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Research Statement

I am an applied macroeconomist with interests at the intersection of economic growth, the economics of innovation, labor economics and financial economics. My research involves a wide range of methodological approaches, including building dynamic, stochastic, general equilibrium models, the causal analysis of rich microdata, and text-to-data methods. An overarching theme in my research interests is the central role played by firms in the modern economy.

My research at Stanford studies two different aspects of this behavior. First, in my dissertation, I explore the role played by firms' adoption of advanced business technologies in affecting the relative demand for skilled workers, arguing that such adoption can go a long way towards explaining trends in labor income inequality such as the slowdown in the growth of the skill premium and the declining share of income going to labor. Second, in ongoing work, my coauthor and I explore the macroeconomic impacts of the survival of relatively unproductive and insolvent "zombie" firms. In the future, my research will continue to explore the implications of technology adoption and diffusion for labor markets, as well as study the impacts that complex relationships between firms and their sources of funding have on the response of an economy to shocks.

Dissertation Research

My job market paper, *Technology adoption and the Relative Demand for Skilled Labor*, explores the behavior of the skill premium, the relative hourly earnings of skilled workers to unskilled ones. Understanding the behavior of the skill premium is vital for evaluating policies intended to tackle inequality between workers of different skill levels, such as those aimed at encouraging college attendance. Between 1980 and 2000, the skill premium rose by almost 20 percentage points, but between 2000 and 2019, only 5.6 percentage points. This was accompanied by an initially stable labor share declining almost 6% after 2000. Standard models of the initial increase in the skill premium struggle to rationalize the slowdown after 2000, and counterfactually imply an increase in the labor share via an increase in the share of income going to skilled labor post 2000.

I propose a simple explanation that is consistent with the paths of both series, based on endogenous technology adoption. The story I propose is simple: as skilled labor gets relatively expensive, firms have stronger incentives to adopt new technologies economizing on the use of skilled labor. I construct a macroeconomic model to formalize this idea. In the model, firms perform skilled labor-specific tasks and unskilled labor-specific tasks to produce goods. A share of each type of tasks can also be performed by capital. Firms make dynamic choices to upgrade their technologies, which involves raising the share of each type of tasks that capital can perform, paying adjustment costs to do so. The driving force in the model is a decline in the relative price of capital. Initially, the stronger complementarity between skilled labor and capital at the tasks it performs drives up the skill premium. But this increase leads firms to start displacing *skilled* labor, by installing new technologies in which capital performs a higher share of skilled labor-specific tasks. The model can replicate both the initial increase in the skill premium and the subsequent slowdown, while also being consistent with the behavior of the share of labor in value added, a target that standard models of the skill premium struggle to be consistent with. In a counterfactual exercise, I find that in the absence of endogenous technological change, the skill premium in 2019 would have been about 5 percentage points higher and the labor share over 10 percentage points higher.

Having established that my mechanism is quantitatively relevant, I provide microeconomic evidence for it. First, I use data on patents and occupational tasks and use Natural Language Processing techniques to document that newer technologies are particularly likely to perform the same tasks as relatively skilled workers. I perform a case study of accountants, where I use establishment-level microdata on the use of advanced accounting software. I show that rising exposure to these technologies has slowed the growth of accountants' wages. My research implies that policies to simply encourage college attendance are no panacea to address labor income inequality. It also implies that models of college attendance and inequality which take technology as given may overstate the benefits of college, since increases in the college wage premium induce technology adoption that can partly offset it.

In my other project, *Survival of the Unfit? Short-run Gains and long-run Pains from Zombie Lending* (in preparation), my co-author Martin Souchier and I study the phenomenon of "zombie lending", where banks continue to extend loans to unproductive and insolvent firms. While a key issue of policy interest since the experiences of Japan in the 1990s and the experience of Southern Europe since the 2008 recession, the literature on zombie lending is largely either empirical or uses illustrative models to highlight the causes and long-term consequences of zombie lending. By contrast, we argue that zombie lending, where banks keep lending to insolvent and unproductive firms, attenuates the effects of recessions in the short-run at the expense of output in the long-run. We study this tradeoff in a quantitative dynamic general equilibrium model in

which heterogeneous firms finance themselves through retained earnings and bank debt. Banks face capital requirements but have private information on whether a given loan is in default, allowing them to hide losses and bypass these requirements. In a recession, higher firm defaults lead to larger bank losses, raising the incentives to hide losses by keeping insolvent firms alive. In the short run this allows banks to keep lending, which supports output. In the long run, however, this leads to misallocation due to the survival of relatively unfit firms and lower entry. We use the model to quantify the contribution of zombie lending during and after the 2008-09 crisis in Europe. Our model has strong implications for the implementation of macroprudential policies and debt subsidies, which were an important tool in the response to the COVID-19 crisis.

In addition to my core research focusing on firms, I have been involved in research projects in collaboration with colleagues at Stanford and elsewhere. In *Elections, Political Polarization, and Economic Uncertainty*, co-authored with Scott Baker, Nicholas Bloom, Steve Davis, and Jonathan Rodden, we study the impact elections have on economic policy uncertainty using data on multiple countries. We find that it is the combination of political polarization and the closeness of an election that makes it particularly likely to raise policy uncertainty, with adverse effects on firm investment in the runup to such elections.

Future Research

In the future, I intend to pursue three main research agendas.

First, I will continue to explore the implications of technology adoption decisions for labor market outcomes using microdata on firm-level stocks of IT capital which I have access to. This data will allow me to both explore the IT revolution of the late 1990s and the early 2000s, and extrapolate insights to the more recent "4th industrial revolution". To what extent do the technologies of the 4th industrial revolution augment the capabilities of workers across different backgrounds, including by education, gender, race, and region? What are the consequences of the limited adoption of these technologies for inequality and for dispersion in firm sizes and performance? How can we raise the adoption of these technologies across firm classes? Avi Gupta and I explore some of these ideas from a policy point of view in a policy brief prepared for Stanford's Institute for Human-Centered AI and will study them using the more quantitative apparatus afforded by macroeconomic modeling in the future.

Second, I will explore in more depth the labor market implications of the slowdown in skilled labor demand by documenting the extent of this decline across demographic groups and investing the intersection of this slowdown with the large increase in student loan indebtedness we observe over the 2000s.

Third, I will extend our work on zombie lending to a more complete policy analysis, in which we quantitatively evaluate proposals to require larger equity holdings of banks, modify the risk-weighting approaches used by banks in calculating their net worth and implement countercyclical capital buffer policies. As we emerge from the economic turmoil caused by the COVID-19 pandemic and the large increase in private sector indebtedness this has led to, our research should prove invaluable to policymakers seeking to balance the value of allowing current firms and their employment relationships to survive downturns against the cost of lost aggregate productivity due to misallocation of resources. More broadly, this research agenda focuses on the "exit margin" in firm dynamics, quantifying the costs of distortions in economies which delay the exit of unproductive firms.

Funding

In my academic career as an undergraduate and graduate student, I have successfully obtained multiple fellowships and grants. As an undergraduate student, I successfully applied to several research fellowships and awards, which partially funded my final year at the University of Delhi. On the strength of my undergraduate work, I successfully obtained funding for tuition and a living stipend in completing my master's degree at LSE from a competitive fellowship program in India, the Inlaks Scholarship. My final year at Stanford is funded by a competitive dissertation fellowship. As I continue my career as a researcher, I am confident in my ability to secure funding sources for collecting and accessing data and hiring students to assist on projects.

Collaboration

My approach toward research is thoroughly collaborative – working with coauthors both makes the research process substantially more enjoyable and has contributed substantially to my own learning. My collaborations have afforded me access to data and resources, as well as introducing me to different disciplinary approaches and methodologies in research. In the future, I will maintain these existing research relationships, and look forward to starting new ones with colleagues and students.

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