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Twelve Angry Men: Jury Deliberation and Consensus

It seems that Americans cannot get enough courtroom drama. From *Perry Mason* to *Law and Order*, dramatized court cases have long been staples in prime-time TV. Today we have live coverage of whichever trial catches the media's attention, and we have numerous programs dedicated to analyzing each of the high profile trials' personalities. But while much of what we see occurs in the courtroom, the most important and intriguing drama may occur behind the closed doors of the jury room.

In a recent paper, *PERC Research Fellow* William S. Neilson and Ohio University Professor Harold Winter present a formal model of the jury deliberation process. (*PERC* working paper #0221.) Their paper links an existing model of consensus, which has a continuous decision variable, to a deliberation model, which has a binary decision variable. The model also formally defines a deliberation rule.

Since disagreement is often a major topic in jury deliberation, their work adds to the consensus model by not only identifying factors that make a group agree, but also factors that make one disagree. In addition, the model looks at when deliberation determines the outcome of a trial, and finds that deliberation is an important determinant of the outcome whenever jurors disagree before the deliberation starts. This, of course, is the most interesting scenario and the one that all analyses of jury behavior consider.

The authors show that when a consensus exists, unanimous verdicts must match the consensus assessment of the evidence. Therefore, deliberation aggregates the jurors' assessments of the evidence, and the jurors who have a large influence in the deliberation process are most significant in the determination of the verdict. The paper also identifies what must occur for a trial to hang, and what factors in the deliberation process matter most.

For a unanimous verdict, the only considerations that affect the trial outcome are the jurors' initial assessments of the

evidence, the manner in which they influence each other, and the timing of the final vote. Finally, the paper allows us to determine the impact of relaxing the unanimity requirement. Doing so removes the link between the consensus assessment and the trial outcome, and the verdict may disagree with the consensus assessment of the evidence. Consequently, the information aggregation properties of consensus are lost. Furthermore, the timing of early votes becomes important, whereas only the timing of the final vote matters when verdicts must be unanimous. Because of this, relaxing the unanimity requirement makes the process by which jurors reach a verdict much more critical.

Although Neilson's and Winter's deliberation model has been applied to the determination of a verdict in a criminal trial, the model can easily be adapted to fit other types of trial deliberations. For example, in a civil trial, instead of having to find a defendant "guilty beyond a reasonable doubt," a jury can find against a defendant if there is a "preponderance of the evidence." In terms of the model developed in the paper, the only change required is a change in the interpretation of the threshold level of the strength of the evidence. The model can also fit deliberation in the punishment phase of a civil trial. While agreement on a verdict only requires all jurors to end up above or below the threshold level of evidence, an agreement on a specific dollar amount of award requires a consensus to be reached.

The model can also be used to describe and analyze deliberation over whether a convicted defendant should be punished with death or life imprisonment. In this case, the jury has already deliberated over the strength of the evidence before deciding whether to convict or acquit. The punishment deliberation, then, could determine the standard according to which the defendant is sentenced to death. The disagreement in this setting is about what constitutes sufficient evidence to warrant a death sentence, and the jurors must agree in order to determine the punishment. Since the ultimate



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choice is binary, the analysis proceeds according to the jury deliberation model.

A final implication of the authors' model is that it adds to our understanding of jury selection. The academic literature on jury selection largely focuses on peremptory challenges and broad juror biases pertaining to race and gender. Furthermore, since the Supreme Court's decision in *Batson v. Kentucky*, prosecutors and defense lawyers have been somewhat constrained in using peremptory challenges to eliminate jurors who are believed to have racial or gender biases toward defendants. But even if the *Batson* decision has effectively limited the role of jury selection in some contexts, the model suggests that jury selection can consist of far more than simply trying to identify jurors who may either be pro or anti-defendant.

Also of great concern is how jurors are predicted to affect the deliberation process, and the authors allow for the impact of these particular character traits through the

introduction of consensus weights. An example of an implication of their model is its ability to predict that a defense attorney may be less concerned with striking a juror who is predicted to be severely anti-defendant but may have little influence in the deliberation process, compared to a juror who is predicted to be only slightly anti-defendant but may have greater influence during deliberation.

While the likelihood of being able to identify consensus weights during *voir dire* and the empirical validity of their role during deliberation remain open questions, the jury consultant profession has relied on their claim of being able to predict how different juror personality types may interact. For example, one jury selection strategy is to deliberately pick jurors who are expected to explode in the jury room. Doing so increases the likelihood of a hung jury, which may be the best outcome a lawyer can expect in a given case.

Eating Out in China

In the last decade, China has experienced rapid growth in per capita real income and urban population with an annual increase of about 7% and 2.3%, respectively. Associated with the growth in per capita income and urban population is an increased reliance on dining out. From 1992 to 2000, the food-away-from-home (FAFH) share in total food expenditures increased from 5.03% to 14.70%. Given the rising importance of the FAFH expenditures, it is of interest to look at the factors that have contributed to the growth of FAFH expenditures and how much further they are expected to grow in the future.

Until the 1980's, there was relatively little value added in China's food sector and FAFH consumption. Consumers prepared most meals at home with grain, raw vegetables, and meat they produced or purchased from state-run food stores or directly from farmers. Along with China's rapid income growth of the last 20 years, Chinese consumers have begun eating more meals in restaurants, cafeterias, and dining halls.

After 15 years' negotiations, China officially became the 143rd member of the World Trade Organization (WTO) in December 2001. China's inclusion in the WTO has been a significant trade issue for the U.S. and other large trading countries. China has committed to eliminating all non-tariff trade barriers and to significant tariff reductions.

Tariffs on agricultural products are scheduled to drop from an average of 22% to 17% by January 2004. China has also committed to eliminating most foreign-equity and geographic restrictions. China's service sector accounts for one-third of its GDP, and food processing and food services are major components of the service sector. With one-fifth of the world's consumers, its new membership in the WTO, and rising per capita income, many observers believe that China will emerge as a major force in world food service markets.

A better understanding of the factors associated with FAFH expenditures has become increasingly important to anticipating



changes in the food commodity market, in forecasting food demand, in predicting changing eating patterns, and in designing effective marketing programs for both domestic and international restaurants.

A recent paper by *PERC Research Fellow* Qi Li and coauthors Cheng Feng and Isik Min uses a newly developed nonparametric approach to examine some of the important determinants of FAFH spending. (*PERC* working paper #0215) Nonparametric methods have the advantage of allowing flexible regression functional forms.

However, when dealing with a mixture of categorical and continuous variables, the conventional nonparametric method is unsatisfactory, because the conventional approach is to split the sample into many discrete cells and use the data in each discrete cell to estimate a nonparametric regression function with the remaining continuous variables. This sample splitting method often results in huge finite sample efficiency losses and it can even become infeasible when the number of discrete cells is large relative to the sample sizes.

The recently developed cross-validation-based techniques used to smooth both the discrete and the continuous variables do not suffer the above-mentioned problem. Recent studies indicate that smoothing the discrete variables often leads to much better out-of-sample predictions than the conventional sample-splitting nonparametric method and the commonly used parametric methods.

Using China's Urban Household Survey data, the authors show that this newly proposed nonparametric estimation method gives a much better estimation result than a parametric linear model. The methods employed also reveal how consumption changes for different income levels, for different demographic regions, and over time, which may not be easily detected by commonly used parametric specifications.

The paper indicates that income is a significant determinant of FAFH spending and that income elasticities in China are much higher than in the U.S. China's income elasticity

between 1992 and 1998 years has increased (the parametric model fails to detect this tendency), which suggests that the FAFH consumption market in China has yet to reach its full potential.

Household size affects FAFH expenditures in an interesting way. The authors find that the three-person family spends the most on FAFH. Given that families of this size are a growing percentage in China, this result suggests that family size is becoming a more important factor in determining FAFH consumption.

The paper's nonparametric estimation results show significant nonlinearities in the FAFH regression function, and a specification test suggests that the parametric linear model is misspecified. The cross-validation selected smoothing parameters suggest that in 1992 the consumption behavior in large city households is quite different from middle and small city households, and this difference becomes smaller in 1998. In contrast, the parametric model is unable to detect this tendency.

The authors also point out that the nonparametric estimation method employed can provide comprehensive and detailed economic interpretations of FAFH consumption behavior and patterns. This is important in determining marketing methods and targeting potential customers for fast-food and family restaurants.

Based on the estimated income elasticities from this study, China's urban FAFH expenditure is projected to grow at more than 8.5% or \$1.35 billion annually, keeping other factors constant. The growth in FAFH consumption provides great opportunities to foreign companies in the restaurant and prepared food sectors. In recent years, U.S. owned fast food and family style restaurants have become more popular with Chinese consumers. U.S. food products have gained a good reputation for high quality, unique taste and reliable supply, and more Chinese restaurants are adopting Western menu items. The techniques employed in this paper provide a useful methodology for the study of these trends as they unfold.