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Comment on "Does the Cream Always Rise to the Top? The Misallocation of Talent in Innovation" by Murat Alp Celik

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1. Overview

The nexus between inequality and growth has been the focus of long-standing empirical and theoretical literature in economics. The present paper studies a new channel through which wealth inequality affects growth: the misallocation of talent between innovation and production jobs. The paper combines an innovation-based endogenous growth model with a general equilibrium heterogeneous agents model with skill accumulation and occupation choice. A new data match of historical Census records and the recent data on inventors and their productivity confirms that the allocation of individuals to innovation jobs suffers from misallocation. Quantitative analysis shows the importance of the credentialing friction that distorts the allocation of talent and considers optimal bequest taxation and education policies.

The paper is well-executed and is an excellent showcase of the tight link between microdata analysis and a structural macro model. The study has the potential to speak to the recent salient macroeconomic trends in the United States and other developed economies. Wealth inequality has been growing, while productivity growth has been slowing down in recent decades. This paper offers a specific direction of causality – from higher wealth inequality to lower productivity growth. It remains to be explored how much the mechanisms in this paper can quantitatively account for the reduction of innovation and productivity growth in the U.S.

2. Model

For the purpose of the discussion, I outline the main building blocks of the simplified version of the model. Consider the economy, where the final good is produced using unskilled labor l^u and productivity A:

$$Y = Al^u.$$

Productivity A grows as a result of innovations that depend on skilled labor in the innovation sector:

$$A' = (1 + g(l^s))A,$$

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[1] The views expressed here are those of the author and do not necessarily represent the views of the Federal Reserve Bank of Atlanta or the Federal Reserve System.

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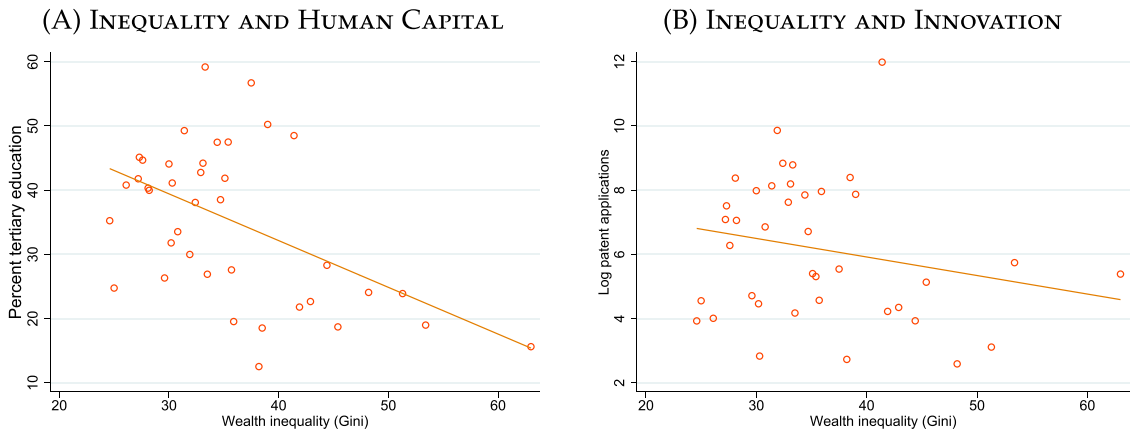

Fig. 1. Wealth Inequality, Human Capital Accumulation, and Innovation Notes: Each dot in the scatterplot represents a country. The percentage of the adult population with tertiary education and Gini coefficient data come from the World Bank. Patent applications come from the United States Patent Office data. Data on 43 countries in the overlapping sample are plotted.

where A' is next-period productivity, and g is the productivity growth rate that is increasing in the skills supplied in the innovation jobs.

The unit mass of individuals has different skill levels that result from their innate ability a and pre-college education h: $s = s(a, h)$. Individuals' skills matter only for innovation jobs. Specifically, if an individual with skill level s works as an unskilled worker, she supplies $l^u = 1$; and if she works as a skilled worker, she supplies $l^s = s(a, h) > 1$.

The economy has a fixed number of innovation jobs η. It is clear then that the optimal allocation of individuals to jobs is such that the top η share of the highest-skilled individuals is allocated to innovation jobs, and the rest are allocated to production jobs.

However, individuals are not allocated to jobs based on their skill level s. Instead, allocation is based on the signal about their skills $\tilde{s}$, where

$$\tilde{s}(s, n) = (1 - \nu)s(a, h) + \nu n.$$

n is a credentialing spending that increases the signal to the potential employers but does not increase individual skills. ν is signal weight on credentialing relative to the true skill level. In the calibrated version of the model, ν is quite high at 0.89, so credentialing outweighs the individual's true skills.

In an economy where investment in pre-college education h and credentialing n are costly activities and wealth is unequally distributed across individuals (with imperfect correlation with innate abilities), optimal allocation of most skilled workers to innovation jobs is distorted, and growth is lowered.

2.1. Misallocation vs. human capital accumulation

There are two channels through which wealth inequality dampens growth in this economy. The first main channel operates through *misallocation of skills* to innovation jobs (the cream does not always rise to the top), conditional on skill accumulation. The possibility of credentialing spending ($\nu > 0$) operationalizes this channel. This channel is the main innovation of the model and introduces a new link between inequality and growth.

The second channel operates through the *accumulation of skills* (how large the cream is), conditional on the allocation of skills. In an economy where skills do not purely govern job allocation, the incentives for skill accumulation are reduced. This second channel is close to Galor and Zeira (1993) and Galor and Moav (2004), where because of credit constraints, higher inequality reduces investments in human capital and hence growth. Relatedly, the findings in Lagakos et al. (2018) suggest that the misallocation of talent and the resulting flat experience-wage profile can contribute to the slow accumulation of human capital across countries, similar to the human capital misallocation channel in Hsieh et al. (2019).

Which of these two channels drives the results in the paper: the new misallocation channel or a more standard human capital channel? In the counterfactual experiment where a credentialing channel is shut down ($\nu = 0$), growth increases by 21 basis points. This increase is driven by the increased skills l^s, which in turn is the outcome of overall higher investment in human capital (pre-college education increases by 30%) and better allocation (hinted by the 23% growth of innate ability of skilled workers in innovation jobs). To understand the importance of the novel misallocation channel, a quantitative decomposition of the growth effect into the two channels is needed.

In Figure 1, I provide preliminary cross-country evidence speaking to both channels in the model. Panel A shows that countries with higher degrees of wealth inequality have much lower human capital, while Panel B shows a negative link between wealth inequality and innovation. Taken together, the cross-country data show strong support for the human capital

channel as well as the misallocation in the innovation channel, albeit with a weaker correlation. Going forward, it would be interesting to understand how much skill misallocation in innovation could account for cross-country income differences.

2.2. Endogenous number of innovation jobs

In the model, the share of individuals who get innovation jobs is fixed at η. The fixed number of jobs implies competition for slots and an important role for credentialing spending in allocating skills. Could inequality increase η, reducing the skill misallocation channel?

Theoretically, there might be a positive link between higher inequality and the number of innovation jobs. In a classical theory of wealth distribution and growth,[2] higher concentration of wealth in the hands of the richest increases savings and capital accumulation. This might induce entry into entrepreneurship and the creation of more jobs in innovation. Aghion et al. (2019) observe a positive correlation between the change in top income share and innovation across the U.S. states. This would be consistent with the innovating entrepreneurs chasing high returns from innovation.

Empirically, data from the U.S. suggests that the number of skilled individuals in innovation jobs is increasing. Over the past decades, the number of doctoral recipients has been steadily increasing, especially in science and engineering. International recipients have particularly aided these increasing numbers. In addition, an increasing share of doctoral recipients takes employment in the private sector instead of academia.[3] This all suggests that empirically, η is on the rise.

3. Concluding remarks

The study shows that wealth inequality can lead to the misallocation of talent between innovation and production jobs, resulting in lower innovation and productivity growth. Future studies should shed more light on several questions. First, how prevalent is the misallocation of talent in other occupations, and how can we extrapolate the empirical findings about the inventors to other skilled occupations? Innovation workers represent only a fraction of skilled jobs in the economy (17% of master's degrees are in STEM). Second, how strong is the new skill misallocation channel as opposed to a more standard human capital accumulation channel, and how much could it explain large income differences across countries? Finally, what does the model imply for the design of standard R&D policies and the effectiveness of these policies in the presence of allocative frictions? Perhaps, optimal innovation and education policies should be set jointly to address non-trivial interconnections between inequality, skill accumulation, and innovation.

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[2] See discussion in Galor and Moav (2004)

[3] Survey of Earned Doctorates, 2020 (the National Center for Science and Engineering Statistics, NSF).