much more conspicuous in Chart 2 than in Chart 1. For example, median patent price in Chart 2 has declined from more than \$500,000 in 2005 to in between \$200,000 and \$300,000 during the past couple of years, and each consecutive peak is lower than the previous years. By contrast, while weighted average price per patent declined from \$821,000 in 2005 to somewhere around \$200,000 most recently, there is a platform or podium in between the troughs of 2009 and 2016, during which average patent price stayed between \$400,000 to \$600,000 from 2011 to 2015, as shown in Chart 1.

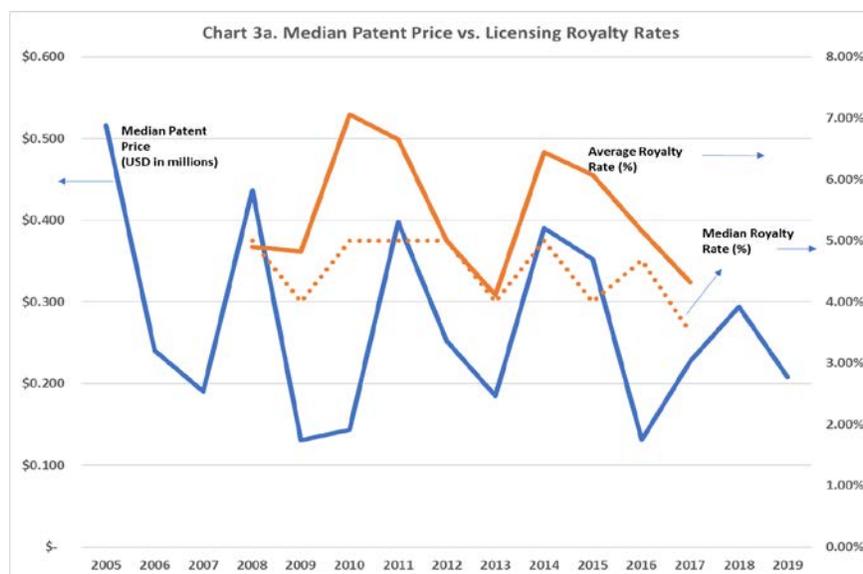
Finally, patent markets seem to have bottomed out after the plunges in 2015-2016, and may have embarked on a path of stabilization and recovery since then. The prices have been on an upswing, with patents being transacted at prices around \$150,000 to \$300,000. Meanwhile, the median prices reached their relative peaks in 2018, but the recoveries failed to achieve their previous peaks in 2014. Also, the decline in median prices resumed in 2019, leaving a question as to whether the generally downward trend since 2005 will continue.

Patent Price in Transaction Market vs. Royalty Rate in Licensing Market

To test the hypothesis postulated by valuation economics, Charts 3a and 3b compare the valuations across patent transaction and licensing markets from 2005 to 2019. As mentioned earlier, the LES USA and Canada High Tech Royalty Survey reported a median rate of 5% and an average royalty rate of 5.73% for the 10-year period of 2008 to 2017. The orange lines in Chart 3a denote annual royalty rates, with the solid line representing average rate and the dashed line reflecting median rate. As shown in Chart 3a, while the annual average royalty rate fluctuated around the historic average

rate of 5.73% over the years, the annual median royalty rate appears to somehow be “capped” at 5%, in the sense that it stayed at 5% for five years and dipped below 5% for the other five years.

Charts 3a and 3b illustrate that the annual changes in average royalty rate mostly coincided with those of average and median patent price, demonstrating the co-movement as postulated by the valuation economics discussed earlier. Also, the discernable decline of the average royalty rate since 2010 seemed to echo the decreasing pattern reflected in the median patent price.



Additionally, all four valuation measures across patent transaction and licensing markets, i.e., average and median royalty rate plus average and median patent price, bottomed in 2013 and recovered in 2014 when they reached their local peaks that were lower than their previous peaks, except for median royalty rate, which did jump back to the historic median of 5%. After 2014, median and average patent price plummeted 66% and 85% during the two-year period, respectively, forming their corresponding new troughs of \$131,000 and \$110,000. While average royalty rate also plunged from 6.44% in 2014 to 4.32% in 2017, the median royalty rate revealed a more distressed situation in the licensing market, to the extent that median rate has been declining, and, more importantly, has been below the historic median rate of 5%, for three consecutive years. LES USA and Canada is expected to launch another High Tech Royalty Survey in 2021, and we will update our analysis accordingly.

Conclusions and Topics for Further Research

This data analysis demonstrates that patent price and royalty rate generally comove with each other, confirming the hypothesis posited by the valuation economics. Also, it seems the valuations across patent transaction and licensing markets have been on a downslope, and that the decline of all valuation measures from their peaks in 2014 were substantial. While royalty rate continued its decline into 2017, patent price data for 2017-2019 seemed to indicate that the patent transaction market had stabilized, albeit at dramatically lower price levels than its previous peaks in 2014. Average patent prices have been gradually recovering, but median prices may portend a continuation of the overall downward trend evident since 2005.

There are several intriguing issues emerging from this study. First, what are the driving forces behind the comovement of the valuations across patent transaction and licensing markets? For example, what are the key determinants that have caused the decline in royalty rate and patent price from their peaks in 2010 and 2011 to their troughs in 2013? What sent the valuations in both markets plummeting in 2016? Since there were no evident supply and demand shocks in these markets, such fluctuations must have been caused by certain exogeneous factors. Further research is warranted to identify these factors.

Second, what about the valuation as reflected by patent damages awarded in the patent litigation market? What is the possible relationship, if any, among the valuations across the markets of patent transaction, licensing and litigation? Theoretically, under U.S. patent laws, patent damages awards shall reflect the past damages in lost profits or lost royalties, implying that damages awards may represent a vindication and reparation, thereby lagging behind valuations in the licensing and transaction markets.

On the other hand, the purpose of license or sale negotiations, most likely, is to avoid potential litigation or to resolve litigation. Therefore, any positive news from litigation such as headline-making damages awards would signal a favorable litigation market and lift the sentiment in the licensing and transaction markets. To this extent, patent damages awards may signal and lead valuations in the licensing and transaction markets. These issues certainly necessitate further research when additional data samples become available.