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PERCSPECTIVES ON RESEARCH



Steven Puller,
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University of Chicago and Ph.D. in Economics from the University of California at Berkeley. His academic appointments include: Research Associate for the National Bureau of Economic Research, Research Affiliate for the International Growth Centre, Faculty Affiliate for The E2e Project, and is an Adjunct Professor for the Bush School of Government and Public Service. He is a past recipient of the Association of Former Students' College-Level Distinguished Achievement Award for Teaching and has received multiple grants from organizations including USAID, the National Science Foundation, the Robert Wood Johnson Foundation, and the New York State Energy Research and Development Authority. His primary research areas are empirical industrial organization and the study of energy markets.

With global temperatures and energy prices soaring, having expertise in energy economics is quite fitting. What first kicked off your interest in energy economics?

I grew up in the Houston in the 1970s and 80s, so the energy industry was just a part of my childhood. I cheered for the Houston Oilers. My family worked in the oil refining industry, so we had stints in oil towns in Texas, Louisiana and Venezuela. I could see how energy was the lifeblood of important parts of the economy.

And then in college, I took a course that led me to read about the history of air pollution in the U.S. and some of the early policy to address the health effects of air pollution in the middle part of the 20th century. The country faced some very real air pollution problems - just do a google image search for "Donora Pennsylvania 1948" if you don't believe me.

These different experiences made it clear to me that there are important trade-offs - energy is an important driver of economic growth and also a contributor to environmental and health externalities. But it wasn't clear to me how to think about these trade-offs. Any policy would have some winners and some losers...how should we decide what to do? Around the same time that I was taking the course that I just mentioned, I started taking classes in economics. I really appreciated how economics provided a rigorous framework to analyze how we should balance these trade-offs. And that has led me to study energy economics.

In recent years, you've written a series of papers on energy market availability, pricing, usage, and emergency relief in developing countries. As part of the research-finding process, you actually traveled overseas. Why did you choose Ghana and what prompted you to physically travel there?

For the early part of my research career, I studied the domestic U.S. energy scene. And there are many exciting dimensions of domestic energy policy to understand. But the real growth in energy consumption going forward is likely to occur in developing economies such as India, China and Sub-Saharan Africa. By chance, I met an economist from Ghana at a conference and we got to talking about power reliability - basically are the lights always on and is the power voltage from the wall socket at the target level? In many low-income countries, the power just isn't reliable. Obviously, this is quite different from the situation we experience in the U.S., so I wanted to find a way to study this.



I applied for a small grant from the International Growth Centre, which is a research organization based at the London School of Economics that connects academics with stakeholders in low-income countries. I formed a research team with IGC economist James Dzansi and Texas A&M graduate student Brittany Street (now an Assistant Professor at University of Missouri). We spent about a week in Ghana meeting with representatives from the electric utility, the power commission, the ministry of finance, and other groups to plan a study of how power reliability impacted the financial health of the utility. Since that initial trip, we've returned several times to meet with stakeholders to gather data and to share research results.

One particularly enjoyable part of my travels to Ghana was to visit the Aksomombo Dam. This is a hydroelectric project where a dam on the Volta River has created the largest man-made lake in the world. Ghana relies on hydroelectric power from this dam for a lot of its power. On one hand, this is a "plus" because hydro power is less carbon intensive than other fuel sources, but there is risk that droughts can disrupt power supply for the country.

As researchers who normally study data series from the confines of our office spaces, what benefits or variables did you uncover with your visits?

I cannot imagine doing microeconomic research without spending time in the setting that one studies, whether that be meeting with policymakers in Ghana or talking to energy traders who compete in the Texas electricity market. Even when your research is using econometric tools on data, it is ultimately the people or firms behind those data that you are studying. In my view, one needs to speak with those people to provide context to the data, to formulate your econometric model in a way that matches the institutions that you study, and to properly interpret the results that your analysis generated.

Personally, I have enjoyed very much the time spent interacting with people in the settings that I have studied. Over the years, this has taken me not only to Ghana, but also to power trading operations in Houston, to a Native American tribe in North Dakota, to the antitrust regulator in the Philippines.

You have taught a range of courses from undergraduate econometrics to graduate industrial organization. What is your favorite topic to teach and why?

I actually love the fact that I get to teach a range of courses on different topics to students at different stages of their academic careers. But if I had to pick a favorite, it would be teaching undergrads to understand the difference between correlation and causality. I know that might sound trite, but it's actually quite challenging to teach and fundamental to learning.

I tell the students that in their professional lives, they will be confronted with someone taking a correlation between X and Y, and saying that it proves that X causes Y. It could be a business discussion about the role of advertising and increasing sales. It could be in a policy discussion around the impact of pre-K education on lifetime earnings. I think that students can be very influential in their professional careers – whatever those may be – if they can distinguish correlation from causality and, importantly, articulate to others whether the impact is real. I have found it so rewarding to see the process as students acquire this skill.

What advice would you give to undergraduates who are interested in pursuing a PhD in energy economics, industrial organization, or public economics?

First, I'll offer the standard advice: get involved in a research project with a faculty member or PhD student – you'll get a first hand look at the joys (and challenges) of research. And take more statistics and math than is required for an undergraduate economics degree.

And, secondly, find two people to talk to – one who was in your shoes a few years ago and is now in the midst of PhD research, and one who was in your shoes but opted for another professional pursuit. Also, ask each of them where they want to go professionally and why. Listen to how these answers resonate with you.



DISBURSING EMERGENCY RELIEF THROUGH UTILITIES: EVIDENCE FROM GHANA

The first warnings from health officials of an oncoming wave of infections began in late 2019. As the Covid-19 public health crisis rapidly spread, it was often followed by deep economic downturns that disproportionately affected the world's poorest. Many governments responded by expanding or introducing social protection programs, or transfer programs, to provide for the needs of their residents. The aid provided by these transfer programs materialized in different forms, such as providing food or food subsidies, direct cash payments, or energy relief programs. In PERC working paper 2108, Steven Puller, PERC's Professor in Free Enterprise, along with coauthors Susanna B. Berkouwer, Pierre E. Biscaye and Catherine D. Wolfram, explore how program design affects the efficiency and distributional implications of these policies, as well as political popularity, by studying an electricity transfer program in Accra, Ghana.

During the coronavirus pandemic, 215 countries introduced or expanded government transfer programs to provide for their residents' needs. Just over half of those countries sent direct cash payments, which often required residents to sign up online, provide bank account or tax information, or confirm residency to receive payments. Without widespread internet access, proliferation of the use of banks, or proof of residency, the government of Ghana sought to distribute aid as quickly as possible, but lacked the infrastructure needed to deploy cash or intangible benefits to those most in need. An electricity transfer program was one the only options available to extend relief.

One utility firm provides electricity to 4 million customers throughout Ghana and to 92% of capitol residents. Using this network, Ghana's electricity transfer program provided monthly transfers worth 50kWh, or \$3.50 USD, for the months April through June 2020 to customers who used less than this amount at baseline, or 'lifeline' customers. For all other customers, monthly transfers worth 50% of baseline consumption were provided. The program for 'lifeline' customers was eventually extended

through March 2021. Transfer amounts were based on March 2020 electricity usage and transfers were allocated per meter.

The authors first assess the economic efficiency and expediency of the program using data collected over a six-month period in 2020 across three rounds of surveys, each with 1,200 respondents who were connected to electricity in Accra. The authors find that since the transfer was based on March 2020 electricity consumption and could be saved indefinitely, transfers were theoretically the same as cash transfers. Additionally, 45% of survey respondents actually preferred the electricity transfer to the cash equivalent, showing that using an electricity transfer program relative to cash did not undermine the program's effectiveness.

One clear benefit of the program was its ability to rapidly dispatch aid to households. The first recipients obtained aid only 1.5 months after the first confirmed case of Covid-19 in Ghana. However, by the end of the first month of the program, only 35% of households had received a transfer, while one-third of households still reported not receiving any transfers three months later. By October 2020, 74% of households that pay for electricity directly had received aid, compared to 53% of households that pay an intermediary.

Next, the authors delve into the program's implications regarding the distribution of aid. Although 82% of Ghana's households use electricity, the remaining 18% and 25% of rural communities are not connected to the electricity grid. These households did not receive a substitute for the electricity transfer.

Additionally, not all households connected to the electricity grid and that were eligible received the transfer credit. This can, at least in part, be attributed to how the electrical grid is used by residents. In the survey sample, 46% of households share a meter and 26% pay an intermediary. Of the households that share a meter, 72% of 'lifeline' customers share a meter with at least one other user, compared to 42% of non-lifeline customers.



These other parties may have received and used the transfer for the meter. In these cases, the transfer may have reached the meter as intended, but not all households on that meter. Survey respondents who buy electricity from a landlord or another household are also 12.5 percentage points less likely to have ever received a transfer. A follow-up survey revealed similar results, suggesting that this gap is not driven by intermediaries taking longer to pass on a transfer.

Lastly, the paper explores the political implications of the electricity transfer program. Providing public goods prior to an election has frequently been found to increase support for the incumbent. Indeed, public support for the program is high with 94% of respondents who had received transfers and 72% of those who had not expressing satisfaction with the program. Transfer recipients are 11 percentage points more likely to support the incumbent party, who won the election by about 4 percentage points nationally.

Public support waned significantly when respondents were given hypothetical scenarios where the program costs would need to be

recouped. At a cost of around \$511 million USD for the first 8 months of the program, or 3.4% of 2019 government expenditures, program costs were substantial. When presented with a scenario in which the utility increases electricity tariffs proportionately to recover costs, satisfaction with the program falls by almost 50%. Nearly 80% of respondents declared that they would not want any electricity aid if the amount received at the present would be offset by an increase of the exact same amount next year.

Ghana's utility transfer program used infrastructure that was readily available, had the capability to reach over 80% of households, and expediently sent aid to recipients. On average, survey respondents also valued the electricity transfers similar to cash. However, a large proportion of 'targeted' residents – those with the lowest incomes or 'lifeline' customers - reported never having received any electricity transfer, potentially due to logistical, technological, or communication reasons. A uniform, rather than a proportional, electricity transfer program would be more progressive, and possibly easier and less costly to implement.



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