Stanford ETH zürich

ipl immigration policy lab

Working Paper Series

Working Paper No. 20-05 • April 2020

Who Can Work from Home?

Vasil Yasenov

Who Can Work from Home?*

Vasil Yasenov†

This version: April 27, 2020
First version: April 18, 2020

Abstract

In response to the COVID-19 pandemic, many states have adopted stay-at-home orders, rendering a large segment of the workforce unable to continue doing their jobs. These policies have distributional consequences, as workers in some occupations may be better able to continue their work from home. I identify the segments of the U.S. workforce that can plausibly work from home by linking occupation data from O*NET to the American Community Survey. I find that lower-wage workers are up to three times less likely to be able to work from home than higher-wage workers. Those with lower levels of education, younger adults, ethnic minorities, and immigrants are also concentrated in occupations that are less likely to be performed from home.

Keywords: COVID-19, stay-at-home orders, work from home, O*NET
JEL Codes: J1, I3

*I thank Noelle Daly, Jens Hainmueller, Duncan Lawrence and Dan Thompson for helpful comments. All errors are my own.

†Stanford University, Immigration Policy Lab and IZA Institute of Labor Economics. 616 Jane Stanford Way Encina Hall West, Suite 100. Email: yasenov@stanford.edu

1 Introduction

The COVID-19 pandemic has brought about unprecedented social and economic changes. For many Americans, daily lives look and feel remarkably different than they did just a month or two ago. In a record time, entire parts of the US economy were brought to a standstill. The Bureau of Labor Statistics announced that 26 million workers have filed for unemployment benefits between mid-March and late April (DOL, 2020). The pandemic has also put significant pressure on financial markets and supply chains across the globe. The Dow Jones Industrial Average index fell 23% in March, marking its worst first quarter in the last 124 years (DeCambre, 2020).

In response to the crisis, many states have adopted stay-at-home orders meant to slow down the spread of the virus. Estimates suggest that currently about 95% of Americans are ordered to stay home (Secon and Woodward, 2020). Similar measures have been undertaken in countries throughout the world covering at least a third of the global population (Kaplan et al., 2020). An significant implication is that a large segment of the labor force is unable to continue going to work.

A important aspect of these policies is their distributional consequences, as some workers may be better suited than others to continue to work from home. On the one hand, an early narrative emerged in the public domain that the virus is "an equalizer" since all humans are innately prone to it (e.g., Owoseje, 2020). On the other hand, recent articles in media outlets suggest the pandemic exacerbates inequality by documenting its disproportionate toll on low-income workers and minorities (e.g., Tensley, 2020; North, 2020; Chotiner, 2020).

In this note, I characterize which segments of the US workforce can plausibly work from home. I link detailed occupation data from the Occupational Information Network (O*NET) to the American Community Survey (ACS). O*NET contains information on the work context, activities and tasks performed on the job. Following Dingel and Neiman (2020), I define an occupation as one that can potentially be performed at home (i.e., is teleworkable) based on a few key measures indicating daily requirement to be present at the workplace. I then

examine the types of workers employed in teleworkable versus non-teleworkable occupations by wage, education, gender, race, and other demographic and socioeconomic characteristics.

I find that lower-wage workers are up to three times less likely to be able to work from home than higher-wage workers. The share of workers in the bottom decile who can telecommute is 28.6% while for workers in the top decile it is 67.9%. The contrast between education groups is even starker. Only 12.6% of high school dropouts are employed in occupations which would allow the flexibility of working from home, while among advanced degree holders this share is nearly six times higher – 74.9%. This pattern is observed for various other proxies of socioeconomic status such as race, poverty level, immigration status, or receiving welfare benefits.

The most closely related analysis comes from a recent Gallup poll surveying 8,572 people about their social distancing habits, employment situation and exposure to risk in the time of COVID-19 (Rothwell and Reeves, 2020). They do not find large differences in the probability of working from home among respondents in the bottom income quintile. Among the most affluent group, however, 71% report working from home while only 19% say they are unable to remain professionally engaged. In a similar vein, (Rho et al., 2020) used the ACS to paint a demographic picture of the workforce employed in "front-line" industries (e.g., grocery stores, public transit and health care). They find females comprise 64.4% of this vulnerable population. This note builds on their work by focusing on the capacity to work from home and using detailed occupational information rather than broad industry groups.[1] Relatedly, a recent analysis using cell phone data shows wealthier areas moved at lower rates following stay-at-home orders (Valentino-DeVries et al., 2020). Lastly, this work is related to a broader literature on the distributional consequences of economic downturns (Woo et al., 2013; Meyer and Sullivan, 2013; Bitler and Hoynes, 2015; Redbird and Grusky, 2016).

[1]For instance, businesses across all these industries employ accountants or financial analysts which potentially enjoy flexible work arrangements.

2 Data

The two primary data sources for this note are the ACS and O*NET. I use the 2017 ACS IPUMS 5-year sample which represents a 1-in-5 random sample of the US population (Ruggles et al., 2019).[2] O*NET is an online database with detailed occupation level information on the requirements, worker attributes, tasks and activities performed on the job (DOL/Employment and Administration, 2018). I merge both datasets using the Standard Occupational Classification (SOC) system. See the Appendix for more details on this.

I focus on individuals age 16-64 who are not enrolled in school and have reported an occupation which results in a sample of 7,135,310 respondents. To get a measure of weekly wages, I divide each respondent's annual total pre-tax wage and salary income by the weeks worked in the previous year. I adjust these with a state-level price index to account for differential price levels across areas (Moretti, 2013).[3] All results are weighted using the ACS sampling weights.

I follow Dingel and Neiman (2020) in classifying occupations as ones that can potentially be performed from home. They use the "Work Context" and "Generalized Work Activities" surveys from O*NET. If an occupation requires, for example, daily "operating vehicles, mechanized devices or equipment," "work outdoors," "handling and moving objects" or "wearing common or specialized protective or safety equipment," then it cannot plausibly be done effectively outside of the workplace. For instance, this method classifies occupations such as Accountants, Computer Programmers and Paralegals as ones that can be performed at home while Electricians, Registered Nurses and Waiters and Waitresses are not teleworkable. See the Appendix for the exact definition of a teleworkable occupation. This classification and hence my results are not sensitive to reasonably large changes in the teleworkability criteria.

[2] This is the most recent sample for which the *occsoc* variable is available.

[3] Specifically, I use the ACS to estimate state-level "monthly gross rental costs" for two- and three-bedroom rental units with the median (Utah) standardized to one. My results are not sensitive to this standardization or using hourly and yearly wages instead.

3 Results

Figure 1 shows the share of teleworkable jobs by location in the wage distribution. The pattern is (nearly) monotone – higher paid workers are, on average, more likely to have the option of working from home. In the bottom decile of the wage distribution, this proportion is low, ranging from 26.8% to 31.4% and it is steadily increasing as we move towards higher paid workers. Among median-wage earners, 43.8% can perform their work duties away from their workplaces. This share peaks at 70.1% towards the top of the distribution. Standard errors are not displayed and are orders of magnitude smaller than the presented estimates.

Next, Figure 2 shows the same results for various demographic groups. The top left panels breaks down the feasibility of working from home by education groups. The pattern is again monotone – higher educated workers are more likely to be able to work form home. About 12.6% of high school dropouts have this option, while among advanced degrees holders (Master's or higher) this share is nearly six times higher (74.9%). The bottom left panel highlights these differences by race. The proportion of workers who can telework is highest among Asian and Pacific Islanders (49.4%) and Whites (44.5%) and lowest among African American (35.9%), Native American (31.0%) and other minority groups (28.9%). Lastly, we also see that young workers (age 16-24; 26.1% versus 44.2%), men (36.1% versus 49.7%), Hispanics (28.2% versus 45.4%) and immigrants (33.0% versus 44.5%) are all concentrated in occupations that are less likely to be performed from home.

4 Discussion

The COVID-19 pandemic has brought the vast majority of the US population under various stay-at-home regimes. The capacity to remain working under these circumstances is dependent on one's occupation. This note presents evidence that lower-wage workers are up to three times less likely to be able to work from home than higher-wage workers. The imbalance among education groups is even more pronounced. Policy makers concerned with

designing ways to combat the health crisis should consider adopting measures mitigating these distributional disparities.

This analysis has several limitations. I look at occupational tasks and contexts and not actual employment status. In this regard, I measure the plausibility of teleworking and not whether the respondents work from home. Additionally, I do not account for layoffs, furloughs or business closures, which likely have heterogeneous impacts across socioeconomic groups. Lastly, future research should isolate the causal effect of working from home as opposed to these more adverse employment outcomes.

References

Bitler, Marianne and Hilary Hoynes, "Heterogeneity in the Impact of Economic Cycles and the Great Recession: Effects within and across the Income Distribution," *American Economic Review*, 2015, *105* (5), 154–60.

Chotiner, Isaac, "The Interwoven Threads of Inequality and Health," *The New Yorker*, 2020.

DeCambre, Mark, "The Dow just booked the worst 1st quarter in 124 years — here's how the stock market tends to perform after brutal quarters," *MarketWatch*, 2020.

Dingel, Jonathan I and Brent Neiman, "How Many Jobs Can be Done at Home?," Technical Report, National Bureau of Economic Research 2020.

DOL, "News Release," *Department of Labor*, 2020.

DOL/Employment and Training Administration, "O*NET Database, Version 23.0," *dataset]. www.onetcenter.org/db$_r$eleases.html.*, 2018.

Kaplan, Juliana, Lauren Frias, and Morgan McFall-Johnsen, "A third of the global population is on coronavirus lockdown — here's our constantly updated list of countries and restrictions," *Business Insider*, 2020.

Meyer, Bruce D and James X Sullivan, "Consumption and income inequality and the great recession," *American Economic Review*, 2013, *103* (3), 178–83.

Moretti, Enrico, "Real wage inequality," *American Economic Journal: Applied Economics*, 2013, *5* (1), 65–103.

North, Anna, "Every aspect of the coronavirus pandemic exposes America's devastating inequalities," *Vox.com*, 2020.

Owoseje, Toyin, "Coronavirus is 'the great equalizer,' Madonna tells fans from her bathtub," *CNN*, 2020.

Redbird, Beth and David B Grusky, "Distributional effects of the great recession: Where has all the sociology gone?," *Annual Review of Sociology*, 2016, *42*, 185–215.

Rho, Jin Hye, Hayley Brown, and Shawn Fremstad, "A Basic Demographic Profile of Workers in Frontline Industries," *Center for Economic and Policy Research*, 2020.

Rothwell, Jonathan and Richard Reeves, "Class and COVID: How the less affluent face double risks," *Brookings Institution*, 2020.

Ruggles, Steven, Sarah Flood, Ronald Goeken, Josiah Grover, Erin Meyer, Jose Pacas, and Matthew Sobek, "IPUMS USA: Version 9.0," *dataset]. Minneapolis, MN: IPUMS. https://doi. org/10.18128 D*, 2019, *10.*

Secon, Holly and Aylin Woodward, "About 95% of Americans have been ordered to stay at home. This map shows which cities and states are under lockdown.," *Business Insider*, 2020.

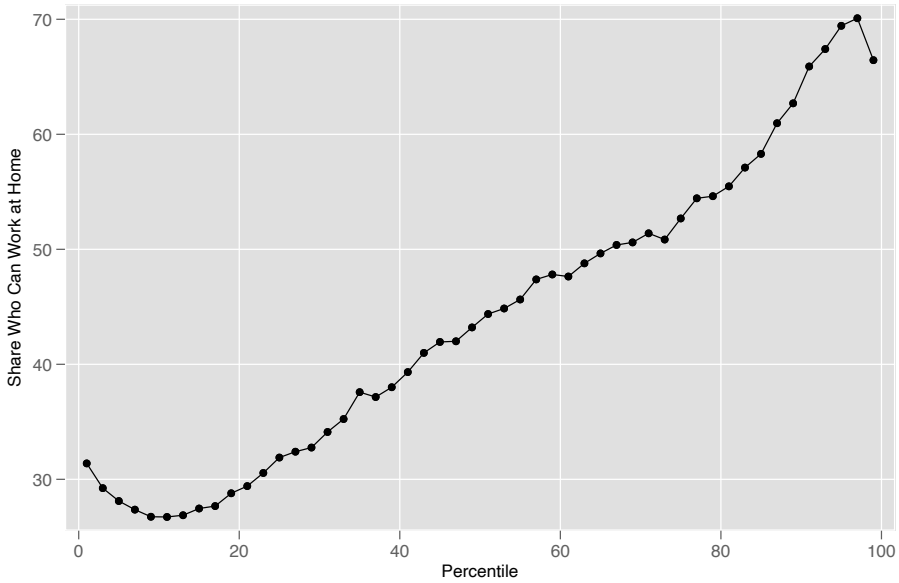
Tensley, Brandon, "How coronavirus is deepening American inequality," *CNN*, 2020.

Valentino-DeVries, Jennifer, Denise Lu, and Gabriel J.X. Dance, "Location Data Says It All: Staying at Home During Coronavirus Is a Luxury," *The New York Times*, 2020.

Woo, Jaejoon, Elva Bova, Tidiane Kinda, Zhang, and Sophia Yuanyan, *Distributional consequences of fiscal consolidation and the role of fiscal policy: What do the data say?* 2013.

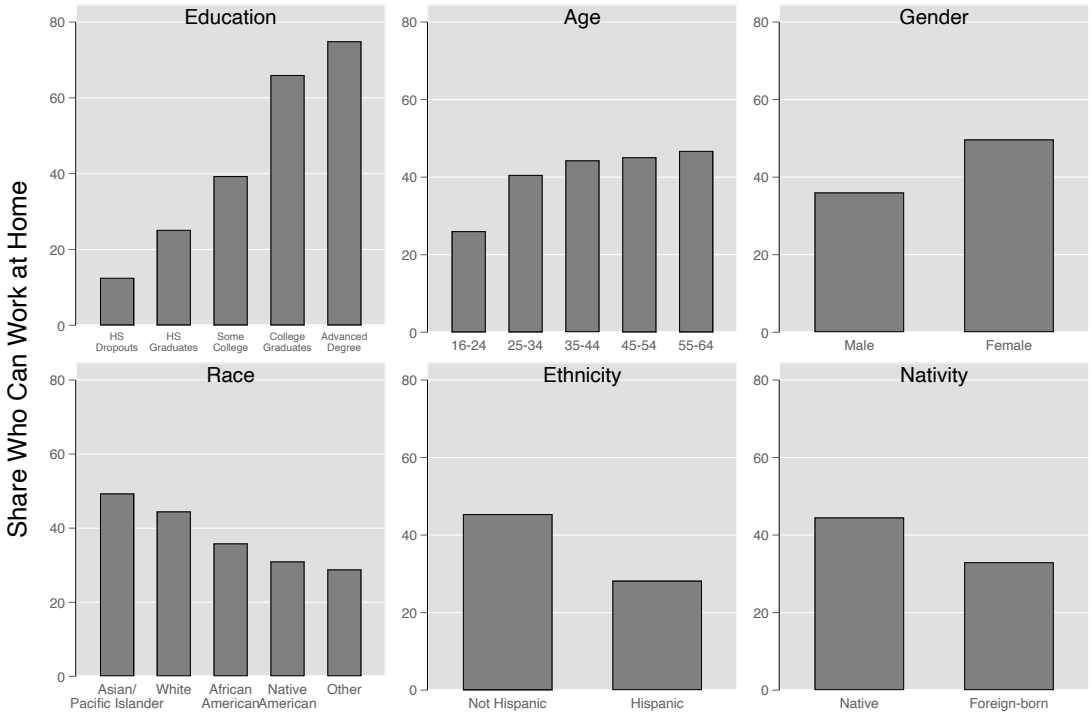
5 Figures

Figure 1: Feasibility of Working from Home by Location in the Wage Distribution



Source: Author's calculations from the American Community Survey. See Section 2 for more details.

Figure 2: Feasibility of Working from Home by Demographic Group



Source: Author's calculations from the American Community Survey. See Section 2 for more details.

6 Appendix

6.1 Merging O*NET and ACS

This involves a few steps. First, I convert the 8-digit O*NET-SOC codes into 6-digit 2010 SOC codes using the crosswalk on O*NET's website. Whenever a single SOC code corresponds to more than one O*NET-SOC occupation, I use the median value of the teleworkability indicator within these occupations. That is, I assign the teleworkability value of the majority occupations within this group. Next, I merge these SOC codes with the *occsoc* variable in the ACS. I deal with the unmatched ACS 6-digit SOC codes by assigning the median teleworkablity value for the corresponding set of 5-digit SOC occupations. If such a match is not found, I continue with the corresponding 4-digit SOC codes and so on. The majority (90.2%) of occupations are matched at the 6- or 5-digit levels. Lastly, I manually match four occupation codes (551010, 552010, 553010, 559830) which have not been matched in the previous steps.

6.2 Defining Teleworkable Occupations

Building on Dingel and Neiman (2020), I code any occupation as one that cannot be performed at home if the average respondent in the O*NET "Generalized Work Activities" lists any of the following activities as very important:

- Inspecting equipment, structures, or materials (Q4A)
- Performing general physical activities (Q16A)
- Handling and moving objects (Q17A)
- Controlling machines and processes [not computers nor vehicles] (Q18A)
- Operating vehicles, mechanized devices, or equipment (Q20A)
- Repairing and maintaining mechanical equipment (Q22A) or electronic equipment (Q23A)
- Performing for or working directly with the public (Q32A)

Additionally, I do the same if the average respondent in the O*NET "Wok Context" survey states they are exposed to any of the following at least once a week:

- Violent people (Q14)
- Very hot or very cold temperatures (Q23*)
- Contaminants (Q25*)
- Cramped work spaces (Q26*)
- Radiation (Q28*)
- Diseases or infection (Q29)
- High places (Q30*)
- Hazardous conditions (Q31*) or equipment (Q32*)
- Minor burns, cuts, bites, or stings (Q33)

An occupation is also deemed non-teleworkable if the average respondent in the same survey says they spent majority of time doing any of the following:

- Work outdoors [every day] (Q17)
- Climbing ladders, scaffolds, poles (Q36*)
- Walking or running (Q37)
- Kneeling, crouching, stooping or crawling (Q38*)
- Using their hands to handle, control, or feel objects, tools, or controls (Q40*)
- Wearing common or specialized protective or safety equipment (Q43)

Lastly, I do the same if they state that:

- They use email less than once per month (Q4) or
- It is very important for them to be responsible for others' health and safety (Q10*)

The symbol "*" denotes additional requirements not imposed in Dingel and Neiman (2020).