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How Willingness To Pay Informs Damages Methodology

By **James Nieberding** (April 5, 2023, 4:25 PM EDT)

A recent article in the Journal of the Patent and Trademark Office Society discusses the increased use of choice-based conjoint, or CBC, surveys in high-stakes litigation where claimed damages can exceed \$1 billion — noting that it has been the subject of 15 court decisions in 2021 alone.[1]

In a litigation context, experts frequently use data from CBC surveys to estimate consumers' willingness to pay, or WTP, for certain product features.

While WTP estimates are used in marketing and business applications to help firms understand their customers' preferences and price sensitivity, they increasingly are being used in litigation as part of an expert's damages methodology.



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Choice-Based Conjoint Surveys and Willingness-to-Pay Estimates

Recent cases involving WTP estimates based on CBC surveys include:

- The 2020 Nemet v. Volkswagen Group of America Inc. case in the U.S. District Court for the Northern District of California, in which WTP estimates were calculated for vehicles with defeat devices;[2]
- The 2021 Dennis MacDougall v. American Honda Motor Co. case in the U.S. Court of Appeals for the Ninth Circuit, in which WTP estimates were calculated for vehicles with defective transmissions;[3] and
- The 2021 Williams v. Apple Inc. case, also in the Northern District of California, in which WTP estimates were calculated for iCloud storage being partly outsourced versus fully in-house.[4]

This article provides an example of how choice modeling can be used to generate WTP estimates using data from CBC surveys.[5]

Such surveys are used to evaluate simulated consumer purchase decisions regarding new product designs, and to evaluate consumers' average WTP for various product attributes.

This technique aids in market research by allowing firms to understand how customers value different components or features of their products or services. CBC surveys typically show respondents a product with varying characteristics that highlight price-attribute tradeoffs at different price points, and present respondents with a series of options asking them to select their preferred one, or none at all.

The survey data can be used to inform firms' pricing decisions, and to generate metrics such as consumers' average WTP for particular product attributes.

The goal of a CBC survey, where respondents select their choices among competing alternatives, is to present product profiles in a way that mimics the consumer decision-making process in the actual marketplace.

By presenting survey respondents with different hypothetical product and attribute scenarios — some of which include the product characteristic of interest — a CBC survey allows for the determination of so-called partworths, or the implied valuation of a particular product feature.

Moreover, statistical analysis of the survey data can provide an estimate of the average WTP for various product features, as illustrated in the example below.[6]

Experts increasingly are using CBC surveys in consumer class actions to estimate price premiums paid by buyers due to misrepresented product attributes or undisclosed product defects.

Plaintiffs alleging such false claims typically argue they did not receive the benefit of the bargain because, but for the challenged conduct, they would have paid a lower price or would not have purchased the product at issue, or that the product they bought has diminished in value subsequent to the disclosure of the alleged misrepresentation.

CBC surveys also are used by experts in product liability and patent infringement matters to estimate consumers' average WTP for the particular product attribute at issue, as well as in antitrust litigation.[7]
[8]

There is concern, however, that CBC surveys and the resulting statistical analyses are being used improperly in estimating price premiums or WTP in product liability and patent infringement matters.[9]

An Example of Obtaining WTP Estimates From Survey Data

Suppose a survey is conducted to gauge consumers' preferences for various programming features from a pay-TV provider so as to estimate their average WTP for those features.[10]

In particular, survey respondents are presented with different pricing and programming scenarios for pay-TV packages. Each scenario has four different combinations of programming, a price and a fifth "no purchase" option. The respondents then make their choice among these five options.

The observed choices by respondents can be analyzed using discrete-choice regression models, such as a multinomial or conditional logit model.[11]

These types of models are widely used in modern empirical microeconomics to estimate demand or to analyze choices made between alternatives, and can be used to infer WTP for individual product attributes.

In the pay-TV example, the dependent variable in such a discrete-choice model represents the option preferred — 1 through 5 — for a given scenario by a survey respondent.

A particular type of independent variable used in this analysis is called a dummy variable, which takes on the value 1 if a certain condition holds and 0 if the condition does not hold.

For example, in coding the survey data, a movie dummy variable is defined as 1 if a particular package in a given scenario contained premium movie channels; if not, then it is coded as 0.

These independent variables are attributes of the choices faced by the respondents. For example, does the offered TV package consist of only basic programming pack, or some other combination such as the basic package plus sports?

In discrete-choice models, the WTP for a certain product feature — or, more precisely, for small increases in that feature — is calculated as the ratio of the regression coefficient on that characteristic to the regression coefficient for price.[12]

The basis for this calculation is that, based upon economic principles, each regression coefficient represents a marginal utility, and the ratio of marginal utilities is known as the marginal rate of substitution.

The marginal rate of substitution between the product feature of interest and price describes how much income the consumer would be prepared to forego to obtain more of that feature. Thus, it can be interpreted as a WTP.

Suppose the regression model in the pay TV example has the following set of independent variables and

regression results in Table 1:

- A dummy variable for whether the offering is from a certain pay TV provider;
- A dummy variable for whether the "no choice" option was selected;
- Separate dummy variables for whether the offering included the basic offering-only — the base case — movies-only and sports-only;
- Separate dummy variables for whether the offering included the basic offering plus movies, the basic offering plus sports, movies plus sports, and the basic offering plus movies and sports; and
- The price of the package being offered.

The WTP as compared to the price of the basic-package-only option is based on the formula: the negative of the coefficient on the package dummy divided by the coefficient on the price variable. For example, for the basic and movie programming package, this is $-(1.4140)/(-0.0662) = 21.36$.

These coefficients are highlighted in Table 1.

Thus, the average consumer is willing to pay up to \$21.36 to add the movie channels to the basic package.

Table 1: Regression Results from the Discrete-Choice Model

Variable	Coefficient	Standard Error	z-stat	p-value
Company dummy	0.0728	0.1040	0.70	0.48
Movie only dummy	-0.6975	0.2352	-2.97	0.00
Sports only dummy	-0.6645	0.2304	-2.88	0.00
Basic and Movie dummy	1.4140	0.2643	5.35	0.00
Basic and Sports dummy	0.9864	0.2558	3.86	0.00
Movie and Sports dummy	0.6260	0.2765	2.26	0.02
Basic and Movie and Sports	2.0879	0.3632	5.75	0.00
Price	-0.0662	0.0115	-5.74	0.00
No choice dummy	-1.1612	0.2889	-4.02	0.00

Concluding Remarks

Notwithstanding the ongoing debate regarding the ability of CBC survey data to reliably approximate real market outcomes for use as a damages methodology in litigation, this technique has been widely used in marketing, economics and public policy in a variety of settings to elicit information on consumer preferences, and to inform models of consumer behavior and demand.[13]

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[1] George Derpanopoulos, Jaci Overmann and C. Paul Wazzan (August 2022), "The Use of Conjoint Analysis in High-Stakes Litigation: A Historical Review up to *Navarro et. al., v. Procter and Gamble* , Which Withstood a Rigorous Daubert Challenge," J. Pat. & Trademark Off. Soc'y, 102(3), pp. 502–526.

[2] This lawsuit is part of the MDL In re: Volkswagen "Clean Diesel" Marketing, Sales Practices and Products Liability Litigation (U.S. District Court for the Northern District of California). <https://www.law360.com/articles/1328555> (Nov. 13, 2020).

[3] <https://www.law360.com/articles/1451001/9th-circ-ejects-honda-s-win-in-defective-transmission->

suit (Dec. 22, 2021).

[4]

<https://storage.courtlistener.com/recap/gov.uscourts.cand.346246/gov.uscourts.cand.346246.110.0.pdf> (May 28, 2021).

[5] CBC surveys and the resulting data are based on the "stated preferences" of survey respondents, and can be contrasted with the analysis of actual market data to estimate WTP based on consumers' "revealed preferences". As an example of this latter approach, Hiller et. al. estimate a representative consumer's WTP for various smartphone features (e.g., \$33 for NFC functionality). Hiller, S., Savage, S. and Waldman, D. (2018), "Using aggregate market data to estimate patent value: An application to United States smartphones 2010 to 2015", *International Journal of Industrial Organization*, 60, 1-31.

[6] A hedonic price regression is another approach used to analyze the value contribution of individual product features. In this methodology, the price of a product is modeled as a function of its characteristics in order to obtain estimates of the contributory value of each one to price. However, the regression coefficients from these models are not generally interpretable as WTP estimates except in very specific instances. See, e.g., Hulten, Charles R. (2003), "Price Hedonics: A Critical Review," *Federal Reserve Board of New York Economic Policy Review*; and Pakes, A. (2003), "A Reconsideration of hedonic price indices with an application to PCs," *American Economic Review*, 93(5), 1578-1596.

[7] See e.g., Greg Allenby, Peter E. Rossi, Lisa Cameron, Jeremy Verlinda and Yikang Li (2017), "Calculating Reasonable Royalty Damages Using Conjoint Analysis," *AIPLA Quarterly Journal* 45(2), pp. 233-253 (discussing how patent damages experts have used CBC surveys to calculate consumers' valuation of the infringing level of the attribute); and Lisa Cameron, Daniel McFadden & Pablo Robles (2022), "Price Premium Damages in Product Market Litigation: Issues in Survey-Based Market Simulations," in *Product Liability 2022*, pp. 23-32 (discussing the use of CBC surveys by experts to estimate price premiums and how such techniques can provide unreliable damages figures if they do not take the supply side of the market into account when estimating but-for prices).

[8] See e.g., Akemann, M., Reed-Arthurs, R., and Zona D. (2018) "Conjoint Analysis: Applications in Antitrust Litigation," Chapter 31, *Handbook of Marketing Analytics: Methods and Applications in Marketing Management, Public Policy, and Litigation Support*, Edward Elgar Publishing (discussing the use of CBC surveys and conjoint analysis in antitrust litigation).

[9] See e.g., Hussan, S. and Vildan, A. (2019), "An Assessment of Analytical Tools in Product Liability Matters – Perspectives from Economics, Marketing, and Consumer Behaviour," in *ICLG's Product Liability 2019*, Chapter 3 (discussing analytical challenges of using CBC analysis in product liability matters); Bernard Chao and Sydney Donovan (2021), "Does Conjoint Analysis Reliably Value Patents?," *American Business Law Journal*, 58(2), pp. 225-269 (discussing how CBC surveys may be more informative about the relative values of a product's attributes rather than their specific monetary values); and Allenby, G., Brazell, J., Howell, J. and Rossi, P. (2014) "Economic Valuation of Product Features," *Quantitative Marketing and Economics* (2014) 12, 421-456 (discussing how WTP derived from CBC surveys do not relate to the economic value of a patent regarding the incremental equilibrium profits it generates).

[10] The example is from work done by the author to develop WTP estimates for certain pay TV services.

[11] These are a particular type of multiple regression analysis – a statistical technique used to analyze the relationship between a 'dependent variable' and various 'independent variables' thought to be associated with variation in the dependent variable.

[12] The regression coefficient obtained for price in the pay TV example is interpretable as the marginal disutility from paying another dollar of income for a programming package.

[13] See, e.g., Ben-Akiva, M., McFadden, D., and Train, K. (2019), "Foundations of Stated Preference Elicitation: Consumer Behavior and Choice-based Conjoint Analysis", *Foundations and Trends in Econometrics Series* (10), 1-144.