Siming Yan

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Re: The Energy Policy Institute at Chicago (EPIC)

Dear Professor Steve Cicala and search committee members,

I am writing to apply for the *Predoctoral Fellowship* in the Energy Policy Institute at Chicago. I have completed four years of undergraduate training in energy and environment engineering and one and a half years of graduated level training in applied economics, which enables me to have an excellent understanding of both energy industry and economic analysis techniques, furthermore makes me a great fit for this position.

During one and a half years of training at the University of Wisconsin-Madison, I developed a good understanding of econometric analysis and machine learning methods. My interest in data analysis has grown through my experience in learning from the courses. During my first semester, I developed several models with fixed effects and clustered errors, therefore evaluated the econometric impact of 68,000 households' energy-consuming behavioral response to the implementation of energy-saving programs. This study is built upon a random controlled trial and I obtained statistically significant results in the interest variables to prove the effectiveness of such program implement. My interests then went to machine learning. In the following semester, I used machine learning techniques such as *Support Vector Machine*, *Random Forests* and *Stochastic Gradient Boosting Machine* to predict used car price in the India market from the year 1996 to 2019, and also identified causal inference by using *Ordinary Least Squares*, *Orthogonal Machine Learning*, *LTE Lasso Regression*, *Causal Tree* and *Causal Forests*. My results showed *Stochastic Gradient Boosting Machine* generated best predictions with lowest *root mean square error*, followed with *Random Forests* and *SVM*.

Currently, I finally have a chance to manipulate my own data of power plant monthly electricity-generating data in Shanxi province, China, from December 2016 to June 2020. My data includes 485 power plants in Shanxi with four different types of fossil-fuel, the hydro, wind, and photovoltaic. I used my data set to answer three questions that I am interested in:

1. How COVID-19 effects power plant production behavior;
2. How different types of plants and ownership of plants (owned by nation or private company) behaved during the COVID-19.
3. How is electricity production behavior reflect local economic vitality?

In this study, I again used econometric tools and neural networks to quantify COVID-19 impacts. I found that during the COVID-19 the production of fossil-fuel plants has significantly declined, however, hydro plants, wind plants, and photovoltaic plants that require less human involved onsite operations have increased compared to the same period before COVID-19. As for different ownership types, the nation owned plants tend to have a larger capacity and generated more electricity during the pre-COVID-19 period, but decreased more during the COVID; on the other hand, the private-owned plants tend to have a smaller capacity and generated less electricity during the pre-COVID-19 period, but decreased less or even increased during the COVID. These interesting findings might be a guidance to the policymakers and an inspiration to deal with future emergence situations.

Before I came to Madison, Wisconsin, I served as a research assistant at the department of economics, North China Electricity Power University. I collected data and manipulated data of power plants in Shanxi province, interpreted the relationship between electricity generated and air pollution, and presented our visualized data and what we found in the causal inference to the audience.

During my undergraduate period, I earned a bachelor's degree in Energy and Environment System Engineering and a bachelor's degree in English. My graduate thesis with the title of *Numerical Study on Boiling Heat Transfer of R1234yf* is honored as the outstanding bachelor's graduation thesis of Donghua University, class of 2018. This is a numerical simulation of a new type of refrigerant performance used for car air-conditioning system. This new type of refrigerant R1234yf is proven to have similar performance and lower greenhouse gas emission compared to multiple types of traditional refrigerants.

I will complete my master degree in Agricultural and Applied Economics at the University of Wisconsin-Madison in December, 2020. I believe that my solid background in both energy and environment industry and economics, strong technical skills, and interest in engaging with professors and collogues uniquely position me to serve as pre-doctoral student in EPIC pre-doctoral program.

Thank you for your consideration.

Sincerely,

Siming Yan