ENTREPRENEURSHIP AND INNOVATION POLICY AND THE ECONOMY: INTRODUCTION TO VOLUME 1

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This volume is the first annual volume of the National Bureau of Economic Research (NBER) Entrepreneurship and Innovation Policy and the Economy (EIPE) series. Entrepreneurship and innovation are widely recognized as key drivers of long-term economic growth, yet the development of rigorous economics research evaluating the causes and consequences of entrepreneurship and innovation (and the relationship between innovation and entrepreneurship) is more recent. Building on the twenty-year legacy of the NBER *Innovation Policy and the Economy* series, *Entrepreneurship and Innovation Policy and the Economy* broadens the focus of this NBER annual conference and volume to reflect more directly the significant growth in academic and policy interest in entrepreneurship and entrepreneurship policy.

The EIPE meeting seeks to provide an accessible forum to bring the work of leading academic researchers to an audience of policymakers and those interested in the interaction between public policy and innovation. Our goals are:

- to provide an ongoing forum for the presentation of research on the impact of public policy on the process of entrepreneurship and innovation;
- to stimulate such research by exposing potentially interested researchers to the issues that policymakers consider important;
- to increase the awareness of policymakers (and the public policy community more generally) concerning contemporary research in economics and the other social sciences that usefully informs the evaluation of current or prospective proposals relating to entrepreneurship and innovation policy.

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This volume contains revised versions of the papers presented in the group's meeting held virtually in April, 2021. As the first volume in this new series, the individual chapters highlight important ways in which both the production and impact of entrepreneurship and innovation is changing and the role of policy in that process. Two of the chapters in the volume draw on recent research directly related to the COVID-19 pandemic. The first essay focuses on the (perhaps surprising) persistent surge in new business formation that commenced in the wake of the pandemic, while the final essay considers the broader lessons for "crisis" innovation and entrepreneurship policy gained by a comparison between the current era and lessons from World War II. The second and third chapters in the volume focus squarely on inclusion within the process of innovation and entrepreneurship. These highlight differences in participation in

innovation and entrepreneurship by women and Black Americans, and the significant variation in the degree of inclusion across locations, industries, and even individual universities and firms. The fourth chapter in the volume draws on both qualitative historical episodes (such as the history of mRNA vaccines), as well as more systematic empirical research into the institution of research funding to assess what types of research funding systems encourage novel research, and the consequence of funding systems that discourage novelty. Throughout, our aim has been to draw out the lessons of recent research in economics and related fields for policy analysis and future research into entrepreneurship and innovation.

The first chapter, by John Haltiwanger, offers an assessment of the impact of the ongoing pandemic (and associated policy response) on the rate and nature of entrepreneurship. At the onset of the pandemic, there was considerable concern not only about the survivability of existing businesses but what impact that the pandemic (and public health response to the health crisis) would have on the rate and nature of new business formation. Concern about the rate of entrepreneurship was particularly salient given (a) the long-term secular decline in the quantity of new business formation since the 1980s (with only a modest uptick over the years preceding the pandemic), and (b) the fact that the major Federal economic relief and support legislation focused primarily on supporting existing businesses rather than encouraging the creation of new businesses. Leveraging the timely and granular nature of the Business Formation Statistics (BFS, a new data series developed at the U.S. Census over the past several years), Haltiwanger documents a striking uptick (rather than an anticipated decline) in new business formation in the wake of the pandemic. Specifically, after a sharp but short decline at the beginning of the pandemic, the BFS registers a sizeable uptick starting in June, 2020, and continuing through the first half of 2021. Moreover, this surge in new business formation seems to be occurring in both employer and non-employer firms, and is concentrated in sectors such as non-store retail, potentially reflecting a process of reallocation of economic activity induced by the pandemic (and policy responses). In addition to providing novel evidence about the potential positive shift in overall business dynamism, these insights highlight the value of timely and granular data for formulating and assessing entrepreneurship policy.

The next two papers in the volume address the impact of historical and institutional barriers to inclusion within innovation and entrepreneurship for both women and African-Americans. In the first of these essays, Lisa Cook, Janet Gerson and Jennifer Kuan undertake a broad overview of the broad economywide loss in innovative capacity and productivity arising from inequality in the process of innovation and entrepreneurship, and the impact of interventions and policies attempting to address these inequalities. The paper focuses on three distinct stages of the "innovation gap": the STEM pipeline, employment within the invention process, and commercialization. Using data from a variety of sources, the authors are able to document striking patterns across each stage. For example, while there has been progress over time in the inclusion of women and African-Americans in the share of doctorates in S&E fields, a sizeable gap persists: women still account for just over 40% and African-Americans account for less than 6% in these fields. A higher level of inequality exist in the process of invention and commercialization. As but one example, only 0.2% of all venture capital funding is allocated to firms founded by African-American women. Cook, Gerson and Kuan consider the role of both public and private interventions and policies aimed at each of these stages (and the evidence for impact of these approaches), and highlight that inclusion in the process of innovation and

entrepreneurship can enhance not only equality but also be a direct driver of innovative capacity and ultimately economic growth.

Mercedes Delgado and Fiona Murray complement this analysis by characterizing and analyzing the gender gap in patented innovation. Specifically, this essay examines not only the overall level of inclusion by women in the innovation process, but specifically documents substantial variation across locations, industries, and even individual firms. To do so, the authors use a probabilistic name matching algorithm across patents. Across the entire population of patents, this metric of inclusion is low: for example, in 2015, only 10% of all inventors are women. Importantly, even after accounting for differences in technological specialization across regions or organizations, there is significant variation in the gender gap across locations, universities and firms. For example, New York boasts a much higher rate of inclusion of female inventors than for example Dallas. By providing a measurement framework for assessing the gender gap in innovation in a systematic but granular way, Delgado and Murray offer insight for policymakers seeking to compare alternative policies or initiatives aimed at enhancing inclusion within the innovation economy.

The fourth chapter of the volume focuses squarely on the potential impact of innovation funding policies on shaping the novelty of research. Motivated by the uneven path by which the research that ultimately resulted in the development of mRNA vaccines was funded, Chiara Franzoni, Paula Stephan, and Reinhilde Veugelers offer a synthesis of an emerging body of evidence that a significant fraction of publicly funded research may be prone to substantial bias against breakthrough research.. The authors suggest that this is not due to the biases of any one individual but reflects more systematic consequence of the research system. Pressure to demonstrate findings in a short-time window, little tolerance for failure, and a prioritization on short-term bibliometric impact all have impacts. Each of these factors are then reflected at each stage of the research process: by research agencies that fund projects on a case-by-case (rather than portfolio basis), by a review process that places a penalty on novel proposals that take more time to assess, and ultimately by researchers themselves who choose to apply for less novel (but more fundable) projects. The authors conclude by suggesting a range of potential approaches – from de-emphasizing near-term bibliometrics to adopting staged funding approaches – that may result in a reduction in the bias against novelty in the research funding process.

The question of how to allocate and organize research funding has become particularly timely with the need for timely and scalable innovation impact in the wake of the COVID-19 pandemic. In the final essay in this year's volume, Daniel Gross and Bhaven Sampat take an historical perspective on "crisis innovation" policy. Drawing on historical lessons from World War II and ongoing analysis of innovation policy during COVID-19, the essay considers the unique challenges that arise when a crisis necessitates that innovation be unusually rapid in nature and able to be deployed at scale. The authors synthesize their ongoing work into the specific ways in which innovation policy was implemented during World War II. They emphasize the importance of strategic prioritization, attraction of talent, providing appropriate incentives to researchers both external and internal to the Federal government, and achieving a high level of coordination and investment in production and diffusion. Some of these elements also featured prominently in Operation Warp Speed during COVID-19, such as a focus on using external contracting and pre-commitments to accelerate the process of innovation and diffusion in vaccines. At the same time, there are important differences: a much greater fraction of innovation during the current crisis seems to have emerged from a "bottoms-up" process through the efforts of researchers around the globe. While it is too early to assess the

long-term impact of the innovation response to COVID-19, Gross and Sampat emphasize that maintaining a long-term capacity to engage in crisis innovation is a necessary element for being able to implement effective innovation policy when the next crisis emerges.

Together, these five essays offer synthetic treatments of a range of timely areas in entrepreneurship and innovation policy that are the subject of active research. While it is clear that there are no easy answers, this new series aims to connect the best of recent economic research to the major issues facing entrepreneurship and innovation policymakers today.