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Recommendation Letter Writer:

Peter J Klenow,
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January 24, 2023

NBER Innovation Research Boot Camp 2023
Admission Committee

Dear members of the admission committee,

I am writing to apply for the Innovation Research Boot Camp hosted by the NBER. I am currently in the third year of the PhD in Economics program at Stanford University, working primarily with Prof. Peter J. Klenow and Prof. Charles I. Jones. My primary field is macroeconomics, with a particular focus on economic growth and firm dynamics. In my research, I like to combine endogenous growth models with careful empirical analysis to study how market failures can lead to misallocation of R&D.

As a growth economist, thinking about innovation is at the core of my research. However, I have never taken an economics of innovation class, and my main exposure to the topic has been through the growth class I took in my second year and a growth reading group I regularly attend. As such, my main goal for attending the boot camp is to broaden my knowledge and gain insights into approaches I am less familiar with, both through lectures delivered by leaders in the field and discussions with peers who are as passionate about innovation as I am.

At Stanford, I have had the chance to meet a few colleagues who share my interest in questions relating to innovation. My work has benefited from their sharp insights and their knowledge of areas within the economics of innovation I am less familiar with. As such, I am thrilled by the prospect of meeting and spending a week with such scholars coming from different backgrounds, each bringing their own expertise and curiosity to the table.

I am looking forward to hearing back from you, and I very much hope I will be given the chance to attend the boot camp. In the meantime, I am enclosing my curriculum vitae, a list of current and completed PhD courses, as well as an essay describing my current and future research. In addition, Prof. Peter J. Klenow will be submitting the recommendation letter.

Kind Regards,
Mohamad Adhami

Mohamad Adhami

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Education

Stanford University	PhD in Economics	*2020-*
American University of Beirut	BA in Economics & BS in Mathematics, High Distinction	*2016-2020*

Employment

2021-	Research Assistant to Professor Peter Klenow, Stanford University
2018-2019	Teaching Assistant: Intermediate Microeconomics, American University of Beirut

Awards

2020	Muhanna Foundation in Mathematics Award of Excellence, American University of Beirut
2020	Mona Chemali Khalaf Award, American University of Beirut
2019	Philip K. Hitti Prize, American University of Beirut
2019	Dr. Basil Fuleihan Excellence Award in Economics, American University of Beirut
2019	Fund Challenge for MCD countries, International Monetary Fund (IMF)
2018	Remy Rubeiz Award in Economics, American University of Beirut
2016	Full-tuition Merit Scholarship, American University of Beirut
2016	Bourse Excellence-Major, Agence pour l'enseignement français à l'étranger (AEFE)

Work in Progress

"Population and Welfare: The Greatest Good for the Greatest Number"
Joint with Mark Bils, Charles Jones, and Peter Klenow

"Market Power and Innovation Distortions"
Joint with Jean-Felix Brouillette, and Emma Rockall

"Direction of Innovation and Endogenous Growth"

Professional Activities

Referee American Economic Review: Insights

List of PhD Courses

- First year core microeconomics sequence : Microeconomics I, II, and III
- First year core macroeconomics sequence : Macroeconomics I, II, and III
- First year core econometrics sequences: Intermediate Econometrics I, II, and III
- Second year advanced macro sequence:
    - Advanced Macroeconomics I: Economic Growth
    - Heterogeneity in macroeconomics
    - Macroeconomics and financial markets
- Second year development sequence: Development Economics I, II, and III
- Second year labor sequence: Labor Economics I, II
- Economic History

I am a macroeconomist and my primary interest is economic growth. An overarching theme of my research is the study of market failures that can lead to misallocation of R&D resources. In fact, a major focus in the growth literature is on the level of R&D. However, in a world with many research areas, the level of R&D is only one dimension of the decision, as these aggregate R&D resources need to be allocated to the different research lines. This opens up the way for another potential source of inefficiency in endogenous growth models: for a given level of R&D, the planner's allocation of R&D resources to different product lines need not coincide with that of the decentralized equilibrium. Combining endogenous growth models with rich microdata, my aim is to understand mechanisms that can lead to such distortions, to quantify their aggregate implications, and to think through the types of innovation policy that can mitigate these costs.

In my second year paper, I argue that the standard quality ladder model of endogenous growth is a natural environment to think about the allocation of R&D resources to different product lines. However, any substantial discussion of the direction of innovation in this class of models is absent from the literature due to the assumption that costs and returns of innovation both rise linearly with quality, leading to innovation rates being equalized across lines. I show that as soon as I depart from this knife edge case (which is inconsistent with empirical evidence), dispersion in rates of creative destruction across varieties endogenously arises. Due to intertemporal spillovers, a standard market failure in this class of models is a gap between the private and social rates used to discount the value of an innovation: the former takes creative destruction into account, while the latter does not. With heterogeneity in rates of creative destruction, the gap between private and social discounting is not homogeneous across varieties, and the decentralized allocation is relatively distorted towards product lines with lower rates of creative destruction where the market leader can expect to extract rents for longer. The model has also rich implications about firm dynamics in different sectors, so going forward I plan to use firm level data to discipline the model and quantify the novel mechanism I identify.

The rise in U.S. market concentration has drawn considerable attention to the potential welfare consequences of product market power. In ongoing work with Jean-Felix Brouillette and Emma Rockall, we explore the tight connection between markup dispersion across firms and allocative efficiency of R&D resources. We write down an expanding varieties model with heterogeneous firms and VES demand, so that in equilibrium, larger firms charge higher markups, as in the data. In addition, incumbents contribute to aggregate growth by investing in R&D efforts aimed at reducing their marginal cost of production. We show that in such a framework, R&D resources are misallocated: if a planner were constrained to maintain the aggregate level of R&D prevailing in the decentralized equilibrium, they would still like to reallocate R&D resources away from incumbents charging the lowest markups towards incumbents charging highest markups. The intuition behind the result is that, in our framework, firms who charge higher markups do so because they face less elastic residual demand, and hence capture a smaller fraction of the social surplus generated by their innovation. We are currently working on a quantitative exercise where firm level data can be used to inform the magnitude of this misallocation.

Given my research agenda, and my desire to tie it back to innovation policy, I think I would benefit tremendously from attending the boot camp. My goal is to broaden my knowledge and gain insights into perspectives I am less familiar with, through lectures delivered by leaders in the field and discussions with peers – both of which, I believe, will help me make the contribution of my research sharper.

STANFORD
UNIVERSITY

PETER J. KLENOW
Ralph Landau Professor of Economics
Gordon Moore Fellow at SIEPR

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February 1, 2023

Dear NBER Innovation Boot Camp Selection Committee,

I am writing to enthusiastically recommend **Mohamad Adhami** for a spot in the 2023 NBER Innovation Boot Camp.

Mohamad is a 3rd year PhD student in the Stanford Economics Department. He took my first-year PhD course on Economic Growth, as well as my second-year PhD course on Economic Growth that I co-teach with Chad Jones. I have been his advisor since the summer after this first year, and he has been my RA since then.

In terms of quality and fit, Mohamad is top-notch. Innovation is his primary interest, and not just from an aggregate growth angle but also from a micro data perspective. Chad Jones, Chris Tonetti, provide him feedback on his growth modeling. But we haven't had an Innovation class taught these past few years, so the Boot Camp would be an invaluable opportunity to be exposed to a variety of applied micro topics, methodology, and datasets.

Mohamad aced all his classes in the first and second year. He encouraged me and Chris Tonetti to start a "Growth Reading Group" that meets weekly and has run for 1.5 years and counting. He is full of ideas, intellectually curious, kind, thoughtful, and highly interactive. He and Emma Rockall (who participated in the very successful inaugural camp last year) have organized social activities for our PhD students and student morale has soared as a result. He would be a wonderful presence and participant in the Boot Camp.

To help convey his research potential I will briefly describe his RA work for me and then a research idea he is pursuing.

Mohamad is a research assistant on a project with Mark Bils and Chad Jones on "Population and Welfare: The Greatest Good for the Greatest Number." It asks how much population growth has contributed to rising total flow utility (the number of people times their average flow utility). As part of this we need to understand and model fertility decisions of parents. In particular, to account for the quantity-quality tradeoff as parents in many countries are having fewer kids but investing more in their human capital. Mohamad has made critical

contributions to both the modeling and empirical work. The latter take the form of analyzing micro datasets on time use in the U.S., Japan, the Netherlands, and South Korea. Based on his significant contributions we have promoted him to a co-author on the paper.

In terms of his own research, one idea Mohamad is pursuing is how variable markups contribute to the efficiency with which R&D is allocated across firms. There is a growing consensus that larger firms charge higher price-cost markups. Key evidence includes not just higher revenue/(input costs) at larger firms, but critically also low pass-through of input costs into prices for large firms relative to small firms. Mohamad, along with two fellow graduate students who attended last year's boot camp (Emma and Jean-Felix Brouilette), are asking how such variable markups are affecting the incentive to innovate. Assuming that the variable markups are due to variable elasticity of demand preferences (as opposed to non-monopolistically competitive market structure), they are finding that large firms capture *less* of the social return to their innovation than small firms do. Thus the decentralized equilibrium features too little innovation by big firms and too much innovation by small firms. They are in the process of getting access to the French administrative data on firms (with the help of Philippe Aghion) firms to quantify this misallocation of market research.

To recap, I enthusiastically and highly recommend Mohamad Adhami for a spot in the NBER Innovation Boot Camp based on his research potential, topical fit, and interpersonal qualities.

Yours Sincerely,

