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Hedonic Regression Shows Promise For Modeling IP Damages

By **Richard Kamprath and Abigail Clark** (April 28, 2021, 5:54 PM EDT)

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To most lawyers, the two words "patent litigation" conjure images of small-print documents filled with dense discussions of technology, written in a language reserved only for those with advanced engineering degrees.

To some extent, these lawyers are correct: Patent litigation involves inventions related to diverse and in-depth subjects such as video coding, cellular communication and pharmaceuticals.

But the technical side of the case is only half of the patent litigation coin — and the other side is, literally, where the money is made. The law is also unsettled here, so this is where new and creative economic models flourish and die and where big verdicts are cut down on appeal. Perhaps surprisingly to the uninitiated, this fluid area of the law is patent damages.

At least one trial team seems to have cracked the hidden code of the patent damages award. On April 21, in VLSI Technology LLC v. Intel Corp., VLSI procured a whopping $2.18 billion damages award in the U.S. District Court for the Western District of Texas for infringement of patents covering energy consumption of microchips.

VLSI proposed a three-pronged damages model. The first two components are commonplace in patent trials. First, VLSI proffered the hypothetical licensing negotiation, which estimated how much Intel would have paid VLSI's predecessor-in-interest if it had known at the time of negotiation exactly how valuable the patented technology would turn out to be.

Next, VLSI presented a patent score from an independent firm that evaluated the strength of the patents at issue. This score found that the asserted patents ranked in the top 10% valuation of similar patents.

But the third prong of VLSI's damages model is the novel component. VLSI used a hedonic regression analysis to model the value of the asserted patents' inventions. While the name is intimidating, the underlying model is straightforward. "Hedonic" just means that consumers prefer certain traits in a good and value the good according to the presence or absence of those traits. Goods are composed of these various characteristics, which affect price and demand.

For example, the price of a good is dependent upon its characteristics: what the product does, how it does it, and how it looks. The hedonic method applies statistical models of varying complexity to determine how a specific characteristic, such as a patented feature, affects the price of a particular product, such as a product accused of infringement.

A regression is a statistical tool that allows the expert to model how, holding all other factors constant, variation in one critical test factor affects the dependent variable. Here, for example, price will often represent the dependent variable, and the key test characteristic will be the infringing characteristic or function.

The downside to this approach is that it is highly specific to the particular product and features

tested, so opponents often attack the selection of specific independent variables as too partial, rendering the model unreliable.

VLSI's key expert witness on damages applied a hedonic regression analysis to estimate the impact of different attributes of Intel microprocessors on their respective prices. The most important factor was the expert's estimate of the price differential attributable to microprocessor speed: the critical benefit of VLSI's patents.

VLSI argued that the infringing components of the chips increased Intel's revenue by a certain percentage, based on the hedonic regression, and that the revenue attributable to the infringing component should be awarded to VLSI as compensation. VLSI's damages expert boiled down the analysis to the following formulas:

Intel's Revenue Increase Due to Use of '373 Patent	(Price-Speed Ratio) (% Reduced Power Use) ($ Accused Product Sales)
Intel's Revenue Increase Due to Use of '759 Patent	(Price-Speed Ratio) (% Increased Performance) ($ Accused Product Sales)

VLSI's damages calculations were based on its technical argument that the inventions at issue decreased the accused microprocessors' power consumption by 5.45% and 1.11%, and that a 1% improvement in power consumption could be valued as a 1% increase in processing speed due to increased efficiency.

Using the hedonic regression analysis, VLSI determined the percentage of price increase attributable to the increase in speed: the price-speed ratio. This ratio represents how much more consumers are willing to pay for the chip based on the increase in its processing speed.

Then, multiplying that ratio by the increase in speed attributable to each of the patented technologies, VLSI multiplied the price-speed ratio, the increase in speed, and the total revenue Intel raked in from the sale of the infringing chips. This formula produced the $2.18 billion figure that the jury awarded VLSI.

Opponents of the regression model argue that, in order for the model to be statistically significant, a hedonic regression must satisfy three requirements: (1) that the seller must be a price taker, i.e., willing to pay the marginal price increase of the characteristic at issue; (2) that the proponent of the regression must have access to data that identifies and quantifies every product attribute affecting price; and (3) that no product attribute affecting price is collinear with the challenged claim.

Counsel attacking the model would argue that these three conditions never occur in the real world, but this is exactly the argument that Intel made, and the jury did not bite.

In rebuttal to VLSI's hedonic regression damages model, Intel shied away from these substantive attacks. Instead, Intel argued that the jury should not award VLSI any damages because VLSI does not produce any microchips that compete with Intel's products. Intel stressed that common sense precluded the award of billions of dollars to an entity that did not produce anything, for one characteristic of a complicated microchip.

The jury did not agree. The jury awarded VLSI damages totaling $2.18 billion for Intel's infringement of the patents. This figure represents the second largest amount of damages ever awarded in a patent infringement case. Intel is now arguing that VLSI is not entitled to collect the award because VLSI has unclean hands because of its high-volume litigation strategy and allegedly dirty trial tactics.

While patent litigators are somewhat inexperienced at applying hedonic regression in patent infringement cases, the method has been widely used in other practice areas — specifically, antitrust and products liability. Proving antitrust injury is difficult for economists, and advocates face an even more difficult burden of convincing a jury.

Experts thus employ hedonic regression to show that, but for the allegedly anti-competitive conduct of the defendant, the price of the good at issue would be different. The idea in an antitrust case is to hold all other variables constant so that the expert can isolate one — the defendant's conduct — and then show the jury how that conduct affected price and compare it to ideal market conditions.

Defendants typically attack hedonic regression in these cases by alleging that the model fails to capture real-world economic conditions. Common arguments are that the plaintiff failed to properly identify the key variables affecting price, and therefore the analysis is unreliable and falls short of the Daubert standard.

For example, in the 2020 antitrust case Commonwealth of Kentucky v. Marathon Petroleum Co. LP, the U.S. District Court for the Western District of Kentucky analyzed whether a gasoline wholesaler acted monopolistically.[1] The plaintiff's expert performed a hedonic regression analysis and purported to demonstrate monopolistic pricing by comparing the price of a specific type of gasoline in three target cities.[2]

He purported to control for every standard market variable and therefore concluded that the difference in price seen amongst the cities was attributable to the defendant's anti-competitive conduct.[3] But the expert failed to control for critical differences between the target cities, such as the number of drivers commuting through the city each day and the cities' respective distances from major petroleum supply hubs. These failings rendered the expert's analysis moot and led to summary judgment in the defendant's favor.[4]

Products liability cases — in particular, class actions that feature a price premium component — sometimes lend themselves to a hedonic regression analysis as well. In these cases, plaintiffs often argue that, but for the defective component of the product, the product would have a potential value increase. The damages ask is then the defendant's revenue on sales of the product multiplied by the hypothetical value increase.

So how does hedonic regression fit into the long-term patent damages landscape? There are lessons to be learned by both defendants and plaintiffs in its application. Looking at hedonic regression as a patent damages model, avenues for attack might exist, depending on how well the expert puts the model together.

One argument is that hedonic regression cannot capture the technical and sophisticated environment of patent licensing and royalties. A defendant could highlight how many variables each party must consider during a typical patent valuation and how difficult it is to calculate a reasonable royalty, even among experts.

Other avenues for challenge could be that the variables used by the plaintiff to control the parameters of the regression were impermissibly slanted in its own favor, and that the plaintiff failed to consider characteristics of the accused products or patents that would have benefited the defendant.

Another argument, if applicable, is that the plaintiff should have factored the price that the plaintiff paid for the patents into the damages model, since the market price could be the best estimate of the patents' value.

Finally, the defendant may argue that the plaintiff's damages model failed to account for the intangible value that the defendant added to the infringing technology when it manufactured a marketable final product, such as a chip. Each of these challenges is highly dependent on the specific facts of the case and the strength of the model created by the plaintiff.

For plaintiffs, hedonic regression looks to be a winning component of a multipronged damages model. A comparison to existing use of the model in the antitrust context will strongly bolster rebuttal arguments against the defendant's challenges to this model. To address allegations that the damages model is impartial, plaintiffs can carefully document each variable addressed in the hedonic regression, demonstrating that the analytics were even-handed and statistically verifiable.

For example, we suggest a clear chart exemplifying each variable considered, which party the variables would benefit in the calculation, and how it would benefit. One of these variables must be

the value that the defendant's work added to the final product, apart from the infringing technology. This type of chart will simplify a judge's determination that the model was fair, reliable, and meets the Daubert standard — and can be easily digested by the jury.

Additionally, the plaintiff should establish that the defendant's pricing of the accused product is responsive to changes in the key characteristic and that no other attribute of the accused product affects its price so dramatically that it would be the only significant attribute.

Finally, a plaintiff should clearly and plainly document how he or she weighted each analyzed characteristic and how the characteristic affected the final damages figure to stave off motions for judgment as a matter of law and the inevitable appeal.

The scope of the litigation between VLSI and Intel is so large that U.S. District Judge Alan Albright determined that it could not be resolved with just one trial. The patents at issue in the second trial claim the benefits of integrated circuits with internal fully integrated voltage regulators. The experts that VLSI called to the stand previewed the same type of damages analysis that took center stage at the first trial. VLSI hammered home the fact that the asserted patents allow the chip to idle and save energy.

In the second trial, VLSI asked for a further $3 billion in damages. But this time the jury found that VLSI did not establish, by a preponderance of the evidence, that Intel infringed any of the claims at issue, so the parties did not reach the question of damages. Notably, however, the jury decided that Intel did not prove that any of the asserted claims were invalid.

This dramatic outcome sets the scene for the third scheduled trial of the final set of patents VLSI asserted against Intel. And based on VLSI's successful navigation of the patent damages waters in the first trial, we can again expect nothing short of show-stopping damages figures. All thanks to this relatively new application of the tried and true hedonic regression model to patent damages.

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[1] Kentucky v. Marathon Petroleum Co. LP , 464 F. Supp. 3d 880, 893 (W.D. Ky. 2020).

[2] Id.

[3] Id.

[4] Id. at 894.
