

**The Impact of Telecommunications Technologies on Social Mobility during the COVID-19
Pandemic**

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On my honor as a University Student, I have neither given nor received
unauthorized aid on this assignment as defined by the Honor Guidelines
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Introduction

As the COVID-19 pandemic continues, we are seeing a dramatic shift from in-person workplaces to telecommuting and work-from-home. It has been speculated that the transition to a virtual workplace will allow people to move away from crowded urban areas. However, these are options are open to everyone.

Experts think that people will move away from metropolitan centers if they can work permanently from home anywhere, due to cheaper housing, proximity to family, etc. This could cause changes in social demographics across America, with people becoming less reliant on large metropolitan areas for career or work.

In addition, these effects will be exacerbated by unequal teleworking opportunities. Especially post-pandemic, as large numbers of people are suffering from losing their jobs, these negative impacts are disproportionately affecting underprivileged communities (Kochhar & Passel, 2020).

The pandemic is accelerating the shift towards telecommuting becoming commonplace, possibly within the next decade (Hernandez-Morales, Oroschakoff, & Barigazzi, 2020). This combined with the rise in utilization of telecommunications software may drive this sizeable shift in mobility.

This topic is significant, particularly in the field of STS, because it combines technology with societal change. Due to changes in technology allowing telework to be more prevalent, it has the potential to be a positive change as it could revitalize rural areas and relieve pressure from urban areas.

My research question will examine how social mobility is changed by the utilization of telecommunication technologies (Zoom, Amazon Chime, WeChat etc.) during the pandemic. I will focus on how demographic factors like age, gender, educational qualification, and income influence the accessibility, choice and use of telecommunication technologies, and how the deployment of technical resources impacts social mobility.

My hypothesis centers around the idea that different social groups have different levels of mobility. Someone's educational background likely impacts what industry they work in, which impacts whether they can move freely. Similarly, different industries are overrepresented by people of certain races, so race should be considered. It is also important to consider the technical factors, as the rise of telecommunications software that allows for virtual conferencing is what enables certain industries to transition to work from home. Therefore, this question should be considered an STS problem.

Literature Review

Overall, the current body of literature that exists on this topic is relatively new. However, there is a good amount of data on employment during COVID-19.

The first are concerned with which jobs are hardest hit due to COVID-19 by industry. One source studies vacancies to draw conclusions about which types of jobs are in demand. Specifically, it finds that “Essential retail took a smaller hit, while leisure and hospitality services and non-essential retail saw the biggest collapses” (Forsythe, Kahn, Lange & Wiczer, 2020). Another source investigates the same questions but approaches the data by surveying firms and employers (Campello, Kankanhalli & Muthukrishnan, 2020).

Different occupations and industries also have different remote work capabilities. Another study done by NBER finds, “professional occupations were more likely to shift toward working from home and had fewer people laid off” (Brynjolfsson, Horton, et al., 2020). This is supported by another paper that finds “remote work is much more common in industries with better educated and better paid workers” (Bartik, Cullen, et. al, 2020).

This is important, as other research has shown that COVID is accelerating the adoption of remote work – but, not all occupations have the same capability for it; industries that cannot adapt may be disproportionately harmed.

In addition, many sources investigate whether inequality in race, gender, level of education, etc. determine to what degree employment prospects are impacted by COVID-19.

One source finds that “New-hiring cuts are most pronounced in local labor markets lacking depth, in low-income areas, and in areas with greater income inequality” (Campello, Kankanhalli & Muthukrishnan, 2020) which indicates that low socioeconomic status may be amplified by COVID’s effects. Pew Research finds that significant differences exist between populations: women, white or asian, and those with advanced degrees are far more likely to be in jobs that can be teleworked compared to their black or Hispanic, male, or less-educated counterparts (Kochhar & Passel, 2020).

COVID-19’s effect in increasing the prevalence of remote work is well researched. A paper in the *Journal of Vocational Behavior* states that COVID-19 has led to a “broad shift to working from home” (Kramer & Kramer, 2020). This adoption of remote work may affect urban areas. As Politico speculates, “The end of the office would transform the urban landscape. Workers, unshackled from their morning commute, will be free to gravitate to suburbs and the countryside” (Hernandez-Morales, Oroschakoff, & Barigazzi, 2020).

However, the thesis of my research paper centers around the idea that not everyone is afforded the ability to move away from urban areas. Some sources have already begun investigating how mobility is impacted: one paper, published by NYU Stern, theorizes that underprivileged communities are disproportionately affected by COVID (Coven & Gupta, 2020).

My research aims to take this one step further, and investigate the long-term effects that COVID-19 will have on the capability of people from different backgrounds to move. This will be unique from the current literature since I plan to focus specifically on mobility and take into account desire and incentives. So, while the others just look at labour data, I want to take into account other dimensions that may impact mobility outcomes (like if people have no incentive or desire to) that may obscure COVID’s impact.

STS Framework & Research Method

I plan to examine the problem through one STS Framework: Hughes's perspective on socio-technical systems. He breaks these systems into system builder, technological momentum, and reverse salient components, and then examines the interactions between them.

I've defined the system as telecommunications software like Zoom, Amazon Chime, etc. The system builders include the engineers, company leaders like the founders and shareholders. The technology industry is known for high growth and innovation, creating a complex system that has a reputation for hiring top talent, being willing to change, and always improving.

As for the social, political, and technical means of constructing the system, in America, capitalism and the tech industry are very closely related. America encourages innovation and capital growth through tax breaks, specialized immigration pathways for highly-skilled workers, etc. The system reflects capitalist values like constant growth and creation of economic value. The ones that shape the system are the shareholders and upper leadership; their goal is to create the most value for the company and enrich themselves.

Most of the users of the system, the students and workers whose schools or workplaces mandate usage of telecommunications software, do not get a direct say in how the system is shaped. Because they are forced to use a particular product, dissatisfaction with the product could be masked; they are required to participate in the system.

We can also observe different technological styles of similar technology development in this case. One example is WeChat, a technology that is dominant in China.

China is similar to the United States in that they both encourage economic and technological growth. However, the cultures in these two countries are different. It seems that in Chinese culture, people are more willing to accept impactful government oversight. WeChat is officially supported by the Chinese government and more integrated in Chinese life. America, by contrast, has many competing technologies without official endorsement of one by the government.

The primary reverse salient is that many do not have the newest devices, and cannot handle the hardware requirements of telecommunications software, which slows down its adoption. Full adoption of the system is reliant on a majority of users being able to run the software. Especially in education and government systems, users are known to be behind in modernizing.

However, in recent years we have seen a push towards modernization in many government entities. In addition, consumption culture has sold Americans on having up-to-date technology. This culture will likely lead this reverse salient being diminished eventually. This is one example of a social means that is leveraged to increase the social adaptation of this technology.

I utilized a survey and interviews for my research and data collection method. I designed and sent out a survey to recently graduated students from UVA. This survey asked for demographic information like their occupation, race, gender, etc. In addition, I asked for their ability to move, desire to move, the remote work capabilities of their job, etc. To find respondents, I posted to my UVA-centric social media circles such as Facebook, LinkedIn, and Reddit.

Quantitative data I collected included demographic information such as race, gender, age, yearly income, and educational background and qualification. Qualitative data that collected are individual's feelings of mobility, as well as their moving history.

However, these methods do have potential bias. Because I sent out these surveys and interview questions through social media, I received the most results from my personal circle, which

likely skewed the results towards my personal demographics. In addition, survey participation is highly voluntary. I tried to counteract this bias by looking outside of my own connections by seeking assistance through UVA or online forums. Though many of the respondents were technology industry employees, which makes sense given my personal connections, by outreaching in different ways, I was still able to receive a variety of data points that best represent a random sample.

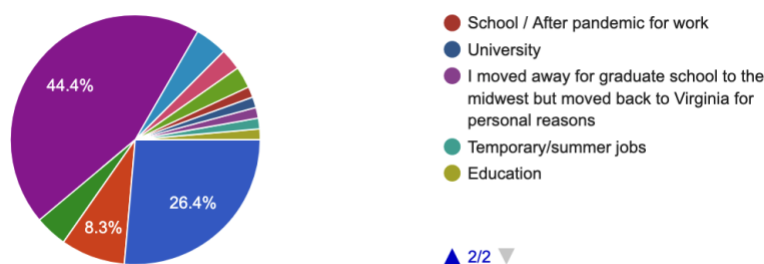
Data Analysis

Over the course of a month, I put out a research survey that received 76 responses. First I will go into detail about the backgrounds of the survey respondents that make up my final dataset.

Unfortunately, due to perhaps my personal network skewing to people I know personally who are around my age, and also the avenues where I put out the survey (I distributed the survey primarily on the internet or on social media, where the average demographic of readership likely skews young), around 70% of the respondents were in the 18-24 age range. However, I did succeed in obtaining a relatively balanced gender pool of applicants. Around 50.7% of the survey respondents were male, and around 46.5% were female. In addition, most of the survey responses were from people who had obtained Bachelor's degrees, followed by Master's.

I also included a question that allowed survey respondents to note what industry they worked in, with broad terminology. Many worked in technology-related fields. This likely explains why many are able to use telecommunications software for their jobs: an overwhelming 94.4% of survey respondents stated they used Zoom or other telecommunications software, and a majority of 80.6% of survey respondents worked from home full time. Only about 32% of survey respondents and one interviewee said they would want to work remotely full time. However, if they did work remotely full time, a large portion would consider relocation (46.4% of survey respondents). Of those who *have* relocated in recent years, most say it is due to work or educational related reasons. This is very important as it indicates that mobility is intricately tied to employment, as it is the major factor in causing relocation, spread among all demographic groups (see Figure 1).

Figure 1. Recent relocation history of survey respondents



After determining reasons for past relocation and understanding that it is intrinsically employment-related, in order to more directly answer the question of how relocation will affect different social groups by ability work from home, I decided to analyze WFH potential of different income brackets, education, and race.

Figure 2. Likeliness to continue WFH by Educational Level

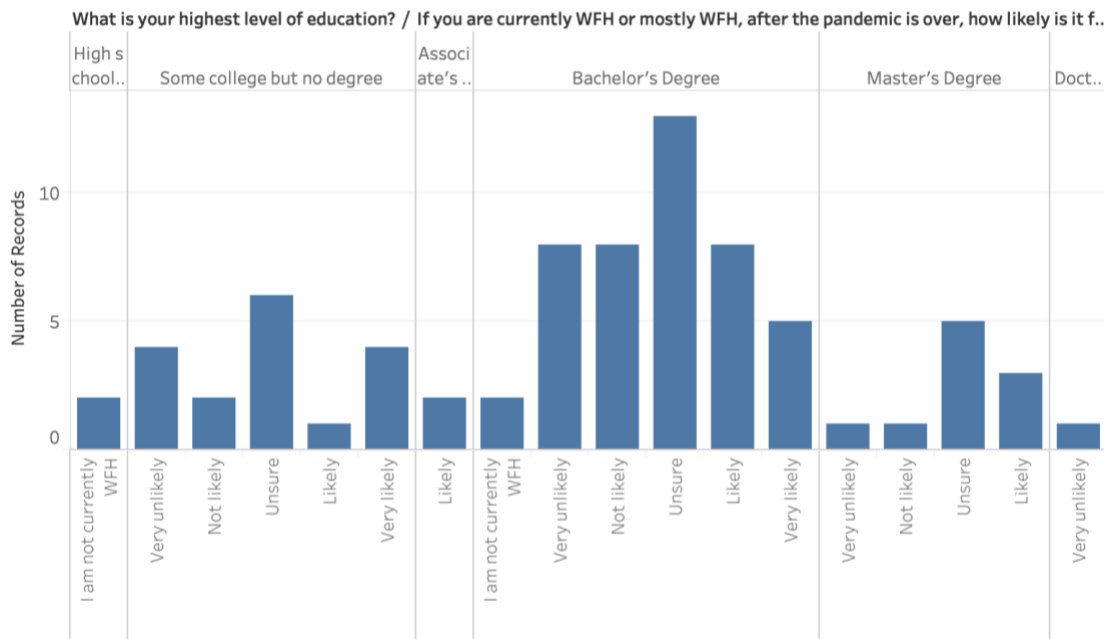
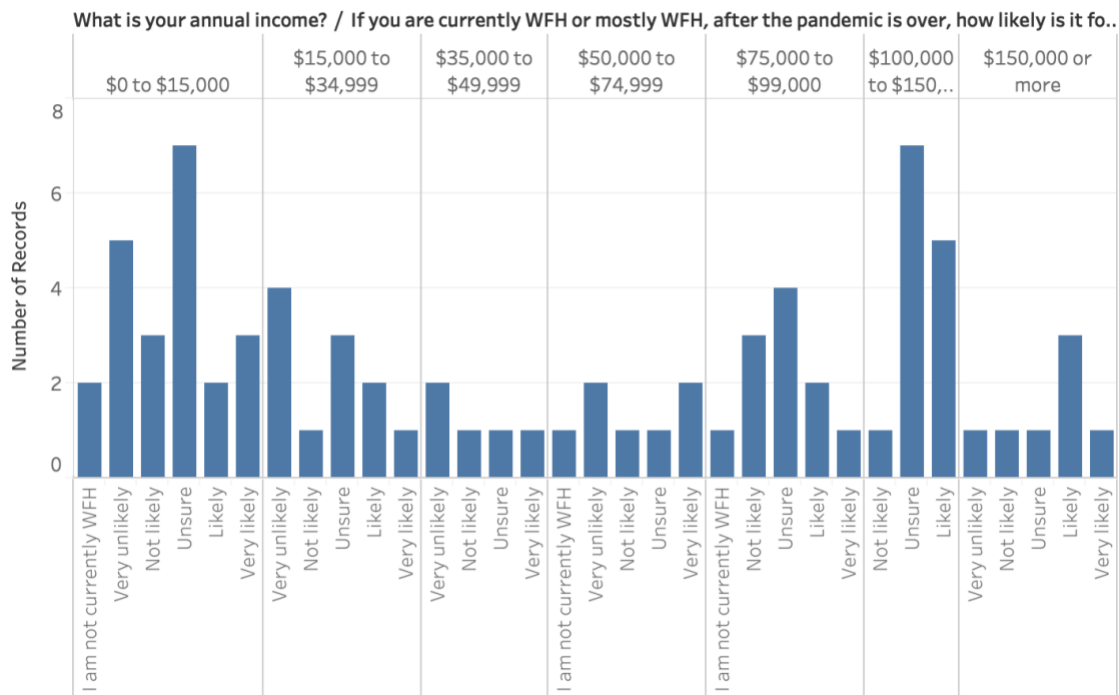


Figure 3. Likeliness to continue WFH by Income Bracket

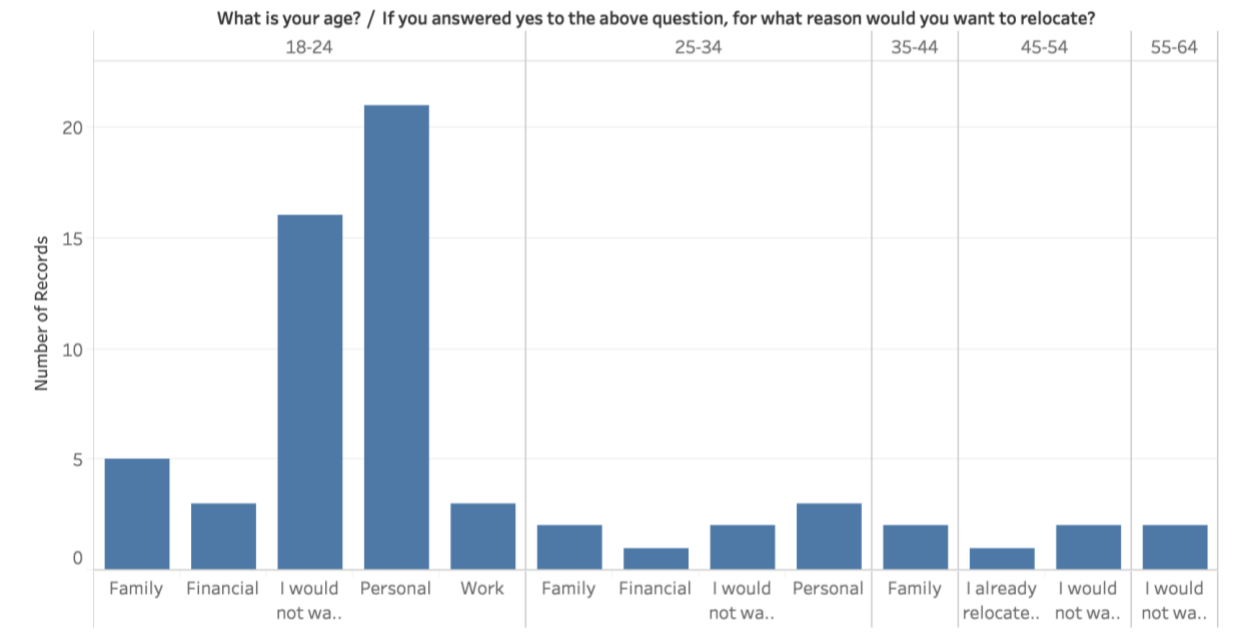


As seen by the data, people who were in a lower income bracket were less likely to be currently WFH during the pandemic and less likely to be able to continue WFH after the pandemic, while the trend is reversed to likely and very likely as income bracket increases. However, interestingly, this trend is not seen by educational level. Nonetheless, we can still make note of the fact that the more you make, the more likely you are to be able to work from home after the pandemic, and the more likely your mobility will increase due to the shift to WFH from the pandemic.

Now that we have determined that certain social groups (namely, those in higher income brackets) will have more potential to relocate if they desire, I also wanted to explore the reasons why people might want to relocate. Generally, reasons for desiring relocation were mixed. A large number

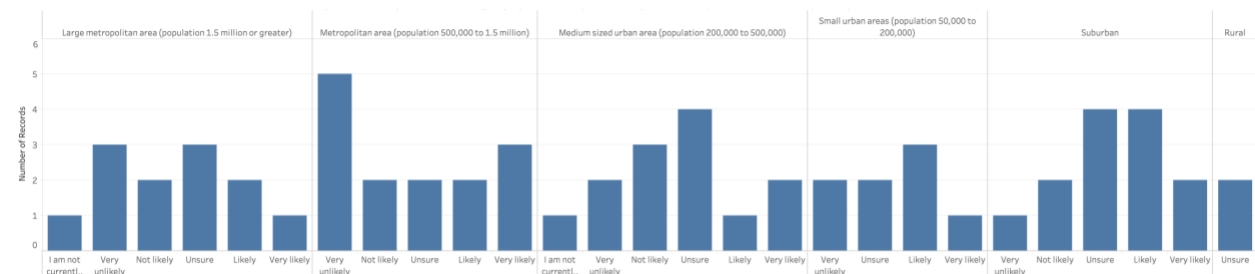
on the survey said they would want to relocate for personal reasons, which could be for a variety of health, lifestyle, cultural, etc. reasons. In the interviews, reasons were varied as well, for reasons like wanting to live near partner, wanting to be in industry hubs for their career, or just wanting to move back to where family members live.

Figure 4. Reasons for Relocation by Age



Personal reasons seemed most important, but family also becomes more important as people age. So, because the data indicates that people will most likely want to relocate for personal reasons, I also wanted to investigate where people will want to relocate to. If people want to relocate due to personal reasons, then it is likely that they will relocate to areas of their choosing if given the opportunity.

Figure 5. Most Popular Relocation Areas by WFH Capability



Interestingly, the data seems to contradict my hypothesis that the shift to full-time remote work would cause workers to move away from large metropolitan areas and settle in smaller metropolitan areas or suburban areas due to cheaper housing costs. Most seemed to desire to move to

metropolitan or large metropolitan areas instead of suburban areas for personal reasons due to the higher number of responses for those sections. This is true of everybody regardless of WFH capability, though the data does seem to indicate that suburban areas and mid-size metropolitan areas were the most popular among those with a greater likelihood of WFH ability.

Overall, though, it seems that my hypothesis that those of a higher income bracket (though not educational level) will have a greater WFH capability and therefore increased social mobility due to the effects of telecommuting technologies on the pandemic. However, these survey responses are still purely hypothetical, so the reality may be different, but this is what the data seems to suggest at this time.

Discussion

As said before, my hypothesis proposes that different social groups have different levels of mobility. Someone's educational background likely impacts what industry they work in, which impacts whether they can move freely, and higher paying so-called "white-collar" industries or careers are more likely to see an increase in mobility. Similarly, different industries are overrepresented by people of certain races, so race should be considered, as races such as White or Asian may be overrepresented in technology (an industry more likely to allow flexible and remote work options) compared to other races.

This is definitely a hypothesis that was supported by my research. Many of my survey respondents were technology industry employees, and a significant percentage, around 30.8%, answered that it was likely or very likely for workplaces to continue WFH policies even post-pandemic. While not a majority, it is a higher percentage than expected.

However, interestingly, there is resistance towards wanting to work remotely full-time, with most participants indicating they would prefer to have the option to or at least partially come into the office as seen in Figure 5 in the Data Analysis section. In addition, only about 32% of survey respondents indicated they would choose to work remotely full time if they workplace offered it.

This is likely due to reasons of wanting a better workplace environment or culture or for productivity reasons as I gathered from my interviews, but I did not include it in my survey as I did not think it was exceptionally relevant to my research question. This seems to indicate that even if workplace policies shifted towards allowing WFH as a majority post-pandemic, not every employee would choose to take advantage of these policies. So, they may not see the benefits of social mobility as indicated in my research question. Or, even if they have the opportunity, they may not choose to take advantage of it, which will make it hard to quantify the results.

However, if the company or workplace mandated full-time remote work, then it seems like a large portion of survey respondents would want to relocate. It is therefore very relevant to my research question to see what type of area survey respondents currently live in compared to what type of area survey respondents would like to relocate to.

Overall, though, as it seems from my research, cheaper housing costs or financial reasons is only one reason among many that someone would choose to relocate (for work, personal, or family reasons). So, it seems like the impact on telecommunications software on social mobility could still be significant in that it could provide many workers the mobility they desire, but my initial hypothesis of what types of areas would lose or gain population may have missed the mark. For example, it seems like most survey respondents, if given the opportunity, would choose to move to larger metropolitan areas. This may be skewed by the fact that the survey respondents overall run young.

Another issue that arose from unequal survey participation is that many respondents were overwhelmingly technology workers, with some other industries such as finance and economics being represented but not in large numbers. Therefore, it is difficult to draw conclusions about how different social demographics are affected.

All in all, the data seems to suggest that though aspects of my research question may be supported, such as an unequal increase in WFH policies for certain industries, the effects of this phenomenon may not be as anticipated. Instead of flexible WFH policies leading to people moving into smaller metropolitan or suburban or rural areas, it may simply allow people to move to their large metropolitan area of choice.

Conclusion

The worldwide COVID-19 pandemic has exacerbated a dramatic shift from the in-person workforce to the prevalence of telecommuting that we see today. With the utilization of telecommunications software like Zoom, Amazon Chime, WeChat etc, this is likely to continue. This could lead to an increase in social mobility in those whose jobs have shifted to telecommuting. Unlike what was previously proposed, that this increase in social mobility could lead to migrations away from large urban centers, it seems like my research supports the opposite, that it could lead to migrations towards large urban centers. However, working from home is not an option that is available in equal degrees to all social groups.

Overall, it seems like my research question was only partially supported by the research. I investigated how the ability to work from home and thus social mobility differs between social groups like different races, genders, ages, etc. and how the COVID-19 pandemic and telecommunications software have impacted inequality in these areas. This is an important aspect to consider ethically, as increasing inequality is an unfortunate side effect of many new technologies that engineers and scientists should aim to avoid. The goal of technology should be to improve quality of life for the most amount of people, but it seems like the benefits of telecommuting technologies are currently limited to the most privileged social groups. This is an unintended negative ethical consequence.

While I found that certain privileged social groups, like those with higher educational qualifications, tend to have a higher degree of social mobility over their less-privileged counterparts, and these differences are more prominent compared to those who are not in jobs that can be telecommuted, it appears that the utilization of this social mobility may have less far-reaching effects as many may not choose to take advantage of this social mobility.

However, there are still broader impacts to this research, as it indicates that the shift may not be as drastic as previously considered in the literature. This means that public transportation or infrastructure will be able to catch up to population growth in many of these areas, which is a positive impact.

For future areas of research to consider, I believe that it would be a good idea to more fully investigate the motivations behind migration patterns that lead people to relocate to different areas. In addition, being able to get data points of workers outside of the technology industry and across a wider variety of ages would help assist in analyzing trends. Unfortunately, I was limited by the voluntary nature of survey responses, but can see how using different data collection methods could help.

Bibliography

Barrero, J. M., Bloom, N., & Davis, S. J. (2020). Covid-19 is also a reallocation shock (No. w27137). National Bureau of Economic Research.

This journal article was published by the National Bureau of Economic Research, which is a reputable nonprofit research organization. It looks at future projections of the labor market and job losses as a result of the COVID-19 pandemic. It is interesting in that it also looks at the short-term impacts and compares the rate of hiring to layoffs. It also ends with providing policy recommendations to combat the reallocation shock.

Bartik, A., Cullen, Z., Glaeser, E., Luca, M., & Stanton, C. (2020). What Jobs are Being Done at Home During the Covid-19 Crisis? Evidence from Firm-Level Surveys. The National Bureau of Economic Research. doi:10.3386/w27422

This journal article is also published by the National Bureau of Economic Research. It looks at the prevalence of remote work during the COVID-19 pandemic and also looks at expectations for whether or not remote work will persist post-pandemic or return to in-person work. Much of this research was done by conducting surveys from firms across a wide variety of industries, providing comparative data on the correlation of education, higher pay, etc. with the ability to transition to remote work.

Brynjolfsson, E., Horton, J., Ozimek, A., Rock, D., Sharma, G., & Tuye, H. (2020). COVID-19 and Remote Work: An Early Look at US Data. The National Bureau of Economic Research. doi:10.3386/w27344

This journal article is also published by the National Bureau of Economic Research. It reports the result of a survey done on a random representative sample of the US population that asks about employment outcomes and remote work capability. It differs from the previous source in that it surveys workers instead of employers or firms/corporations, so we can examine unemployment factors as well. In addition, it compares employment outcomes across states as well as the effects that industry makeup of state economies may have on them.

Campello, M., Kankanhalli, G., & Muthukrishnan, P. (2020). Corporate Hiring under COVID-19: Labor Market Concentration, Downskilling, and Income Inequality. doi:10.3386/w27208

This journal article is also published by the National Bureau of Economic Research. It looks at data analysis done on job-vacancy postings to examine the effect of COVID-19 on the US labor market in terms of which types of jobs and in which industries have been cut down and which have persisted. It compares these employment outcomes across industries and regional areas.

Coven, J., & Gupta, A. (2020). Disparities in mobility responses to covid-19. NYU Stern Working Paper.

This paper was published by NYU Stern, which is a well-known business school that publishes trustworthy academic research. This paper examines post-COVID-19 responses by racial and economic demographic factors in New York City. For example, it finds that higher-income residents were more likely to leave the city while residents from low-income, Black, and Hispanic areas were less likely to shelter in place. This is particularly relevant to my prospectus, as this paper shows that these differing levels of mobility across demographic factors are exacerbated by COVID-19.

Elliott, N., and R. Kling. "Organizational Usability of Digital Libraries in the Courts." Proceedings of HICSS-29: 29th Hawaii International Conference on System Sciences, 1996, doi:10.1109/hicss.1996.495299.

Forsythe, E., Kahn, L., Lange, F., & Wiczer, D. (2020). Labor Demand in the time of COVID-19: Evidence from vacancy postings and UI claims. *Journal of Public Economics*. doi:10.3386/w27061

This paper was published by the National Bureau of Economic Research, which is a reputable nonprofit research organization. It differs from the other sources by looking only at job vacancy data provided by the Bureau of Labor Statistics and a private company, Burning Glass Technologies, as opposed to comparing new postings vs closed positions. It compares this data by geography and industry, which is of interest to my research paper.

Glaeser, E., Gorbach, C., & Redding, S. (2020). How Much does COVID-19 Increase with Mobility? Evidence from New York and Four Other U.S. Cities. *The National Bureau of Economic Research*. doi:10.3386/w27519

This paper was also published by the National Bureau of Economic Research. It investigates the effect of geographic mobility on the spread COVID-19 using data collected from Atlanta, Boston, Chicago, New York City, and Philadelphia. This is an interesting comparison because my paper plans to research the effects of COVID-19 (among other factors) on geographic mobility, while this paper looks at the reverse, which may help me compare the causative effects.

Hernández-Morales, A., Oroschakoff, K., & Barigazzi, J. (2020, August 03). The death of the city. Retrieved October 16, 2020, from <https://www.politico.eu/article/the-death-of-the-city-coronavirus-towns-cities-retail-transport-pollution-economic-crisis/>

This article was reported in Politico, a newspaper that primarily covers American politics. This is an interesting piece about how teleworking has affected urban areas, with people moving out of large metropolitan areas due to the availability of remote work. It makes the claim that this movement is due to telework and not COVID-19, while my research paper will examine both as factors, so it is a very relevant source.

Kochhar, R., & Passel, J. (2020, August 26). Telework may save U.S. jobs in COVID-19 downturn, especially among college graduates. Retrieved October 16, 2020, from <https://www.pewresearch.org/fact-tank/2020/05/06/telework-may-save-u-s-jobs-in-covid-19-downturn-especially-among-college-graduates/>

This article was published by Pew Research, which is a well-reputed think tank based in America that conducts empirical research on politics, social science, etc. This article confirms what many were already suspecting about telework shifting towards the norm, with most of the positions lost being positions that could not shift to remote work. It looks at labor statistics and classifies certain occupations as being able to be teleworked compared to ones that require direct human contact or physical work, then compares the percentages of who is in those jobs across demographic groups like sex, race, and education level. This comparison is very relevant to my research, as I wanted to investigate how these demographic factors affect ability to move.

Kramer, A., & Kramer, K. Z. (2020). The potential impact of the Covid-19 pandemic on occupational status, work from home, and occupational mobility. *Journal of Vocational Behavior*, 119, 103442. doi:10.1016/j.jvb.2020.103442

This article was published by the Journal of Vocational Behavior, which is an academic peer-reviewed journal that conducts research on career development and choices. This article therefore centers the impact of COVID-19 on perceptions of remote work and on different occupations. In addition, this article touches on occupational inequality, which is a very relevant topic for my research paper.

Lyttelton, T., Zang, E., & Musick, K. (2020). Gender Differences in Telecommuting and Implications for Inequality at Home and Work. doi:10.31235/osf.io/tdf8c

This paper was written by authors from the Department of Sociology at Yale University and the Department of Policy Analysis at Cornell University. It examines the disproportionate impact that COVID-19 has had across both sexes both occupationally and in terms of housework, and the issues that this may have for gender equality. Though it does not talk about mobility specifically, I believe it is still relevant to my research paper.

Sato, Y. (2007). Systems Engineering and Contractual Individualism: Linking Engineering Processes to Macro Social Values. *Social Studies of Science*, 37(6), 909-934. Retrieved November 7, 2020, from <http://www.jstor.org/stable/25474556>

What the Surge in Working From Home Means for Big Cities. (n.d.). Retrieved October 16, 2020, from <https://www.usnews.com/news/cities/articles/2020-06-29/how-teleworking-may-accelerate-the-shift-away-from-big-cities>

This article was written by the U.S. News & World Report, which is a media company that publishes a wide variety of news content. This article speculates on how remote work may affect metropolitan areas, with people being incentivized to move away due to rising housing prices and the availability of telecommuting. This article covers interviews done with workers who have had the ability to do so and produces anecdotes for why they have decided to make the move. Overall, this is a thorough secondary source that provides a high-level overview of the subject of my research paper.