

Modeling Discriminatory Bargaining Practices in Automobile Dealerships: A Replication and Extension of the Emergence of Classes Bargaining Model

An agent-based bargaining model of heterogeneous buyers and consumers is implemented to model the emergence of race- and gender-based statistical discrimination in the American dealership system of automobile-buying; and to simulate the impact on discrimination of Internet-based automobile dealerships and proposed anti-discriminatory changes to American franchise law. The bargaining model integrates agent-based modeling in the social sciences, empirical legal scholarship, and game-theory based analyses of legal problems.

Building on the work of Axtell, Epstein, and Young in their multi-agent bargaining model simulating the emergence of economic classes between heterogeneous “tagged” and “untagged” agents¹ and the replications of Axtell et. al. model performed by Poza et. al.², the bargaining model begins by replicating via reverse-engineering the model and results of Axtell and Poza. The resulting dynamics are consistent with both the original Axtell model and the Poza replication: starting from random initial conditions, some model runs converge to an equitable Nash equilibrium of bargaining behavior while others fall into a fractious state.

The bargaining model introduces a new extension that comes out of Ian Ayres’s empirical studies on car-buying discrimination and the game-theoretical framework Ayres proposes to explain the underlying causes discrimination.³ Ayres’s framework is implemented in the bargaining model so the interaction of the heterogenous agents resembles the salient features of the car-buyer/car-dealer interaction observed in the field. The resulting modification is first calibrated according to Ayres’s empirically observed parameters assuming complete information. The agents are subsequently given incomplete information and have to make statistical inferences of opposing agents’ bargaining behavior based on their memory for agents with and without a “tag”—here a proxy for race or gender. The extension’s results are broadly consistent with the tag-based offer price discrimination observed by Ayres, and remain consistent with the dynamics of the original Axtell and Poza model.

Finally, two different dealer types are introduced to simulate the entrance of Internet-based tag-blind dealerships and the passing of a hypothetical law requiring “haggle-free” bargaining. The results are broadly consistent with predictions in the legal and economic scholarship—statistical discrimination is profitable enough that a market-based solution alone will not change a discriminatory outcome; and that a “haggle-free” requirement would result in an overall reduction in discriminatory bargaining outcomes.

¹ R. L. Axtell, J. M. Epstein, and H. P. Young, “The emergence of economic classes in an agent-based bargaining model,” in *Social Dynamics*, S. N. Durlauf and H. P. Young, Eds., pp. 191–211, MIT Press, Cambridge, Mass, USA, 2004.

² D. J. Poza, F. A. Villafañez, J. Pajares, A. López-Paredes, and C. Hernández, “New Insights on the Emergence of Classes Model,” in *Discrete Dynamics in Nature and Society*, vol. 2011, Article ID 915279, 17 pages, 2011. doi: 10.1155/2011/915279. Available at <<http://www.hindawi.com/journals/ddns/2011/915279/>>

³ I. Ayres, *Pervasive Prejudice* (2001).