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College of Social & Behavioral Sciences Department of Resource Economics

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Research Statement

By Augusto Espin
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My research focuses on empirical industrial organization and applied microeconomics with emphasis on policy evaluation and technological innovation. Specifically, I am interested in understanding how technology can impact society at different levels. My dissertation, where I cover many aspects on how information and telecommunications technologies (ICTs) are shaping our society, reflects this interest. In my first paper, I study how remote meeting technologies helped companies overcome the disruptions that the COVID-19 pandemic generated. In my second paper, I pursue providing an empirical answer to a question that has been widely discussed in policy circles and industry for years: do subscribers care (or even perceive) the bandwidth speed limits (or deceleration) that are often imposed by mobile providers? Finally, I quantify the digital divide (lack of access to broadband internet) in the US and evaluate the costs and benefits of various policies, notably those recently proposed in the Biden Infrastructure Bill, to close this gap.

I use a broad set of econometric techniques in my current research. These include both reduced form approaches (e.g., difference in differences) as well as structural methods (e.g., discrete choice demand models, counterfactual simulations). In addition, my research heavily relies on machine learning techniques. In my job market paper, ***"Bridging the digital divide in the US"***, I seek to understand the dynamics behind the digital divide in the US. I estimate a discrete choice model for household internet broadband demand and use the structural parameters to evaluate various policies aimed at closing the digital divide. Importantly, some of the policies evaluated include those stipulated in the recently approved Biden Infrastructure Act. A key component and contribution of this work is the construction of the most comprehensive dataset on broadband coverage (around 225 million block-level registers), usage and prices. This data assembly was made possible with the use of machine learning techniques that allowed me to reliably assign prices to the largest set of households (87% of the total households). Many counterfactuals were carried out to understand the costs and benefits of closing the digital divide. The first counterfactual evaluates the Biden Infrastructure Act on broadband access, and the results show that direct subsidies could increase household connectivity by 4 percentage points, while infrastructure deployment would result in less than 1% of additional connected households. Other evaluated policies show consistent results: investments in network deployment provide a more limited impact on internet adoption than government subsidies aimed at improving service affordability. I expect to submit this manuscript for publication by the end of February 2023.

In my paper, "***The impact of the COVID-19 pandemic in the use of remote meeting technologies"*** (co-authored with Prof. Christian Rojas and published in *Economics Bulletin*), I use a unique dataset obtained from a leading remote technology company, Vyopta, to study how firms' usage of remote meeting technologies in different industries was affected by the pandemic. Using more than 70,000 observations of daily firms' meeting activities between 2019 and 2020, I use a difference-in-differences (DiD) approach to quantify the effects of the pandemic on the number of meetings, their duration, and their connection quality. We find that meetings increased by 48% while the meeting duration decreased by 30%; these positive effects, however, were counteracted by a sizeable decline in the (video and audio) quality of meetings.

Finally, in my paper, ***"Do subscribers of mobile networks care about Network Neutrality?"*** (co-authored with Prof. Christoph Bauner and that has been submitted for publication at *Information Economics and Policy*), we created a novel dataset that merges detailed information on the bandwidth slowdowns imposed by providers on its subscribers with market and usage data, to understand if subscribers react to such slowdowns. We use a non-standard instrumental regression and find no evidence that subscribers change their consumption patterns when such slowdowns are imposed.

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As part of my duties during my years in the PhD program at the University of Massachusetts Amherst, I have held several research assignments in which I have used and improved my data science skills. With Prof. Christoph Bauner, I processed large files with internet traffic from the Center for Applied Internet Data Analysis (CAIDA), which involved processing hundreds of files, each with a size over 1GB. These files were processed in one of MIT's supercomputers using programs developed in C++. During my second summer in the program (2019), I won a fellowship with the Center for Data Science of the College of Information & Computer Science to work in the Data Science for Common Good program. I worked on estimating the greenhouse emissions associated with guest travel of the Appalachian Mountain Club. The calculation was performed using scripts created in Python and involved development and integration to a relational database system. Later, I worked with Prof. Christian Rojas in his work to evaluate the impacts of diet quality policies on health outcomes mainly in the trans-fat ban and reductions in saturated fats in the US. Most of my work involved processing large datasets, in particular using text analysis to identify brand and manufacturer information at the barcode level and carrying out regression analysis.

I am an economist with field experience in the development and implementation of public policy with interests in a broad range of topics around industrial organization issues. In addition, I have extensive experience and skills in computer programming. I had acquired and used several of these skills as an engineer prior to my PhD studies and during my time at UMass I have extended and honed in on newer and more efficient methodologies, software tools, and platforms. Specifically, I have strengthened my skills in data processing and machine learning in both Python and R and I have deepened my knowledge of relational databases with SQL. I expect to keep my main pipeline of research in the telecommunications and information technology realm. One project involves the evaluation of a specific government policy aimed at improving digital literacy in marginalized populations; another project is aimed at studying how competition in the mobile industry is affected by the recent diffusion of over-the-top applications. Further, I have ongoing interests in related areas, in particular the electricity market (i.e., the usage of smart grids to decrease energy theft).

As of January 2023, I have been working as a postdoctoral researcher for Prof. Christian Rojas. I am in charge of processing barcode level datasets for millions of food products sold across thousands of retailers in the US. The objective of this ambitious project is to assemble a database that can be used to quantify the extent to which food manufacturers have reformulated products towards healthier versions in the last two decades. An expected outcome of my involvement in this research is that I will be a co-author in at least one manuscript resulting from this work.

In summary, I am interested in pursuing a variety of research topics in industrial organization, with a particular emphasis on technological innovation. Given my interest in policy-oriented issues, I remain open and motivated to studying other issues. I am highly motivated by research questions that pursue causal effects, in particular those derived from policy interventions. I plan to keep working and publishing my work in high impact field journals. I also believe that communicating results to a broader audience is important and I will seek avenues to pursue this as I develop my research agenda further.