August 10, 2017

Dear Professor Healy,

Thank you for giving me the opportunity to review Ben Edelman's many excellent papers, and to reflect on his fundamental and unique voice in the economics profession. He has a deep knowledge of economics, the law, and computing, that enables him to provide original and important insight into the economics of digital markets. Professor Edelman's research is consistently rigorous, and addresses important issues for management and policy. His research has had a wide impact on scholarship, the classroom, business practice, the legal profession, and government.

Before I begin, let me provide a brief summary of my qualifications and perspective. I am the [redacted] I received a PhD in economics at [redacted] in 2002 and went directly to [redacted] I am a Research Associate at the [redacted] and help organize some of the [redacted] initiatives around the economics of digitization. Like Professor Edelman, I have focused on digital markets. In terms of service, I am a Senior Editor at [redacted] the premier journal in quantitative marketing. In the past, I have served as a co-editor at the [redacted] and as an associate editor at [redacted] and the [redacted] I know Professor Edelman primarily through his work. While I have seen him present at conferences, have been impressed with his work from afar, and have cited his research on several occasions, I do not know him well personally.

I will describe the contributions of his many excellent papers below. First, I want to emphasize what makes Professor Edelman's perspective so important. At the NBER Summer Institute last month, Professor Edelman discussed Anja Lambrecht and Catherine Tucker's paper on Algorithmic Bias. It was the best discussion I have ever seen of any paper in any context. He explained the paper to the audience, described why it mattered, provided a critique, and did so with a perspective that no other economist (or lawyer) could provide. In particular, his discussion emphasized the legal principles that economists need to understand how their research might matter. The discussion was informative for the paper, but, more importantly everyone in the room learned something, from the PhD students and assistant professors to the Clark Medal winners and past editors of the AER. We all learned how to think about the legal meaning of

economic research. To be able to provide this extraordinary discussion, it required a deep understanding of the economics and a deep understanding of the law (and for that matter, a solid understanding of computer science). The ideas in his discussion are now a key component of a book I am writing on managing artificial intelligence.

No other scholar has these skills at the level of Professor Edelman. His economic papers are top level contributions, worthy of tenure at an elite school like Harvard. He also brings a legal expertise that informs his interactions with the profession and his research. I know that some economists find the legal perspective abrasive. Legal scholarship often involves advocacy in a way that is unfamiliar and uncomfortable to economists. Importantly, this advocacy perspective does not appear in his economic publications. They conform to the norms of the profession. However, the research topics he chooses, and his popular writing and general influence outside the academy, build on the legal perspective. This is what makes his perspective so distinctive and important.

In what follows, I will focus on the quality of his research from an academic economic perspective. Nevertheless, the benefit of the legal expertise cannot be ignored. That expertise is fundamental to his influence. The discussion at the NBER is but one example of the unusual combination of knowledge he brings to the profession.

Of his papers, perhaps the most important so far is his paper with Ostrovsky and Schwarz, "Internet Advertising and the Generalized Second Price Auction" in the *American Economic Review*. This paper forms the foundation for our understanding of the properties of the auctions for advertising. Such auctions are backbone of the billions of dollars of revenue collected by Google and other internet advertising platforms. Professor Edelman's paper provided a solution to understanding the strategic and welfare consequences of auctions for vertically differentiated products when only one is purchased. I distinctly remember the first time I read this paper and the clarity it provided to understanding why generalized second price auctions are so powerful, and when they break down. We has built on this work in two other papers, "Greedy bidding for Keyword Auctions" with a number of collaborators in *ACM Transactions on Economics and Computing* and "Strategic Bidder Behavior in Sponsored Search Auctions" with Michael Schwarz in the May 2010 *American Economic Review*. He has continued to explore how advertising systems affect strategy and welfare. Unlike the generalized second price auction, Groupon advertising has proved less successful. Professor Edelman successfully identified the challenges for this kind of advertising in his paper "To Groupon or Not to Groupon" with Jaffe and Kominers in *Marketing Letters*.

I expect his recent (2017) paper in *American Economic Journal: Applied Economics*, "Racial discrimination in the sharing economy" with Luca and Svirsky to be similarly influential with time. While AEJ-Applied is a very good journal, I nevertheless believe this paper is under-placed. It belongs in the AER, the QJE, or another "top five"

[redacted]

economics journal. The paper is important for two reasons. First, it shows that minority guests were discriminated against at Airbnb. It does this in an extremely careful and convincing way. Second, it sparked a conversation in the media and within Airbnb that ultimately led to changes in how Airbnb operates, leading to reduced discrimination. These changes were only possible because the research showed how Airbnb's website structure was inadvertently enabling discrimination. The paper showed the economic mechanism in addition to documenting the fact of discrimination. I expect this paper to be a model for impactful research on discrimination (and perhaps in other areas too). It shows the discrimination without accusation. It does so in a way that clearly lays out the drivers of discrimination, and so suggests a pathway through which it can be overcome.

A third influential academic economic paper is "Price Coherence and Excessive Intermediation" with Wright in the *Quarterly Journal of Economics.* Like the papers above, this paper provides a clear basis for understanding a phenomenon that is newly important because of technological change. It examines the empirical phenomenon that users often pay nothing to use intermediaries. They show that this leads to excessive use of the intermediary, reducing welfare. It was cited in Jean Tirole's Nobel Lecture on *Market Failures and Public Policy*, as an example of the challenges of regulation. Neither laissez faire nor blunt regulation is appropriate.

Ben has two papers that appeared in a top marketing journal, the *Journal of Marketing Research.* I served as the Associate Editor for the paper "Design of Search Engine Services: Channel Interdependence in Search Engine Results" (with Lai). I was very happy to accept this paper. It shows how Google's flight search led to more paid clicks and fewer organic clicks on the search engine. So, the flight search product increased Google's revenue, and also increased the cost to online travel agents. The analysis is careful, and creative, showing a causal link from flight search results to paid clicks. It shows how design decisions have large economic consequences in the context of the Google platform. Broadly, it provides an economic perspective on a newly emerging advertising technology. It helps understand substitution patterns between different types of information provision in the online context, and the incentives that platforms have to display some information over others.

The second paper in the *Journal of Marketing Research* is "Risk, Information, and Incentives in Online Affiliate Marketing" with Brandi. It shows how technology changes might have enabled advertising fraud, and by explaining the mechanism, it proposes what might be done to reduce such fraud as it relates to management structures.

He has a number of other interesting papers. His *AEJ-Microeconomics* with Schwarz unveils challenges in a rarely-considered but important aspect of internet commerce: The marketing for IP addresses. His *Organization Science* with Larkin examines gaming of online ranking systems in the context of research papers on SSRN. His

Information Economics and Policy with Gilchrist shows how many consumers might be misled by advertisements because they do not know that they are advertisements. Like his other work, all of these bring interesting insight into important topics in economics and management. They identify interesting questions that have emerged with advances in technology, and provide an economic framework for understanding the challenges that arise.

He also has an extraordinary number of important general interest articles that explain how digital technology works, and how it might affect business, law, and the economy. While these are outside the standard criteria for research-based tenure, they add to his already excellent research portfolio by increasing the potential impact of his ideas. I assigned his "Priced and Unpriced Online Markets" in the *Journal of Economic Perspectives* (*JEP*) and "How to Combat Online Ad Fraud" in the *Harvard Business Review* to my MBAs when I taught Digital Marketing. I recommend that all my PhD students read the *JEP* article "Using Internet Data for Economic Research". After reading a great deal about Bitcoin, it wasn't until I read his *JEP* on that subject that I really understood the phenomenon. In addition, his various HBR, computer science, and law papers on platforms and online legal issues do an exceptional job clarifying the underlying economic ideas for a wide audience.

The combination of legal understanding, interest in influencing government, firm, and non-profit policy is distinct and has given Professor Edelman extraordinary impact on policy, business, and the academy.

Generally, while I am best positioned to comment on the research output and overall impact, the packet included information on teaching and service. This record also seems to be excellent. His teaching materials are good. While I do not teach courses for which they are appropriate (I have taught statistics and marketing), I find his note on platforms to be very useful. Furthermore, the American Airlines case is extremely well done and I have heard my colleagues complement it on many occasions. Professor Edelman has been involved in course development, and MBA and executive teaching. He serves on various department committees, and, amazingly, has developed software to help with teaching. Professor Edelman has also provided reviews to a variety of journals. When I have asked him for reviews at [redacted]nd other journals, his reviews are always careful, thoughtful, and clear. On both these dimensions, this seems excellent, though I want to make clear that I relatively little information to judge the teaching component in particular.

Your letter specifically asked me to compare Professor Edelman to other scholars in his field of his vintage, along with a few other related questions. There is no one like him. He has a unique and powerful perspective. I have written promotion letters in the last three years for scholars at Chicago, Stanford, London Business School, Cornell, Kellogg, and a large number of other places. Professor Edelman's record dominates all of them in several dimensions: Quality of the top papers, quantity of papers, quantity

of papers in top journals, diversity of outlets, influence in the academy, and, perhaps most importantly, influence beyond the academy.

Overall, I hope it is clear that I am an enthusiastic supporter of Ben Edelman's case at HBS. He has a distinctive perspective that is extremely valuable to the profession has a whole. His record is unusual, in the sense that he is well-known for his advocacy and policy ideas that are related to, but independent of, his academic research. Nevertheless, looking through his scholarly papers, it is clear that his research output alone is excellent. His working papers suggest promise of continued excellent academic achievement. And his overall influence goes well beyond this excellent research output.

Please do not hesitate to ask me if you have any further questions about my letter.

Sincerely,