Mateus Souza,
our new EnergyEcoLab member!

This academic year we are welcoming a new member to our team at EnergyEcoLab. Mateus Souza is joining us as a Postdoctoral Researcher to help with ongoing work, as well as to start new projects on energy and environmental economics. Last August, Mateus completed his PhD in applied economics from the University of Illinois at Urbana-Champaign. Most of his doctoral research consisted of analyzing policies/programs, behavioral nudges, and market failures related to residential energy efficiency and conservation. He has experience with traditional econometric modeling, experimental design, and with novel machine learning techniques for causal inference.

In a paper recently published at the Journal of Environmental Economics and Management, Mateus and coauthor Erica Myers investigate if behavioral nudges are effective for promoting energy savings in a context where tenants do not have monetary incentives for conservation. Specifically, they conducted a field experiment in a large undergraduate residence hall, to test if energy consumption reports would encourage students to lower the thermostats in their rooms (thus generating energy

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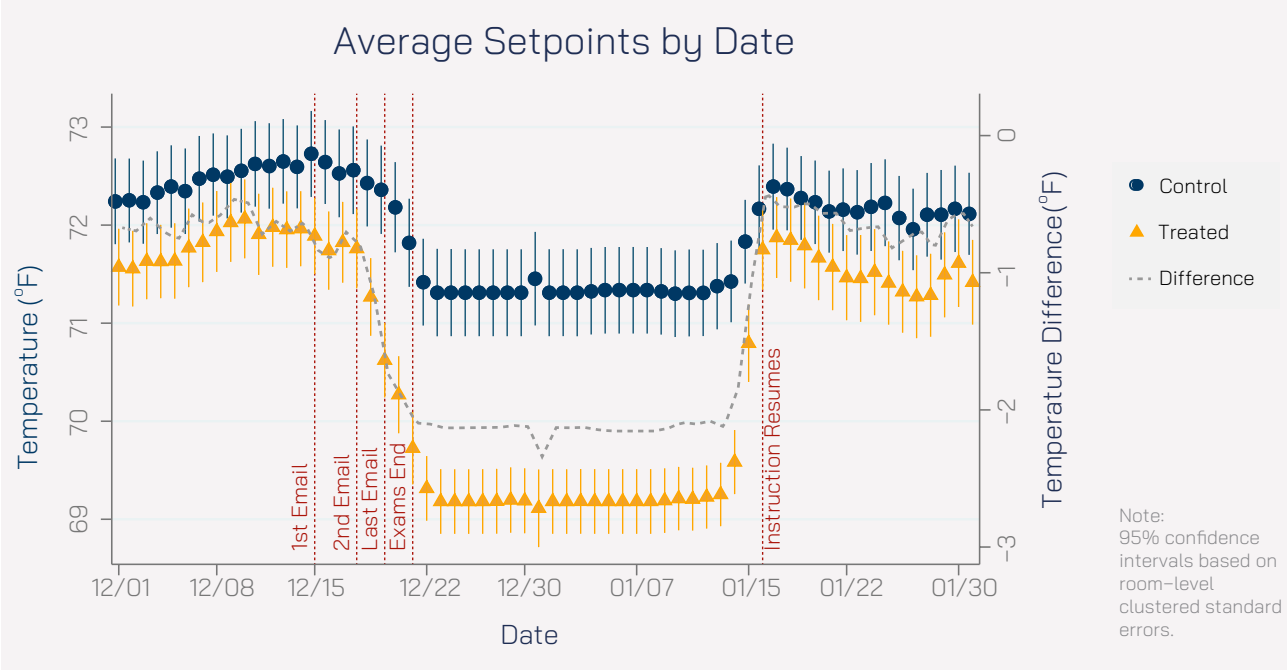
savings). The energy reports were designed to appeal to "social norms" by comparing students' own energy usage vs. that of an average or efficient neighbor. That type of nudging has proven to be effective in normal residential contexts (in which tenants do pay for their energy bills). However, Myers and Souza find that the energy consumption reports did not induce any change in behavior of students who do not directly pay for their energy (as they pay a fixed bill for rent at the beginning of each semester). Therefore, without monetary incentives, behavioral levers alone may not be effective. With a secondary experiment, Myers and Souza rule out inattention or that the students were completely ignoring the energy reports. They sent simple email messages to students asking them to lower their thermostats prior to leaving for vacations. As seen in the figure below, those messages were effective, as students in the "treatment group" (those that did receive nudges) had significantly lower thermostats during the winter vacations. These findings reveal how the timing of behavioral nudges is crucial to generate effects.

Myers and Souza find that the energy consumption reports did not induce any change in behavior of students who do not directly pay for their energy

Still in the context of residential energy efficiency, Mateus has been part of a team of economists, engineers, and computer scientists to evaluate a large federally funded program in the US. They analyze the Weatherization Assistance Program (WAP), which provides subsidies for low-income families to have their homes' heating and cooling systems completely retrofitted. For an E2e working paper, the team focused on understanding discrepancies between ex ante engineering models of energy savings from the program versus ex post realized savings according to measured energy usage. In this setting, ex ante projections are often used to decide which types of upgrades to

Figure 1. Thermostat setpoints of treated vs. control rooms. Testing the effectiveness of nudges sent prior to winter vacations.



perform. Therefore, any errors in the projections can lead to misallocations of program resources. The team sought to understand which factors contribute most to this "wedge." To look at this question, the team analyzed a rich dataset of weatherized homes' monthly energy consumption, along with detailed information from energy audits. Using a machine learning based approach developed by Mateus, it was possible to construct counterfactuals of what the energy consumption of the homes would have been in case they had not been weatherized. That approach also allowed more precise heterogeneity analyses to disentangle the main factors associated with the wedge. Results suggest that up to 41% of the wedge can be explained by systematic biases in the modeling of savings, with up to 20 percentage points being attributed to one retrofit category: wall insulation. The estimates also indicate that the wedge could be reduced by up to 43% if all contractors performed at the level of the top 5th percentile. Finally, there is evidence that a few households slightly increased their thermostats after their homes were retrofitted, accounting for up to 6% of the wedge. Therefore, the implications are that correcting the systematic biases and improving ex ante projections from WAP could significantly improve the allocation of program funds. Further, significant differences in workmanship in the program may warrant enhanced training, oversight protocols, or contractor incentives.

Looking ahead, as part of the EnergyEcoLab, Mateus will continue to pursue research in topics related to energy and environmental economics. This semester he will start by getting acquainted with the Lab's ongoing projects, both in terms of the research questions/objectives, as well as with respect to the data sources available to the team.

Further reading

Souza, M. (2020) "Predictive Counterfactuals for Treatment Effect Heterogeneity in Event Studies with Staggered Adoption" available here.