

Technology and the Financial System
by
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Discussion by
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Introduction

- Susan has done a very good job of summarizing the role of machine learning and artificial intelligence
- She has many interesting and important papers on this that I recommend to you
- The presentation mentions the issue of financial regulation and what I will do is dig a little deeper with regard to this very important area using two examples

Example 1

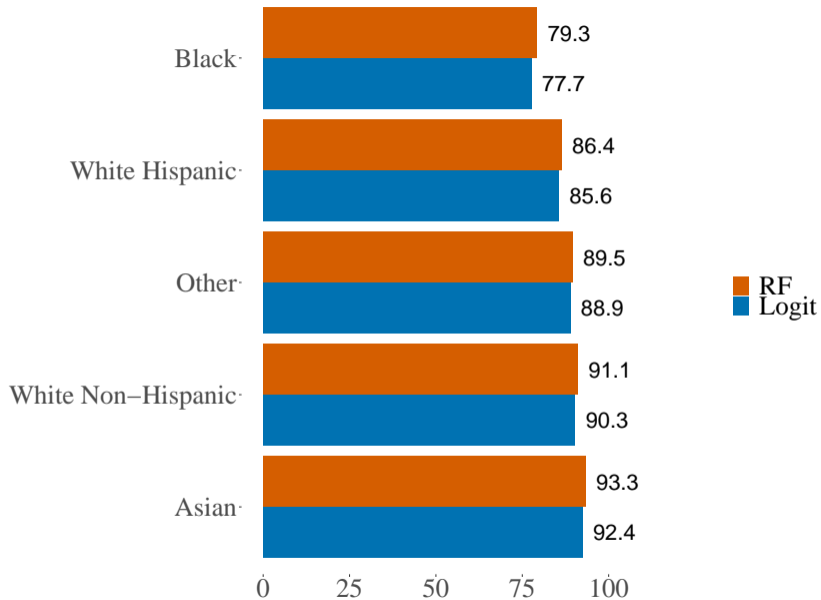
- One area where financial regulation is very important is ensuring the lack of racial discrimination in loan decisions
- Fuster, Goldsmith-Pinkham, Ramadorai and Walther (2018) compare the use of traditional credit scoring techniques (Logit) with those based on state-of-the-art machine learning techniques (Random Forest) with no explicit racial information incorporated in the analysis
- They find the following important results

Example 1 (cont.)

- With machine learning techniques, people in some minority groups pay higher rates than when conventional techniques are used
- The dispersion of interest rates both across groups and within in groups increases
- Machine learning techniques are effectively able to work out based on aggregate distributions the relative probability of a person belonging to a particular group

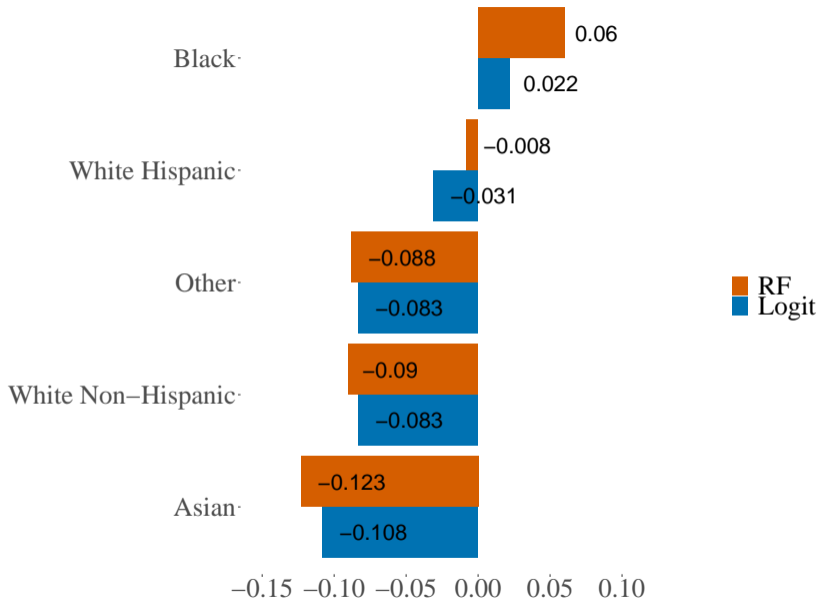
Model Outcomes

- Acceptance rates



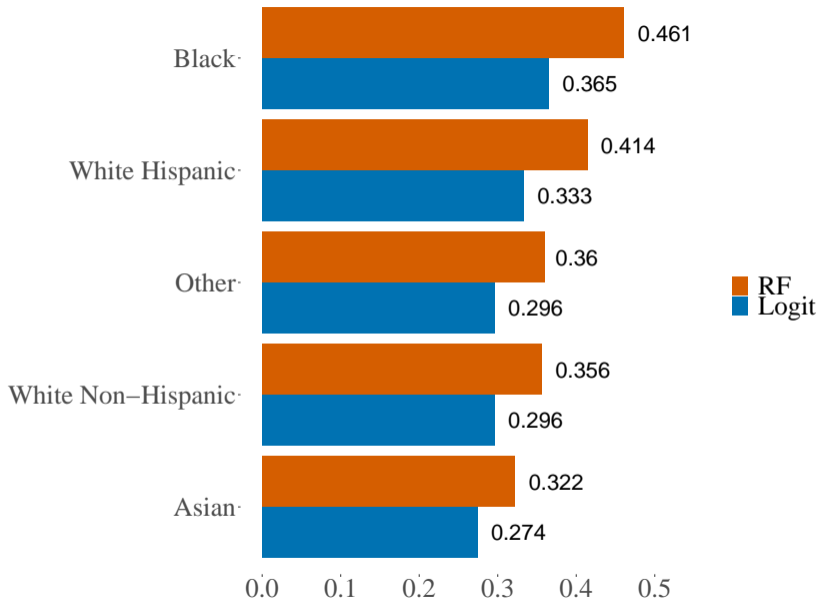
Model Outcomes

- Acceptance rates
- Average SATO
(= $R - \bar{R}_t$)



Model Outcomes

- Acceptance rates
- Average SATO
(= $R - \bar{R}_t$)
- S.D. of SATO
→ new technology
increases
dispersion *across*
and *within* groups



Implications for regulation

- How should regulators respond to these changes from using machine learning techniques?
- Possible responses
 - Ignore
 - Regulate input information even more tightly
 - Regulate rates charged
- None of these are very attractive

Example 2

- Another important issue is the extent to which machine learning techniques allow financial institutions to take unobserved risks
- An old example is Allen and Karjalainen (1999) who use genetic algorithms (then state of the art) to see if returns can be increased investing in risk free government securities and the S&P 500
- They find that buy and hold returns are the same but the algorithm can reduce risk by knowing when to be in the risk free and when to be in the S&P 500
- In an agency context this means investment managers can take potentially significant risks
- Again regulatory options not appealing

Concluding remarks

- Machine learning seems likely to complicate financial regulation
- We need to carefully consider the options and what can be achieved without triggering an arms race

References

Fuster, A., P. Goldsmith-Pinkham, T. Ramadorai, and A. Walther (2018). “Predictably Unequal?” The Effects of Machine Learning on Credit Markets,” SSRN 3072038.

Allen, F. and R. Karjalainen (1999). “Using Genetic Algorithms to Find Technical Trading Rules,” *Journal of Financial Economics*, 51, 245-271.