Spring 2023

ECONPress

rethink *your world*

ECONPress
of Northeastern University

ECONPress is a publication for undergraduate compositions in economics. ECONPress invites the highest quality submissions from undergraduate students in various economics-related disciplines. It provides a forum for the undergraduate economics community to engage in active discussion and debate about the topics, theories, and applications they have learned inside and outside

Edited and published at Northeastern University

Editorial Offices
ECONPress
360 Huntington Avenue
316 Lake Hall
Boston, MA 02115-5000

Electronic Mail:
NUEconPress@gmail.com

Web Site:
www.northeastern.edu/econpress

ECONPress
of Northeastern University

Letter from the Editor

To Our Readers,

I am overjoyed to share with you the new edition of ECONPress. While it has been several years since our last edition of ECONPress, the unwavering support and enthusiasm from those involved have enabled us to continue to showcase high-quality undergraduate research. We hope this journal will launch a fantastic new generation of ECONPress and inspire undergraduate students to engage with economics research. For this journal, we have specifically not requested a research theme in order to present the incredibly diverse interests of economics students. The research topics covered include an investigation into the intergenerational effects of Baltimore's redlining, a discussion of the growing pains caused by the global transition to renewable energy, an assessment of OPEC's costs and benefits to members and the global community, an analysis of the Marxist ideas presented in the dystopian film, *Moon*, and an exploration of the effects of labor force participation on income inequality in the U.S. context. While the authors cover a variety of economic topics, they are united in their passion for their respective topics and their use of strong economic reasoning.

ECONPress as a club and journal would not be possible without the support from many individuals. I would first like to thank all authors who submitted their papers for publication. This semester we received and reviewed many papers, and we are grateful for the level of sophistication in the papers submitted and the time investment that the authors made. I would also like to thank our advisor, Dr. Madhavi Venkatesan for her support this academic year. Her guidance has helped ECONPress return to regular journal publication. Additionally, we are very grateful to the Northeastern University Economics Department, and Katie Thorpe for their assistance.

I am incredibly thankful to every member of the ECONPress team. Your enthusiasm, rigor, and dedication are what make ECONPress unique. I would like to thank all current and past members of our executive board, specifically Maddy, Vanessa, and Erik for your efforts in leading and promoting ECONPress.

Lastly, I want to thank you, the readers. Your support and curiosity of a multitude of economics topics are why we continue our work in compiling this journal. We hope you will enjoy the research.

Sincerely,

Owen Graham-O'Regan

Owen Graham-O'Regan
Editor in Chief

A Tale of Two Cities: Baltimore and Baltimore

Delaney Marvel-Burns
Northeastern University

I. Introduction

While traveling down historic North Charles Street in Baltimore City, Maryland, you may encounter numerous people eating outside, walking their dogs, hustling to catch the bus, or enjoying the greenspace of Mount Vernon Place. This enticing imagery juxtaposes the harsh realities experienced by those on Martin Luther King Boulevard (MLK), less than a mile away. Here, there is a large homeless population alongside groups of juveniles, all congregating on the corners, creating an underground economy as they offer to wash car windows between green lights, and vacant, boarded-up rowhomes loom in the distance. These stark differences are representative of what Baltimorean, poet, and author Kondwani Fidel refer to as "two Baltimores…your zip code determines whether or not you live or die" (Fidel, 2017).

After being criticized by U.S. Representative Elijah Cummings, President Trump labeled Baltimore as a "disgusting rat and rodent-infested mess" (Nobles III, 2019). While this remark is unprofessional at best and discriminatory at worst, it is one of many that has helped perpetuate a negative impression of the city. Baltimore's not alone as cities across the nation grapple with similar issues propelled by racially motivated economic and political policies of the past. By analyzing the social context that creates the negative connotation associated with Baltimore, we can acknowledge current shortcomings and establish sustainable recommendations. This paper addresses financial institutions' perpetuation of racism within Baltimore City and analyzes modern implications for the juvenile population. I will present research that focuses on the history of the housing market within Baltimore City and how it has worked to establish present-day segregation. Furthermore, I will focus on children within public schools, both in and outside of Baltimore City, to illustrate the impact one's residential address can have on their social and economic outcomes. Lastly, I will evaluate current efforts addressing these inequitable outcomes and propose recommendations for further research.

II. Historical Background: The Beginning of the End

Baltimore's contemporary distribution of wealth within the housing market can be traced back to one event in 1910: the purchase of a property at 1834 McCulloh Street by W. Ashbie Hawkins, a Yale-educated lawyer. Upon renting to his law partner, Hawkins broke the color barrier, and the white community retaliated; this forged the way for a series of housing discrimination policies and grass-roots efforts to arise within the city (Baltimore's Pursuit, n.d.).

Subsequently, an unofficial pattern of selling arose; white Baltimoreans sold to Jewish homebuyers, and these properties were eventually bought by Black Baltimoreans, albeit they were primarily within areas facing economic hardship. As more Black homeowners began to populate the city, white Baltimoreans turned to official policies to control the spread of integration. Baltimore City implemented Ordinance 610 "West Plan" in December of 1910, and it prohibited Black citizens from moving onto blocks in which more than half of the residents were white, and vice versa (Baltimore's Pursuit, n.d.). The first of three race-based housing

ordinances in Baltimore, this policy inspired other cities and acted "as the first citywide law in the United States that mandated the segregation of each residential block" (Pietila, 2010). After seven years passed, the United States Supreme Court held that civil government-instituted housing segregation laws were unconstitutional in Buchanan v. Warley.

Ordinance 610 was decidedly unconstitutional solely because it restricted (white) homeowners from selling to whomever they desired, and the ruling failed to mention the rights of African Americans, which were undeniably abridged. In retaliation of the U.S. Supreme Court's ruling, Baltimore's mayor further instructed city building and health department inspectors to cite code violations for anyone renting or selling to Black Baltimoreans within neighborhoods that were predominantly white. In the early 1920s, Mayor J. Barry Mahool also established the Committee on Segregation, which coordinated efforts between building and health departments, real estate, and white community organizations to pressure white people to avoid renting or selling to Black citizens (Rothstein, 2015).

Despite its reversal, this ordinance's initial enactment empowered race-based lending policies, all of which helped to establish the race-dictated housing lines that are identifiable today. The implications of this ordinance, as well as the actions of previous mayors, can be seen as recently as 2012, when Baltimore City sued Wells Fargo, a home loan lender, via the Fair Housing Act, by arguing that it "steered minorities into subprime loans, gave them less favorable rates than white borrowers and foreclosed on hundreds of Baltimore homes, creating blight and higher public safety costs" (Broadwater, 2012). This court case resulted in a one hundred and seventy-five million dollar settlement, and it illustrates the modern consequences of past race-based policies and loan techniques. While the government of Baltimore City is not at fault in this scenario, Wells Fargo attempted to take advantage of persons of color who are still facing the negative repercussions of the attempts made in the early 20th century to control their housing opportunities.

Community Measures

In addition to city-wide segregation policies, private communities enacted their own race-based covenants. The Guilford Neighborhood of Roland Park within Baltimore City stated that "at no time shall the land in the said tract or any part thereof shall, or any building erected thereon, be occupied by any Negro or a person of Negro extraction" (Baltimore's Pursuit, n.d.). Eventually, eighteen Baltimore neighborhood associations united to establish the "Allied Civic and Protective Association," which encouraged property owners to sign covenants that committed them against selling to Black Baltimoreans. Furthermore, it was enforceable by law, as courts could evict Black families that violated the covenant by purchasing property (Rothstein, 2015).

Government Influence: The Rise of Redlining

The Great Depression prompted The National Housing Act of 1934, which effectively established the Federal Housing Administration (FHA). This branch of the U.S. Department of Urban Housing and Development's goal was to reverse the effects of the banking crisis on housing loans and ownership. Despite its seemingly positive objective, the FHA hired chief economist Homer Hoyt, whose dissertation employed race and nationality as a tool to determine "desirability" (Racial Restriction, n.d.). The Home Owner's Loan Corporation (HOLC), an affiliate of the FHA, utilized Hoyt's racial hierarchy to increase the accuracy of real estate appraisals and establish a standard mortgage lending process that avoided "undue risky lending and bail[ed] out homeowners" (Racial Restriction, n.d.).

Ultimately, The HOLC published a Residential Security Map of Baltimore in 1937, and while it intended to "prevent foreclosures," it transformed into the symbol of race-based housing discrimination (Baltimore's Pursuit, n.d.). The Residential Security Map categorized areas as green, by giving them an "A" grade (minimal risk), and red, which was given a "D" grade (hazardous). Predominantly white neighborhoods were generally labeled as green ("A") or blue ("B"), while Baltimore's traditionally Black and immigrant neighborhoods were red ("D"), hence the term "redlining." Real estate brokers, mortgage lenders, and other financial institutions referred to the HOLC map and viewed the red areas as poor credit risks. High rents, as well as houses of poor quality and limited access to social and city services, were referenced to justify the "D" grade. However, there was no recognition of the history of racism that had given rise to these conditions; this directly contributed to deterioration amongst many blue-collar and minority communities, which fostered cyclical justification for further race-driven discrimination.

These restrictive policies contributed to financial

apartheid. The U.S. government often backed the credit of white individuals, which enabled them to flee to "comfortable," single-family suburban homes. Black Baltimoreans, however, were subjected to unscrupulous lenders, forced to rent apartments at rates comparable to houses in predominantly white neighborhoods, or buy homes via installment plans because they were unable to obtain mortgages. Installment plans, or contract sales, were not amortized, meaning a missed payment resulted in immediate loss of housing, and the accumulation of equity was not feasible (Rothstein, 2015).

Public School Funding

Within states across America, inevitable differences in the quality of public education arise. These variances are dependent on the city or county in which you reside. State and local funds supplemented by federal grants finance the public education system. However, 44% of property taxes from local homeowners are allocated toward public education (Chen, 2021). The quantity and quality of educational resources largely depend on funding dictated by a community's accumulation of wealth (via taxes). As a result, student outcomes are directly determined by where they live.

National Educational Differences: A-D

In March of 2021, the Annenberg Institute at Brown University published a report analyzing the "long-term intergenerational association between 1935-1940 HOLC A-D grades and educational outcomes." On a national level, 74% of neighborhoods given "D," or red hazardous, ratings during the 1930s and 1940s, are now considered low-to-moderate income communities, and nearly 64% are occupied by minorities (Lukes & Cleveland, 2021). Furthermore, Lukes and Cleveland (2021) found that intergenerational transmission of neighborhood inequality exists and persists over time, and there is a widening gap between red, green, and yellow districts across the country. Additionally, schools within historically "hazardous" neighborhoods lack diversity (most Black and non-white), and they often perform worse on ELA and math assessments.

III. Maryland: Baltimore City vs. Howard County

Baltimore City: Educational Outcomes

Within Baltimore City, a mother recently discovered that her high school senior had a 0.13 GPA, and they had failed nearly every class (all but three) between their freshman and junior year. Nonetheless, this student was ranked 62nd out of the 120 students in their graduating class (Andrzejewski, 2021). This specific case highlights the poor educational outcomes of the city's public schools. Additionally, many Baltimore City public school students struggle to complete high school, which is a prerequisite to establishing generational wealth and fueling social mobility. After the 2020 school year, Baltimore City's graduation rate fell to 69.9%, while surrounding school systems such as Baltimore, Howard, and Anne Arundel County saw an increase in graduation rates and averaged 89% (Papst, 2021). Furthermore, many of the Baltimore City students interact with the United States Justice System, and 98% of the students arrested on school property between 2015-2016 were African American; 40% of those arrested received Special Education services and had Individualized Education Programs (IEPs) (Humphrey & Gardiner, 2019).

When interviewing Magistrate Kristin Peacock from the Circuit Court of Baltimore City's Juvenile Division, she expressed that, "One of our goals in juvenile court is to provide sufficient intervention and services to youth to prevent any further arrests. [A] barrier for youth who have received intensive services is the inevitable return to the same community from which they were removed. These are communities struggling with high rates of crime, drug activity, and underserved schools." Students, primarily those of color, given that 75.7% of Baltimore City Public School children are African American, come from communities that lack intergenerational wealth (District Overview, n.d.). Schools do not have authority over the volatile environment that students face outside of schools, and they do not have adequate resources to encourage students to break cyclical outcomes; as a result, they rely on force and policing to establish control.

The School-to-Prison Pipeline

The previously alluded to school-to-prison pipeline results from the convergence between the United States public education system and the juvenile justice system. School is an integral aspect of socialization for children, and it can substantially provide the basis for

social and economic mobility. However, many public schools within city landscapes are overly reliant on disciplinary policies that utilize increased policing, suspension, and expulsion to punish students for misbehavior. By referring students, disproportionately those of color and disability, to law enforcement and removing them from the school environment, schools can diminish their student population's sense of structure and safety (National Council on Disability, 2015). These issues may impact students' physical and emotional well-being, which directly determines their ability to learn. Furthermore, involvement in the United States Justice System from a young age can significantly impact one's ability to accumulate wealth, particularly given that many lack pre-existing financial ground typically derived from homeownership.

Howard County: Origin Story

Advertised as being directly between Baltimore City and Washington D.C., Howard County, Maryland is a short drive west via Interstate-95 from Baltimore yet many Baltimorean adolescents have not been able to leave the city limits and explore Howard County's "charm of a historic past mixed with the excitement of a cosmopolitan community" (About Howard, n.d.). The Wire, which chronicles the tribulations of a post-industrial American city, adequately sums up Baltimoreans' perception of Howard County when one of the characters, Namond Brice, states "The Klan be out in Howard County" (Simon & Chapelle, 2006). Despite the proximity, there is a lack of partnership between the two places, and educational outcomes for its residents are incredibly different given that the household income in Howard County is $121,160 while Baltimore City's is $50,379 (QuickFacts Baltimore, n.d.).

James Rouse: The Inception of Columbia

Columbia, a city within Howard County, Maryland, was established by James Rouse in 1967. Rouse, who had previously worked to help rehabilitate "Baltimore slums," decided to buy land in "pursuit of [establishing] an ecologically sensitive, mixed-income and colorblind community in an era when redlining was common" (Hurley, 2017). Rather than try to address underlying systemic issues that led to the existing Baltimore slums, Rouse thought it best to leave his mark by capitalizing on the housing market surrounding the city. Due to white flight and the desire to achieve the typical "American Dream," there was significant interest in suburban development.

Despite Howard County's demographic breakdown, which includes 55.9% white and 20.4% African American, Rouse's goal for Columbia was to establish a "garden for the growing of people." Additionally, he wanted "to grow better people; more creative, more productive, more inspired, more loving people" (Hurley, 2017). As a result, he built an ad hoc diversity committee to ensure that builders were not attempting to segregate potential homebuyers by race. Ultimately, Rouse's goal was to make Columbia "the country's most diverse suburb, racially and economically integrated" (Epstein, 2000).

Present Day: Long Reach High School

Long Reach, one of many high schools within Columbia, has a diverse student body and claims to be dedicated to restorative justice in education. Their "#OneLongReach Mission" promotes inclusion, challenges racism and marginalization, and desires to build a community with authentic, positive relationships regarding differences (#OneLongReach, n.d.). Given that minority groups constitute 76.7% of the student body, Rouse was seemingly successful in ensuring a diverse landscape for Columbia's citizens. Furthermore, economic diversity is promoted as there is a variety of accessible housing options within this school's district, and 40% of the student population meets the federal income guidelines necessary to receive Free and Reduced Meals (FARMs) (Long Reach, n.d.).

Educational Outcomes

How has Rouse's vision impacted educational outcomes within Columbia, and how do they compare to Baltimore City Public Schools, which suffer from the intergenerational impact of redlining? Furthermore, have integrated communities been more successful in establishing schools equipped to provide accessible opportunities that result in economic equity? The answers to these questions require extensive research outside the reach of this paper, and a case study documenting specific students within Baltimore City Public Schools vs. Columbia Public Schools vs. other Howard County Public Schools would be insightful. Nonetheless, Long Reach High School does seem to underperform compared to other Howard County schools outside of Columbia. Howard High School in Ellicott

City, Maryland is less than 3 miles away from Long Reach; however, it has a minority population of 54.9%, and only 12.3% of students are economically eligible for Free and Reduced Meals. Howard's graduation rate is greater than 95%, while Long Reach's is 86.9% (Howard High, n.d.).

Additionally, placing students in a diverse environment does not negate the inequitable realities that they face outside of the classroom, and it does not alter the systematic pressures that impact the education that students receive. As a graduate from Long Reach, and the only ivy league attendee from his 2020 class, Alexander Eapen expressed that being surrounded by people with a plethora of backgrounds and experiences fostered an empathetic environment. Nevertheless, Alex commented that he could "count the number of AP teachers of color I had during my four years of high school on one hand. Having representative faculty is a big part of ensuring that students of diverse backgrounds have an equal opportunity of academic excellence." This example is simply representative of one aspect of schooling that Rouse did not account for, and having attended Long Reach High School myself, I can add that out of the 10 Advanced Placement (AP) courses that I enrolled in, there were only two African American students within all those classes combined. While both are anecdotal examples, they illustrate how diversity can create an appearance of higher-quality educational access. There is limited equity amongst outcomes resulting from self-segregation and unforeseen factors, such as an unrepresentative staff population.

IV. Conclusion

Recommendations

Very few studies have investigated the intergenerational relationship that exists between racist housing policies, which result in redlining, and present-day educational outcomes. Therefore, there is a lack of quantitative data on a macro and micro level. Qualitative research via naturalistic observations is prevalent, but this research has paved the way for quantitative approaches. Studies such as "The Lingering Legacy of Redlining on School Funding, Diversity, and Performance," published by Brown University, have encouraged the identification of outcome differences amongst juveniles impacted by racist economic policies, all of which perpetuate neighborhood inequality eight decades after their inception (Lukes & Cleveland, 2021). The Wells Fargo lawsuit demonstrated that while this problem is acknowledged, a monetary settlement, or "quick fix," fails to address underlying inequities that result in disparities, such as inequitable educational access. In designing and implementing complex modern interventions that target inequitable outcomes between students of different socioeconomic and racial groups, it is imperative to consider the historical implications of past inequality on present-day neighborhoods. Furthermore, the institutionalized racism and biases ingrained within our reflexes and systems require time, as well as large-scale commitment, to properly be addressed and resolved.

Closing Remarks

Racially driven policies within the 1900s housing market have present-day implications on educational outcomes. Redlining perpetuated the segregation of race and wealth within Baltimore City, thus resulting in inequitable funding of its public schools. This segregation further empowers cyclical consequences, such as the school-to-prison pipeline, and prohibits students from achieving social mobility. Solutions cannot be one-dimensional given that this issue has seeped its way into our education and justice systems, which are both complacent via inaction.

James Rouse viewed Baltimore City as a lost cause and left to create a redemptive community that accounted for all of Baltimore's wrongdoings and failures. James Rouse sought to build a diverse city, both socioeconomically and racially, to solve the issues Baltimore failed to address, and it has had a noticeable impact on the educational outcomes of residents. However, this measure alone is insufficient. Given that Rouse's utopia is not impervious to the systematic pressures that result from racism, such as a lack of intergenerational wealth, his attempt is alike to a band-aid fix. Columbia cloaks inequity via the appearance of higher quality educational access and struggles to adequately uplift African Americans, many of whom left Baltimore City in hopes of obtaining greater educational opportunities.

References

About Howard County. (n.d.). Howard County Maryland. Retrieved October 29, 2021, from https://www.howardcountymd.gov/about-howard-county

Andrzejewski, A. (2021, March 30). Baltimore City Public Schools Promoted Student With 0.13 GPA While Spending A $1.4 Billion Budget. Forbes. Retrieved October 26, 2021, from https://www.forbes.com/sites/adamandrzejewski/2021/03/30/baltimore-city-public schools-promoted-student-with-013-gpa-while-spending-a-14-billionbudget/?sh=5cdba41263dc

Baltimore's Pursuit of Fair Housing: A Brief History. (n.d.). Maryland Center for History and Culture. Retrieved October 24, 2021, from https://www.mdhistory.org/baltimores-pursuit-of-fair-housing-a-brief-history/

Breaking the School-to-Prison Pipeline for Students with Disabilities. (2015, June 18). National Council on Disability. https://permanent.fdlp.gov/gpo66021/NCD_School-to PrisonReport_508-PDF.pdf

Broadwater, L. (2012, July 12). Wells Fargo agrees to pay $175M settlement in pricing discrimination suit. The Baltimore Sun. https://www.baltimoresun.com/news/bs-xpm 2012-07-12-bs-md-ci-wells-fargo-20120712-story.html

Chen, G. (2021, March 31). An Overview of the Funding of Public Schools. Public School Review. Retrieved October 24, 2021, from https://www.publicschoolreview.com/blog/an overview-of-the-funding-of-public-schools

District Overview. (n.d.). Baltimore City Public Schools. Retrieved October 30, 2021, from https://www.baltimorecityschools.org/district-overview

Epstein, G. A. (2000, November 26). Rouse arranged for integration in his new town. The Baltimore Sun. https://www.baltimoresun.com/maryland/howard/bal-columbia-rouse story.html

Fidel, K. (2017, August). How a young boy has been decaying in Baltimore since age 10: A Death Note. Kondwani Fidel. Retrieved October 26, 2021, from https://medium.com/@KondwaniFidel/how-a-young-boy-has-been-decaying-in baltimore-since-age-10-a-death-note-98573c2e05cf

Howard High School Profile [Infographic]. (n.d.). https://www.hcpss.org/f/schools/profiles/prof_hs_howard.pdf

Humphrey, K. R., & Gardiner, S. (2019, January 22). Comments to the Baltimore City Public Schools Board of Commissioners – January 22, 2019 RE: Consideration of the Maryland General Assembly's House Bill 31 (Maryland Coalition to Reform School Discipline).

Hurley, A. K. (2017, June 13). Here's a suburban experiment cities can learn from. The Washington Post. https://www.washingtonpost.com/lifestyle/magazine/heres-a-suburban experiment-cities-can-learn-from/2017/07/11/c737165e-4d1f-11e7-bc1b fddbd8359dee_story.html

Long Reach High School Profile [Infographic]. (n.d.). https://www.hcpss.org/f/schools/profiles/prof_hs_longreach.pdf

Lukes, D., & Cleveland, C. (2021, March). The Lingering Legacy of Redlining on School Funding, Diversity, and Performance. Brown University: Annenberg. https://www.edworkingpapers.com/sites/default/files/ai21-363.pdf

Nobles III, W. P. (2019, July 27). Trump calls Baltimore 'disgusting ... rodent infested mess,' rips Rep. Elijah Cummings over border criticism. The Baltimore Sun. https://www.baltimoresun.com/politics/bs-md-pol-cummings-trump-20190727- chty2yovtvfzfcjkeaui7w-m5zi-story.html

#OneLongReach. (n.d.). Long Reach High School. Retrieved October 30, 2021, from https://lrhs.hcpss.org/about/one-long-reach

Papst, C. (2021, March 31). Baltimore City Schools graduation rate drops to six-year low. Fox 45 News. Retrieved October 28, 2021, from https://foxbaltimore.com/news/project baltimore/baltimore-city-schools-graduation-rate-drops-to-six-year-low

Pietila, A. (2010, March). History of Baltimore's racial segregation includes a hard look at newspapers' role. BaltimoreBrew. Retrieved October 24, 2021, from https://www.baltimorebrew.com/2010/03/15/history-of-baltimores-racial-segrega-

tion includes-a-hard-look-at-newspapers-role/

QuickFacts Baltimore city, Maryland; United States. (n.d.). U.S. Census Bureau. Retrieved October 30, 2021, from https://www.census.gov/quickfacts/fact/table/baltimorecitymaryland,US/INC110219 Racial

Restriction and Housing Discrimination in the Chicagoland Area. (n.d.). Digital: Chicago Lake Forest College. Retrieved October 24, 2021, from https://digitalchicagohistory.org/exhibits/show/restricted-chicago/other/redlining

Rothstein, R. (2015, April 29). From Ferguson to Baltimore: The Fruits of Government Sponsored Segregation. Economic Policy Institute. Retrieved October 25, 2021, from https://www.epi.org/blog/from-ferguson-to-baltimore-the-fruits-of-government sponsored-segregation/

Simon, D. (Writer), & Chapelle, J. (Director). (2006, September 10). Boys of Summer (Season 4, Episode 1) [TV series episode]. In The Wire. HBO.
Stamp, J. (2014, April 23). James W. Rouse's Legacy of Better Living Through Design. The Smithsonian. https://www.smithsonianmag.com/history/james-w-rouses-legacy-better living-through-design-180951187/

Wood, M. J. (2015, July 1). Highlighting the History of Housing Segregation in Baltimore, Maryland and its Impact on the Events of April 27, 2015 and Beyond. Johns Hopkins School of Education. https://new.every1graduates.org/wp-content/uploads/2015/11/Housing-Segregation-in-Baltimore.pdf

Financing the Low Carbon Transition: Implications for Carbon-Intensive Industries and Developing Economies

Anna Daraselia
Northeastern University

I. Introduction

The transition to a low-carbon economy is rapidly transforming the global energy market, with significant implications for oil-intensive industries and developing economies. As the world takes initiative to mitigate climate change, industries like oil & gas are facing increasing pressure to reduce their carbon emissions or risk becoming obsolete. A global shift in clean energy demand will require "large-scale structural change, with some sectors having to rapidly expand their relative production, and others having to entirely transform their technological basis" (Semieniuk et al., 2020). Developing economies, which often rely heavily on fossil fuels for economic growth and stability, are also facing the challenge of transitioning to low-carbon alternatives while balancing economic development.

This report will analyze the impact of a low-carbon transition on the global economy, highlighting the challenges faced by developing economies that are particularly vulnerable to the effects of climate change. Additionally, this report will analyze how shifting global demand affects trade. Further, this report provides insight on recent and long-term trends in investment into carbon-intensive industries versus sustainable industries. Throughout the report, there will be thorough analysis of the risks involved in sustainable financing and suggestions for alternative avenues to create economic growth for the negatively-impacted players.

II. Risks of an Uneven Low-Carbon Transition

Why is the Transition Uneven?

The International Finance Corporation (IFC) estimates "over $23 trillion in investment opportunities in green and climate-related sectors and activities" (Garcia Mora et al., 2021) that can accelerate the global transition to a low-carbon economy. However, the distribution of these funds has been disproportionate thus far as 16% of all countries account for 95% of installed capacity (Eicke & Goldthau, 2021). Installed capacity is defined as the maximum amount of power generation that a renewable energy facility can produce. Increasing the installed capacity of renewable energy sources such as solar, wind, or geothermal power is a critical strategy in the energy transition, as it enables a greater share of clean energy in the energy mix. Additionally, developing economies have a higher demand for fossil fuels as cheap energy due to their growing population and expanding economy (Eicke & Goldthau, 2021). Countries that consume the most amount of fossil fuels receive a disproportionate amount of funding to transition to cleaner energy, which not only hinders an even global transition but also exacerbates the issue of climate change by failing to address the behaviors of heavy emitters. Because developing economies are significantly more dependent on nonrenewable energy, the exposure risk of the transition is unevenly distributed. According to Krishnan et al. (2022), lower-income and carbon-intensive economies need significantly more investment than higher-income developed economies. This is because they have more assets and stakes in nonrenewables. The issue of an uneven transition is clear. Countries that are economically limited to consuming fossil fuels at a higher rates are also face-

ing the brunt of the financial burden. They are underfunded throughout the energy transition, and the implications of this growing gap will be discussed further in the following section.

Macroeconomic Implications for Developing Economies

The Paris Agreement, an international treaty that aims to limit global warming, threatens to leave ⅔ of fossil fuels unmonetized. When paired with the fact that countries with developing economies "have relatively greater shares of their jobs, GDP, and capital stock in sectors that would be most exposed to the transition" (Krishnan et al., 2022), the extent of potential financial loss can be understood. Oil-producing economies can face a total loss of nearly $7 trillion, according to Laima Eicke and Andreas Goldthau's publication in *Environmental Science and Policy* (2021). Since fossil fuels are a cheap energy source for these countries, they are frequently heavily intertwined with the production process of other goods. With consumer demand shifting toward a sustainable value chain, assets can become stuck in nonrenewables as these products lose popularity. Carbon-intensive economies would face significant financial loss, increased unemployment, and decreased quality of living.

Based on a theory from Eicke & Goldthau (2021), the relative speed of decarbonization will determine economic stability. Carbon reserves, fossil fuel deposits that are still in the ground, will be increasingly up for sale. This uptick in supply and dwindling demand would result in quick devaluation of these carbon reserves. Without sufficient funds to bridge the transition away from carbon-reliance at a pace comparable to established economies, late-decarbonisers will be left not only with stranded assets but also without the ability to grow. A popular low carbon market would inhibit smaller countries to enter and operate successfully. The barriers to entry may become insurmountable and developing countries will be left behind.

In addition to the financial implications, the global progress report of the Sustainable Banking and Finance Network (Garcia Mora et al., 2021) asserts that "emerging markets are far more vulnerable to rising global temperatures and suffer significantly from the physical impacts of climate change, which can have direct effects on food security and financial stability" (p. 9). Developing nations often rely on climate-sensitive sectors such as agriculture and forestry, and climate change can lead to crop failures, smaller agricultural yields, and loss of livestock, which can affect food security and livelihood. These countries are typically located in tropical regions, which are more prone to extreme weather events, and they do not have the financial and technological capacity to implement effective adaptation and prevention measures. Although this is not a direct effect of an uneven low-carbon transition, it is imperative to understand that emerging economies face a financial tradeoff when it comes to funding the clean energy transition or improving their infrastructure to mitigate the physical risk of climate change. The physical effects will likely take an additional toll on the economy, exacerbating the financial losses from an uneven transition.

Whether countries are oil producers or simply have a carbon-intensive infrastructure, any developing nation with a high ratio of gas and oil reserves to GDP is vulnerable. They are not receiving necessary funding to keep up with the evolving global energy market, and the inability to transition from carbon-intensive behaviors will devalue these nations' products. Facing inevitable financial losses, unemployment rates will increase. And when paired with the physical impacts of climate change, the economic future of developing countries presents itself as bleak. After all, Eicke & Goldthau (2021) said it best: a nation's ability to transition to a low carbon economy "is widely seen as a precondition for long-term economic development" (p. 372). If a country fails to make a timely transition, it will face economic barriers that will hinder it from further development.

Impact on Global Trade

The low-carbon transition is likely to have a significant impact on global trade. As suggested by Eicke & Goldthau (2021), a potential outcome for countries that are slow to decarbonize is that they may face reduced competitiveness in a global market. The implementation of mechanisms that discriminate against high-emitting countries, such as carbon-related trade measures or preferential trade agreements, may hinder the platform for developing nations to participate in the market. An uneven transition may also create potential for economic growth in certain regions. Increasing production for the purpose of trade will increase a country's carbon emissions. Therefore, countries with low-emissions products would have an advantage since consumer preferences shift the flow of

trade in their direction (Krishnan et al., 2022). These changes in consumer preference could also provide opportunities for countries to stop importing fossil fuels to increase production and instead to grow domestic industries, the products of which would have a lower carbon mileage and therefore be more attractive to conscious consumers.

Alternative Routes and Solutions

All countries have the opportunity to tap into natural resources as an alternative source of energy. Countries particularly rich in "stocks of natural capital such as ample sunlight and wind, forestland, mineral resources, and CO2 sequestration potential" could actually benefit from the transition (Krishnan et al., 2022). Developing countries, especially those located on the equator and in tropical areas, possess many of these natural resources that would be in demand during the transition. Additionally, harvesting renewable energy would reduce a country's reliance on fossil fuels. Human capital is equally as important in the case of facilitating a low-carbon transition. For example, countries like Singapore "have a high share of STEM graduates in the population" (Krishnan et al., 2022), which indicates high technical skills in the workforce that can be used to develop low-carbon technologies. Farah Imrana Hussain (2020), the Senior Financial Officer for the World Bank Treasury attributes transition failures to under-developed capital markets. She reinforces that central banks can and should "[redirect] capital flows to environmentally responsible projects and innovative technologies" by incentivizing local banks. As of 2018, Bangladeshi banks were able to increase their green loan portfolios by BDT69.9 billion after central banks mandated that financial institutions dedicate 5% of total investments to green financing (Hussain, 2020). Although all of the necessary international funding may not be easily accessible, domestic financial institutions can play a crucial role in facilitating the low-carbon transition. There will be a section further discussing sustainable financing, and its pros and cons.

III. The Future of Carbon-Intensive Industries

Recent Trends in Investment Spending

In recent years, the increasing affordability and availability of renewable energy has encroached on fossil fuel's market dominance. It is becoming costly to support the financial stability of the oil and gas industry through bailouts and subsidies as it faces a decline in profits and stock prices. According to Clark Williams-Derry and Grant Smith's paper for the *Environmental Working Group,* "industry analysts Hayne and Boone have listed nearly 800 exploration and production, oilfield services and midstream oil and gas companies that have filed for bankruptcy, with a debt load of more than $300 billion" since 2015. In the past decade, the world's five largest oil and gas companies have prioritized dividend payouts and share buybacks, while generating only about half of that sum from their core business operations. "To cover these deficits, the oil majors sold off $230 billion in oil and gas assets, while taking on $168 billion in additional long-term debt" (Williams-Derry & Smith, 2021). These financial risks were likely taken to appease investors so that they can continue funneling capital into oil and gas (O&G) firms. After all, "maintaining dividends and growing the top line remain central elements of Big Oil's value proposition for shareholders" (Berns et al., 2022). While this explains the rapid devaluation that is trapping emerging economies, it also demonstrates the dismal financial position that the oil and gas industry has found itself in. Consumer preference, government action, and investment spending have significantly diminished the stability that the O&G industry once possessed.

Long-Term Financial Stability Surrounding the Oil and Gas Industry

The BCG Center for Energy Impact (Berns et al., 2022) conducted a survey of 250 institutional investors in the O&G industry, finding that the majority of these experts are unsure of the industry's long-term success. 60% of institutional investors feel the pressure to divest, and ⅔ say that oil demand will peak by 2030. It is evident that achieving a low-carbon transition demands a reconfigured market structure, as the O&G industry is shrinking in size and investors are losing confidence. Carbon-intensive sunset industries are compelled to either reduce in size or transform, while more sustainable sunrise industries are expected to expand their production. Despite concerns about the potential impact of failing sunset industries on overall financial stability, it is probable that the growth

of sunrise industries will offset the adverse effects of bankruptcies and decline. Gregory Semieniuk et al. (2020) affirms that although sunset industries are facing financial losses and high unemployment rates, sunrise firms are expected to contribute towards creating a diversified and profitable economy that can withstand such shocks. However, one thing to consider is the potential for speculation. There is uncertainty surrounding the growth and decline of industries, which creates the risk of overinvestment in sunrise firms. Overinvestment could result in overcapacity, which means that there could be an oversupply of sustainable products or services, leading to declining prices and reduced profitability. This could also result in misallocation of resources and other economic inefficiencies, which could negatively impact economic growth.

Alternatives for Oil and Gas Firms

It is indisputable that O&G companies will need to modify their business model if they want to attract investment going forward. As of 2022, 39% of the surveyed group of investors factored climate risk into O&G company valuations, and 40% say that they will follow suit (Berns et al., 2022). Taking on initiatives to improve O&G firms' long-term value proposition for shareholders allows them to claim a stake in the growing clean energy market. For example, they can venture into natural gas, which bridges the gap between traditional hydrocarbons and renewables. Some other emerging markets that O&G could expand into include renewable power generation and battery storage, carbon capture, and hydrogen production. In the end, investors want to see companies hitting emission reduction targets and showing EBITDA growth from clean energy investments.

III. Financing the Growth of Sustainable Firms

Green Bonds: What and Why?

Green bonds are fixed-asset instruments earmarked for climate-related or environmental projects, and may carry tax incentives like exemption and credits to encourage sustainability and to finance climate change mitigation. Green bond issuances have grown significantly each year, with the market size expanding from $2.6 billion in 2012 to nearly $270 billion in 2020 (Segal, 2022). They are widely considered the most prominent financial instrument to finance the low-carbon transition, which is why they are the focus of this section of the report. Greenhouse gas emissions are inherently an intergenerational problem, and their impact is felt for decades. For this reason, it is believed that "at least part of the necessary investment [in the transition] should be paid for by future generations so as the current generation does not carry the entire burden of climate change mitigation" (Sartzetakis, 2021). Bonds have historically been used to finance large-scale infrastructure projects, which stretch the financial burden of loan repayment, meaning that green bonds provide an avenue for large long-term investments. The low-carbon transition will certainly require decades of financing and fund reallocation to successfully come to fruition, and green bonds "enable more long-term financing of green projects that is otherwise difficult to attain … promote the development of bond issuers' green strategies," and increase transparency (Sartzetakis, 2021). They successfully address the difficulties of financing such a mass transition.

The Impact of Green Bonds

When firms issue a green bond, they stand to receive both direct and indirect benefits. John Caramichael and Andreas Rapp (2022), members of the Board of Governors of the Federal Reserve System, state that issuing a green bond "may directly lower the interest rate paid on the bond relative to conventional bonds," (p. 6) referred to throughout the paper as a "greenium." Additionally, when firms issue green bonds they attract sustainably-minded investors and customers, increasing demand for the bond. By increasing the pool of potential investors, firms can reduce the cost of capital by increasing competition among investors and possibly lowering the interest rate, enabling firms to secure financing at a lower cost. Overall, Carmichael & Rapp (2022) found that issuers can see a decrease in overall borrowing cost across all bonds.

Aside from decreased borrowing costs and an increase in potential investors, green bonds can improve a sustainable firms' financial health and environmental performance. Caroline Flammer (2020), a seasoned expert and director of the Sustainable Investing Research Initiative at Columbia University, found that a firm's "ROA and ROE increase significantly in the long run…confirming that green bonds yield tangible benefits to companies" (p. 96) This can be attributed to

the reduced cost of capital mentioned earlier, as well as access to new markets and an improved public image. Additionally, Flammer (2022) found that "following the issuance of green bonds, companies (i) reduce their CO2 emissions and (ii) achieve a higher environmental rating" (p. 96). This is a result of increased cash flow to green projects within firms. Green bonds are value-enhancing for a sustainable firm, and contribute to long-term financial benefits as well as improvements in environmental performance.

Existing Concerns Regarding Green Bonds

In order for green bonds to display the effects mentioned above, they must be certified by a third party to ensure that bond proceeds are invested into green projects. The problem is, however, that "there is no public regulation of green bonds, and hence the 'greenness' of the bonds is not enforceable" (Flammer, 2020, p. 96). This raises concerns of greenwashing by certain companies, which entails the misuse of green bond proceeds by diverting them to non-environmental purposes. It falsely suggests that the firm is acting sustainably, and can not only deceive investors, but also undermine the credibility and effectiveness of the green bond market. Carmichael & Rapp (2022) also flagged the question of whether or not green bonds actually incentivize green investment, or if they are an instrument that "merely identifies green investments that otherwise would have been made and financed with a conventional bond" (p. 2). Even if that is the case, however, green bonds facilitate access to capital for smaller projects that would have otherwise been overlooked. An area for improvement would be defining a global standard for "green" projects, as well as creating a tiered system for bonds based on the level of their sustainability.

IV. Financing the Growth of Sustainable Firms

The renewable energy market is growing and taking up fossil fuel market shares. This trend has two effects: developing economies are underfunded and without the ability to restructure their economies to decrease reliance on fossil fuels, they face economic challenges and growing concerns about being locked out of the evolving global market. The second effect is that carbon-intensive industries are facing major losses, and will need to readjust their business strategies to conform to growing consumer demand for a sustainable value chain. Sustainable industries are on the rise, and are largely being funded by green bonds. Although there are some concerns about the quality of green bond investments, they remain the most reliable financial tool to fund the low-carbon transition. Going forward, it is imperative that institutional investors are weary of overinvestment in sustainable firms. With uncertainty surrounding the growth and decline of industries, there is a chance of overfunding which can ultimately devalue the industry and cause financial distress.

References

Berns, M., Fitz, R., Holm, L., Webster, J., & Winnike, B. (2022, January 6). How institutional investors see the future of oil and gas. Boston Consulting Group. Retrieved February 15, 2023, from https://www.bcg.com/publications/2022/how-investors-see-future-of-oil-gas

Caramichael, J., & Rapp, A. (2022). The green corporate bond issuance premium [PDF]. International Finance Discussion Papers. Washington: Board of Governors of the Federal Reserve System, 1346. https://doi.org/10.17016/IFDP.2022.1346.

Eicke, L., & Goldthau, A. (2021). Are we at risk of an uneven low-carbon transition? Assessing evidence from a mixed-method elite study. Environmental Science & Policy, 124, 370-379. https://doi.org/10.1016/j.envsci.2021.07.009.

Flammer, C. (2020). Green bonds: Effectiveness and implications for public policy. Chicago Journals: Environmental and Energy Policy and the Economy, 1. https://doi.org/10.1086/706794

Garcia Mora, A. et al. (2021, October). Accelerating sustainable finance together: Global progress report of the Sustainable Banking and Finance Network. SBF Network. Retrieved February 10, 2023, from https://sbfnetwork.org/wp-content/uploads/pdfs/2021_Global_Progress_Report_Downloa ds/SBFN_D003_GLOBAL_Progress_Report_02_Nov_2021.pdf

Hussain, F. I. (2020, April 27). Green loans: Financing the transition to a low-carbon economy. World Bank Blogs. Retrieved February 7, 2023, from

https://blogs.worldbank.org/climatechange/green-loans-financing-transition-low-carbon-e conomy

Krishnan, M., Samandari, H., Woetzel, J., Smit, S., Pacthod, D., Pinner, D., Naucler, T., Tai, H., Farr, A., Wu, W., & Imperato, D. (2022, January 25). How the net-zero transition would play out in countries and regions. McKinsey Sustainability. Retrieved February 17, 2023, from https://www.mckinsey.com/capabilities/sustainability/our-insights/how-the-net-zero-trans ition-would-play-out-in-countries-and-regions

Sartzetakis, E.S. (2021.) Green bonds as an instrument to finance low carbon transition. Econ Change Restruct 54, 755–779. https://doi.org/10.1007/s10644-020-09266-9

Segal, T. (2021, September 21). Green bond: Types, how to buy, and FAQs. Investopedia. Retrieved February 18, 2023, from https://www.investopedia.com/terms/g/green-bond.asp

Semieniuk, G., Campiglio, E., Mercure, J.-F., Volz, U., & Edwards, N. R. (2020). Low-carbon transition risks for finance. WIRE's Climate Change, 12(1). https://doi.org/10.1002/wcc.678

Williams-Derry, C., & Smith, G. (2021, April 7). Oil and gas: An industry in decline. Environmental Working Group. Retrieved February 23, 2023, from https://www.ewg.org/news-insights/news/oil-and-gas-industry-decline

OPEC or NOPEC: The Impacts of Oil Revenue Dependency on Member Nations

Maimoonah Shafqat
Wellesley College

I. Introduction

The Organization of Petroleum Exporting Countries, or OPEC, turned 60 years old in 2020. OPEC is a relatively young organization given that commercial oil production has occurred for centuries, yet it is difficult to imagine the modern energy market without it. Prior to OPEC's formation, the governments of the countries where this production took place played a limited role and received royalties when these companies sold the oil. In 1960, five countries with vast petroleum reserves—Iraq, Iran, Kuwait, Venezuela, and Saudi Arabia—met in Baghdad and formed OPEC with the goal of coordinating prices among member nations and guaranteeing fair prices for petroleum producers (Fattouh & Mahadeva, 2013).

While autonomy over their own oil reserves was not one of the founding goals of OPEC, by the 1970s, OPEC member nations stopped granting concessions to multinational oil corporations and took control of their own reserves (OPEC: Our Mission, 2023). Certainly, for many petroleum-exporting countries, OPEC has been a boon. Member nations meet to coordinate how many barrels of oil they will produce in a day to make sure supply does not exceed demand. Thus, OPEC member nations manipulate the price of crude oil by controlling production, giving them incredible leverage over the price of a commodity needed by every nation. I would argue that the increase in revenues from exporting oil under these conditions has allowed some OPEC members to experience significant economic growth. However, I also contend that "OPEC disease" is a valid phenomenon. There is also the issue of dependency on both the demand and supply side—oil exporting nations become dependent on revenues from one finite resource, while oil importing nations are dependent on an affordable, steady oil supply. Lastly, I note that OPEC's power is limited, and it may diminish further as many countries attempt to move away from oil as their primary source of energy.

II. Benefits for Member and Non-Member Nations

Much of the existing research on OPEC approaches the organization from an economic perspective. OPEC is used as a textbook example of a cartel in many economics classes, and many Western economists have critiqued the organization because it does not follow the rules of the free market. I will be considering both political and economic implications, although my economic analysis will be focused on the impacts on member nations, not the organization's market behavior.

Imagine that OPEC never existed, and oil production was managed by several large companies and some countries' governments. Andreas Economou and Bassem Fattouh simulate the global oil market from 1990 to 2018 under such conditions. They find that in a world where OPEC does not play a balancing role and the oil market does not have OPEC's spare capacity, volatility in prices and supply would be significantly higher (Economou & Fattouh, 2021). For example, a negative supply shock that results in a price increase of about 27% would decrease the world GDP by $185 billion in 2011. Economou and Fattouh admit that in

reality, OPEC member nations are not so quick to agree on adjusting production in response to a shock. However, even a slightly delayed response with OPEC's spare capacity results in better economic outcomes than if OPEC did not exist at all, for OPEC member nations and non-member nations.

In their study of OPEC's pursuit of market stability, Almutairi, Pierru, and Smith arrive at a similar conclusion. They claim that OPEC has succeeded to a "limited but important degree" (Pierru et al., 2020). They find that OPEC's management and spare capacity decreased price volatility by at least 25% of what it would have been between the years 2001-2014 . Even with OPEC's imprecise attempts at price stabilization, its efforts increase global GDP by $175 billion annually. Both studies conclude that OPEC's existence and efforts to manipulate oil production produce economic gains for not only member nations, but the entire world. With regards to climate impacts, Hassan Benchekroun, Gerard van der Meijden, and Cees Withagen find that OPEC's market power has resulted in fewer emissions from oil extraction than if there were no dominant group in the global oil market. They claim that "the monopolist is the conservationist's best friend," and note that in non-renewable resource markets, a singular market power slows resource depletion (Benchekroun et al., 2020). OPEC's oil is also extracted in a less carbon-intensive fashion than that of other nations, and their manipulation of supply slows extraction, also decreasing emissions (Benchekroun et al., 2020). While oil is a major contributor to greenhouse gas emissions worldwide, OPEC's existence has prevented an even greater amount of emissions.

In 1978, when OPEC was still young, Øystein Noreng studied the relationship between non-OPEC exporters and OPEC exporters. Noreng notes that for member nations, most of which have colonial pasts, increasing prices and nationalizing their oil industries was a step toward political emancipation (Noreng, 1978, pg. 315). He also notes that OPEC had consistent or increasing membership for its first two decades of existence because member nations tied their economic outcomes and international standing to the oil industry. Thus, OPEC's success was their success, and OPEC's failure was their failure. This sense of unity—Noreng calls it ideological cohesion, although I would contend that members of OPEC are not so ideologically aligned these days—is why countries stay in OPEC (Noreng, 1978, pg. 315). Non-OPEC oil exporting countries also benefit from OPEC's policies, as higher oil prices result in greater revenues for them as well. Consequently, these countries are invested in OPEC's future actions and policies. This improves the bargaining power of member nations. Jeff D. Colgan also alludes to a rise in political recognition and importance for nations that join OPEC. He points out that when Angola joined OPEC in 2007, it took out a full-page advertisement in The Economist to announce its decision and its status as a country of rising importance (Colgan, 2014, pg. 626). Colgan and Noreng both elucidate the political benefits of OPEC membership for developing nations.

It is difficult to determine how much of member nations' economic growth can be attributed to OPEC membership, as there are myriad factors that can explain this growth. Likewise, every economic downturn for these nations is not linked to oil prices. It is also inaccurate to exclusively look at oil production and revenue, as not all of the oil companies active in OPEC member nations are entirely owned by the governments of said nations. For example, in Nigeria, Shell, Chevron, and ExxonMobil share profits with the government (Okolo & Ubadah, 2019). What can be noted is how much of a country's GDP, specifically exports, is composed of oil after it joins OPEC. In fact, this dependency on a single resource for revenue is one of the ways in which OPEC membership might negatively impact a nation, which I will describe now.

III. Drawbacks of OPEC Membership

As Noreng notes, most OPEC nations have tied their economic fortunes to the petroleum industry. Whether we say these nations are victims of "Dutch disease" or a resource curse, the underlying message is the same: it is risky for any nation to become overly dependent on exporting one resource. When it comes to petroleum exporting nations, Anthony H. Cordesman calls this phenomenon "OPEC disease", and discusses that different nations have varying levels of vulnerability to it (Cordesman and Markusen, 2016b). Cordesman notes Saudi Arabia, the UAE, and Qatar as states with the lowest risk of OPEC disease — I will discuss his reasoning in a later section. Saudi Arabia is the largest oil producer in OPEC, and the UAE is the 4th largest; both are currently very dependent on oil revenues. Qatar exports more natural gas than crude oil, and it left OPEC in 2019 because it was unwilling to meet crude oil production quotas. While relying on

exports of natural gas still renders Qatar dependent on the energy market for revenues, it is no longer dependent on crude oil, and has therefore cured its OPEC disease. Indonesia similarly left the organization because it was unable to meet quotas and had become a net importer of petroleum. Although it cured its OPEC disease, like Qatar, it still needs further economic reform and export diversification.

Looking beyond the Middle East, Cordesman finds that newer member nations are at much higher risk of "OPEC disease". Risk is especially high in nations with long colonial histories that remain economically dependent on exporting natural resources. Venezuela, which has the greatest amount of proven oil reserves in the world, has become "critically over dependent" on petroleum revenues due to financial mismanagement by corrupt regimes. Ecuador produces less than 2% of OPEC's total oil production, but it has allowed its economy to become very dependent on oil revenues (Cordesman and Markusen, 2016b). Ecuador left OPEC in 2020, believing that it could earn higher revenues outside of the organization. Nevertheless, leaving OPEC did not cure Ecuador of its OPEC disease, as its economy is still overly dependent on the petroleum industry. Additionally, in Angola and Nigeria, oil exports appear to be a small part of overall economic output, but are essential to funding the government and development projects.

Chimaobi Valentine Okolo and Sylvester Ike Udabah look at how the volatility in crude oil prices affects the exchange rate and the cost of living in Nigeria. Okolo and Udabah find that when oil prices are high and the global economy is doing well, the Nigerian government uses oil revenues to finance government expenditures. However, this means that shocks to oil prices have a drastic impact on the economy—if oil prices fall and public spending does not immediately fall as well, there are economic deficits (Okolo & Ubadah, 2019). When the price per barrel of crude oil fell in 2008, and again in 2015, the Nigerian economy suffered immensely. The value of the naira declined, while the exchange rate and the cost of living for ordinary Nigerians soared. The government had no choice but to keep importing essential goods and engage in fiscal stimulus, which increased its debt burden. Of course, the debt could not be alleviated until oil prices rose and the government had revenues flowing in again (Okolo & Ubadah, 2019). Nigeria's economic health was almost entirely dependent on the price per barrel of crude oil, showing how it was a victim of OPEC disease in those years. While Okolo and Ubadah do not directly blame OPEC for Nigeria's oil revenue dependency, it is clear that membership in the organization and meeting its production quotas puts countries at risk. Like Cordesman, they do not believe that OPEC membership has really benefited Nigeria's economy or Nigerians.

In another chapter of his book on OPEC disease, Cordesman details other economic problems that oil export-dependent countries may face. In addition to currency fluctuations and increased cost of living for citizens, a large oil industry also creates employment problems. Cordesman finds that most OPEC states have gross overemployment in the public sector (Cordesman and Markusen, 2016a). Many of these jobs have no productive value but exist in place of jobs in a more efficient and developed private sector. A lack of real jobs can alienate youth and lead them to religious or political extremism (Cordesman and Markusen, 2016a). Many of these countries have a young, growing workforce, and the oil sector is not a sustainable source of employment for all of these people. Governments also finance these public sector jobs through oil revenues, which are both volatile and finite, as previously discussed. As Okolo and Ubadah found, the victims of oil dependency are often working-class people, who suffer from higher prices and lack of employment prospects.

In my view, Cordesman, Okolo, and Ubadah raise some salient points about the risks of OPEC membership. Still, it is worth noting that only 3 countries have left the organization in its 62-year history, while at least 10 countries have joined OPEC+ and participated in voluntary supply cuts to keep prices stable. The question is not as simple as asking whether OPEC is "good", as Saudi Arabia would want one to believe, or "bad" as many politicians in the US would want one to believe. OPEC's future depends on whether it will be as responsive to global political and economic developments in the future as it has been in the past. In particular, its response to climate change and renewable energies is key to its survival. Lastly, it is important that member nations have a plan to mitigate "OPEC disease" and shift away from oil export dependence.

IV. Curing OPEC Disease

As mentioned previously, different OPEC member nations have differing levels of proclivity to fall victim to OPEC disease. In his ranking, Cordesman does not

exclusively consider the percentage of a nation's GDP that comes from oil revenues, he also accounts for military strength and security, regional threats, the threat of terrorism, the country's governance, and current plans to diversify the economy. According to Cordesman, the only OPEC member nations with low or limited risk of OPEC disease are Saudi Arabia and the UAE. He believes that the UAE and Saudi Arabia are at a low risk because they have well-organized militaries, are generally secure, and are strong US allies (Cordesman and Markusen 43, 2016b). Furthermore, in both states, those in charge are taking active steps towards reform and planning to cure OPEC disease by diversifying their economies, expanding tourism, and exporting greater amounts of minerals and chemical products (Cordesman and Markusen, 2016a). Kuwait, Angola, Nigeria, and Algeria are classified as moderate-risk states. While Kuwait's economy is sound overall, it has one of the lowest rates of export diversification in the region. Algeria, Angola, and Nigeria are all formerly colonized nations with high levels of corruption and desperately need economic reform. Algeria and Nigeria are also at high risk of terrorist attacks and religious extremism (Cordesman and Markusen, 2016b). Lastly, Cordesman classifies Libya, Iraq, Venezuela, and Iran as high-risk states. Not only are Libya, Iraq, and Iran very dependent on oil revenues, they are facing or have faced serious threats of terrorism or war. He goes so far as to declare that Iraq, Venezuela, and Libya are failed states or on the precipice of becoming failed states due to critical overdependence on oil revenues, financial mismanagement, and extreme corruption (Cordesman and Markusen, 2016b).

These examples serve to show that curing OPEC disease will require a multifaceted approach. The main approach I will discuss is the "Hartwick Rule", which is concerned with how oil revenues are invested. In a 1977 paper, John Hartwick states that countries with considerable non-renewable natural resources should invest all revenues from exporting those resources in reproducible natural goods (Hartwick, 2017, pg. 1). Thus, even though the resources are exhaustible, future generations can reap the benefits of past revenues. Kirk Hamilton, Giovanni Ruta, and Liaila Tajibaeva study what the economic outcome of resource-rich nations would have been in 2000 if they had started following the Hartwick Rule in 1970. They find that all resource-rich nations would have had higher levels of produced capital per capita in 2000 if they had begun investing their oil revenues 30 years prior (Hamilton et al., 2006, pg. 6). For example, in 2000, Venezuela's level of produced capital per capita was $7,276, but if the Hartwick Rule had been followed, produced capital per capita would have been $27,072 (Hamilton et al., 2006, pg. 7). Likewise, in Gabon, which had produced $16,028 worth of capital per capita in 2000, produced capital would have been $28,896 per capita in 2000 with the Hartwick Rule. They also find that if these investments had been made, oil would play a smaller role in these nations' economies than it does now, as the investment would have stimulated growth in other sectors (Hamilton et al., 2006, pg. 6). The Hartwick Rule only stipulates investing revenues in an amount that exactly offsets the loss from extracting a nonrenewable resource. In contrast, a constant genuine savings rate does not necessarily mean that a nation is only investing the amount needed to offset the loss, in fact, the nation might actually be investing more. Even if these nations had followed a 5% constant saving rate, they would still have much higher levels of produced capital per capita in 2000. Venezuela would produce $31,008 worth of capital per person, and Gabon would produce $32,931, respectively (Hamilton et al., 2006, pg. 7). This would place them close to South Korea's level of produced capital per capita in 2000.

Nasiru Inuwa, Haruna Usman Modibbo, Sagir Adamu, and Mohammed Bello Sani further this point, noting that if oil revenues are used to develop other sectors, nations experience economic growth rather than stagnation. They also add that resource-rich nations must build sustainable and transparent institutions (Inuwa et al., 2021, pg. 471). Stringent anti-corruption policies should be applied in the natural resource sector to ensure that oil revenues are being invested in ways that will benefit the citizens of the nation, rather than lining the pockets of politicians and ruling elites, or being stored in offshore tax havens. They add that these revenues should be channeled into financial institutions that can invest this money in the private sector (Inuwa et al., 2021, pg. 471). This is essential, as many OPEC nations, even the low-risk Saudi Arabia, have a grossly underdeveloped private sector in comparison to their public sector. An underdeveloped private sector results in a lack of employment opportunities and meaningful jobs, which leads to disillusionment among citizens and places pressure on the government to be the main employer. It also guarantees that jobs will exist after petroleum ceases to be a large industry in the nation. Investing oil revenues to develop other sectors can combat OPEC disease, as

it ensures that the benefits of a non-renewable resource, such as oil, can be felt for generations after that resource has been exhausted.

V. The Challenge of Climate Change

Curing OPEC disease is an urgent challenge that member nations must address, as OPEC's power as an international organization may diminish in the future. As much of the world looks to shift away from oil as an energy source due to its disastrous environmental impact, OPEC must adapt its strategies to stay relevant. At the annual COP summit in November 2021, OPEC Secretary General HE Mohammad Sanusi Barkindo stated that OPEC believes in a "sustainable path for all" ("OPEC Statement"). Nevertheless, he implied that moving too fast toward emissions reduction goals would lead to an energy affordability crisis, especially in developing countries. He acknowledged that the oil and gas industry has immense resources and access to technologies that could help lead the world to a low-emissions future ("OPEC Statement"). With these perspectives in mind, it is worth looking at the steps OPEC has taken to reduce emissions and environmental harm in member nations.

Thus far, the main policies OPEC has promoted in member nations are zero flaring, carbon capture utilization and storage (CCUS), and energy efficiency improvements ("OPEC: Oil Industry Ready"). The first policy, zero flaring, aims to reduce flaring or the burning of natural gas during oil extraction, which is an immense source of pollution and wasted energy. The second policy, carbon capture utilization, is still being developed in most nations and is very costly at the present moment; it will probably not be feasible to implement in most OPEC member countries until 2030 at the earliest. The third policy of improving energy efficiency is vague and could entail anything from performance standards to subsidies for energy companies. While these policies, especially cutting down on flaring, are effective, they must be combined with other targets, such as the nationally determined contributions from the Paris Agreement.

All OPEC member nations are in the global south and are already witnessing the impacts of climate change, such as rising temperatures and more frequent natural disasters. This places them in a difficult situation: their economies are threatened by climate change, but their economies are also dependent on oil, the extraction and use of which is causing climate change. There are also issues of fairness and equity. Most OPEC member nations are developing countries that will produce more emissions while they industrialize, just like the US, Japan, and many Western European countries did for decades. Imposing emissions reduction standards on member nations now and limiting their potential economic growth while other nations were allowed to develop with no restrictions may be perceived as unfair. In various climate negotiations, OPEC member nations, led by Saudi Arabia, have always argued that emissions reductions by developed nations would have a major impact on the economies of OPEC member nations and that they should be financially compensated for any negative economic impacts (Quilliam, 2021). Nevertheless, financial compensation for losses will only serve as a short-term solution.

Overall, OPEC seems to have no concrete plan to address climate change and the eventual transition away from fossil fuels other than reminding the world that they will still need fossil fuels in the near future. In a world where renewable energies are readily available, and the price per barrel of oil does not carry the same importance in geopolitics, OPEC's power will certainly diminish.

VI. Conclusion

There has been an article predicting the imminent death of OPEC in some major US news outlet every year since its founding. Yet, 62 years later, OPEC persists. The Organization recorded its highest increase in revenue this year since the oil crisis in 1973-1974, effectively shutting down any doubts about its profitability. OPEC has given its member nations relevance on the global stage and allowed them to control their oil reserves. While the revenues were sometimes not utilized in the most effective way, member nations have all grown wealthier from exporting oil under OPEC's quotas. The rest of the world has reaped the benefits of stable oil prices and OPEC's spare capacity for decades. The organization has weathered multiple geopolitical landscapes, wars between members and around the world, and a global pandemic without a decrease in net membership. If anything was to land the final blow to its relevance and power, I expect that it would be the climate crisis or an exodus of members due to internal disagreements. However, until we have exhausted every last oil reserve on this planet, I am doubtful that OPEC will ever cease to exist as an organization.

References

Benchekroun, H., van der Meijden, G., & Withagen, C. (2020). OPEC, unconventional oil and climate change-On the importance of the order of extraction. Journal of Environmental Economics and Management, 104, 102384.

Colgan, J. D. (2014). The emperor has no clothes: The limits of OPEC in the global oil market. International Organization, 68(3), 599-632.

Cordesman, A. H., & Markusen, M. (2016a). Setting the Stage: Examining the Diversity of OPEC and Other Oil Exporters and Their Lack of Command Goals and Needs. In The "OPEC Disease": Assessing the True Impact of Lower Oil Export Revenues (pp. 3–15). Center for Strategic and International Studies (CSIS). http://www.jstor.org/stable/resrep23362.4

Cordesman, A. H., & Markusen, M. (2016b). The OPEC Disease: A Country-by-Country Risk Comparison. In The "OPEC Disease": Assessing the True Impact of Lower Oil Export Revenues (pp. 42–173). Center for Strategic and International Studies (CSIS). http://www.jstor.org/stable/resrep23362.8.

Economou, A., & Fattouh, B. (2021). OPEC at 60: The world with and without OPEC. OPEC Energy Review, 45(1), 3-28.

Fattouh, B., & Mahadeva, L. (2013). Brief History of OPEC. In OPEC: What Difference has it Made? (pp. 4–7). Oxford Institute for Energy Studies. http://www.jstor.org/stable/resrep32330.5

Hamilton, K., Ruta, G., & Tajibaeva, L. (2006). Capital accumulation and resource depletion: A Hartwick rule counterfactual. Environmental and Resource Economics, 34, 517-533.

Hartwick, J. M. (2017). Intergenerational equity and the investing of rents from exhaustible resources. In The Economics of Sustainability (pp. 63-65). Routledge.

Inuwa, N., Modibbo, H. U., Adamu, S., & Sani, M. B. (2021). Resource curse hypothesis: fresh evidence from OPEC member countries. OPEC Energy Review, 45(4), 462-474.

Noreng, O. (1978). Friends or Fellow Travelers? The Relationship of Non-OPEC Exporters with OPEC. J. Energy & Dev., 4, 313.

Okolo, C. V., & Udabah, S. I. (2019). Oil price and exchange rate volatilities: implications on the cost of living in an OPEC member country—Nigeria. OPEC Energy Review, 43(4), 413-428.

Quilliam, N. (2021). OPEC Faces Longer-Term Challenges. Chatham House – International Affairs Think Tank. https://www.chathamhouse.org/2021/08/opec-faces-longer-term-challenges.

OPEC : Oil industry ready and willing to tackle climate change issues. (n.d.). Retrieved March 8, 2023, from https://www.opec.org/opec_web/en/press_room/5772.htm

Opec: Opec statement to the un climate change conference(COP 26/CMP 16/CMA 3). (n.d.). Retrieved March 8, 2023, from https://www.opec.org/opec_web/en/press_room/6704.htm

OPEC: Our Mission. (2023). Organization of the Petroleum Exporting Countries. https://www.opec.org/opec_web/en/about_us/23.htm.

Pierru, A., Smith, J. L., & Almutairi, H. (2020). OPEC's pursuit of market stability. Economics of Energy & Environmental Policy, 9(2).

Marxist Dehumanization and Alienation in Duncan Jones' *Moon*

Dylan Black
Northeastern University

I. Introduction

Marxist film theory (MFT) is a subset of traditional film theory that bases its analysis in theories of Marxism as derived from the work of Marx and Engels and the politico-economic system that grew out of it. In fact, MFT is one of the oldest forms of film theory. Marxism impacted writing and filmmaking "by politically committed directors as well as shaped the critical and historical analysis of the film in aesthetic, institutional, social, and political terms" (Kleinhans, 1998). MFT involves the structures of class and labor within a film, focusing intensely on the relationship and struggle between the proletariat and bourgeoisie.

This examination employs MFT to analyze how Duncan Jones' film *Moon* displays Marxist theories of the alienation of laborers and the struggle between the proletariat and bourgeoisie in order to explore how Marxism and Marx's theories are portrayed in film and science fiction. *Moon* is chosen as the subject for this paper because its plot is focused on a laborer in a science fiction environment. *Moon* follows Sam Bell, an astronaut mining Helium-3 on the Moon. He later discovers that he is one of many clones of an original Sam Bell; problematically, he will be killed instead of sent home in exchange for a new clone to be woken up. This analysis applies Marx's theory of alienation to *Moon* and argues that Sam Bell serves as an example of an alienated worker under a capitalist mode of production.

II. Review of Literature

Marxism and Labor

Under a free market system, labor is seen as a tool to extract profit, leading to workers being used at accelerating rates to obtain the most profit and to workers being seen less as people and more as disposable machinery (Yates, 2011). Once workers no longer create profit, "capital no longer needs these populations as labor, [and] these populations are little more than the human-as-waste, excreted from the capitalist system" (Yates, 2011). As such, capitalism's disposability of workers and their labors leads to their objectification (Esping-Andersen, 1990). The disposability of workers objectifies and dehumanizes them. Dehumanization is inherent to capitalism because of the greater emphasis placed on profit, loss, and competition compared to a command economy, which comparatively emphasizes the working class and, under Marxism, the destruction of the class system itself. To Marx (1844), "The worker sinks to the level of a commodity and becomes indeed the most wretched of commodities." Through such commodification, humans are abstracted as products - not people - among themselves and others (Radičevič, 2010).

The dehumanization of workers is seen extensively in Marxian theories of alienation, in which workers lose a genuine connection to their work. According to Marx, alienation is caused by objectification, in which a worker's production changes from a genuine life-activity to merely a good to be sold for profit, in turn causing individuality among workers to fall as well (Lefever, D. & Lefever, T., 1977). Lefver and Lefver

emphasize in their analysis of Marxian labor theories that Marx "sees man" differently from animals because of human's ability of "conscious rational action," and through a capitalist system, such distinguishability is muddled by alienation and the dehumanization of the proletariat (working class) by the bourgeoisie, the owners of the means of production (Lefever, D. & Lefever, T., 1977). A study by Roberta Rosa Valtorta of the University of Milano-Bicocca surveyed university students on levels of moral, physical, and social "taint" relative to certain occupations. The study found that workers in morally "dirty jobs," such as politicians and lawyers, are evaluated as animals more than socially or physically dirty jobs. Similarly, the study found that "socially dirty" workers, such as state workers and, most importantly, blue-collar workers are seen as objects (Valtorta et al., 2019). The results from Valtorta's study indicate how workers in fields that are seen as morally or socially "tainted" are naturally objectified and animalized by society, validating, in part, Marxist ideas of dehumanization.

Applications of Marxism to Film

In recent years, many critics and scholars have applied Marxist political and economic theories to film. MFT is a form of film theory that applies Marxism to the analysis of films, specifically focusing on social stratification and class systems (Baxandall et al., 1979). Although other analytical tools are often employed, Marxist analysis of films uncovers commentary made by films on class struggles and communism. *Fight Club*, for example, is a common example of a Marxist film that has emerged in the modern era. *Fight Club* criticizes consumerism in the form of the main character Jack's alternate personality, Tyler Durden, and thus is a criticism of the waste of capitalism as a whole (Lizardo, 2007). This is corroborated by an analysis that "ironically, Jack is the ultimate oppressing bourgeois," in the sense of his opulent consumerism and high lifestyle (Bishop, 2006). On the other end of the spectrum, Tyler represents the proletariat, contrasting Jack in his blatant disregard for material possessions, squatting in a rundown, abandoned house (Bishop, 2006). *Fight Club* displays Marxist theories through the conflict and literal fighting between the bourgeoisie consumerism and proletariat anarchy shown between these two characters. This binary representation of labor and class through *Fight Club* and Marxist theory in general form the basis for Marxist analysis in art. Both Lizardo and Bishop's analyses of *Fight Club* uniquely pinpoint the relationship between the film and Marxist theories involving class struggles and consumerism.

Mona Siegel (2002) makes a similar Marxist argument in her analysis of the 1993 film *Germinal*, in which she argues that the film emphasizes the separation of classes and existing class struggles under industrial capitalism. Specifically, *Germinal* displays Marx's "two great hostile camps": the proletariat in the form of striking French miners such as Étienne Lantier and the bourgeoisie in the form of authorities that suppress the strike. Siegel specifically uses *Germinal*'s Marxist elements as an educational tool, employing the film to teach students about the history of Marxism. *Germinal* serves as a strong example of how Marxist ideas can permeate mediums such as film. Both *Germinal* and *Fight Club* highlight the strong currents of how Marxist ideals can permeate through different mediums such as film.

Like class struggles present in films, alienation has been studied as an aspect present in Marxist films, albeit to a lesser extent. For example, James Cameron's *Avatar* has been shown to display the alienation of labor, noting how Jake is a prime example of alienation and estrangement in action (Peterson, 2013). This analysis of *Avatar* further presents a solution to such alienation, taking down the system that alienates workers as a whole, echoing the primary message of Marxism as outlined in *The Communist Manifesto*. In his examination of *Avatar*, Peterson traces three primary stages of alienation: estrangement from the object of labor, labor itself, and from other humans. This mode of finding alienation in the film is one that is applied to *Moon* in this analysis.

Marxist Film Theory and Moon

In comparison to the use of Marxist theories in drama films, science fiction has been used repeatedly to make commentary regarding Marxism. Science fiction can make direct connections to political theory and real-world politics alike. Through language and set design, science fiction films have been observed to make real-world political commentary despite most often occurring in worlds that do not exist (Barr, 2012). Science fiction can sometimes make stronger commentary due to this disconnect from the real world. In applying Marxist film theory to science fiction, Duncan Jones' *Moon* stands out. The story of Sam Bell, a simple

miner on the moon for Lunar Industries, emphasizes a critical demographic of Marxism, that of the blue-collar proletariat.

The prevailing analysis of *Moon* surrounds the status of Sam Bell as a clone. To be more precise, the identities of both Sam Bell I (the Sam Bell as shown from the opening of the film who gets in an accident early in the film) and Sam Bell II (the clone later woken up after Sam Bell I's accident) are brought into question. *Moon* presents a new form of a common theme in science fiction that "clones are people too." In her analysis of *Moon*, critic Priya Shetty (2009) builds upon this trope and asks, "if human cloning were to become nothing out of the ordinary, would that mean that human life became more celebrated or worryingly expendable?" Through Shetty's viewpoint, *Moon* displays how human life can be inherently devalued as one can be continuously remade. The ethicality of cloning has also been taken into account, asking if the cloned Sam Bells have any connection whatsoever to the original Sam Bell, or if they are in fact, separate people (Reid, 2010). Such analysis shows how *Moon* presents a new perspective regarding cloning from which the origin of the clones is not present; rather, the clones themselves believe they are each individually the original. However, critics of *Moon* overlook the Marxian aspects of *Moon* and its main characters, Sam Bell I and II, leading to a key gap in the body of knowledge. *Moon* connects to Marxist film theory through the relationship between the identity of the worker and his working conditions.

Alienation and dehumanization relate to the devaluation of life through cloning. The relationship between the worker and the major corporation exemplifies the Marxist relationship between the proletariat and the bourgeoisie, especially in Marx's theory that capitalism forges class struggles between such groups. This paper provides new insight into *Moon* by addressing how Marx's theory of alienation can be seen through analyzing the experiences of Sam Bell I and II in Duncan Jones' *Moon*.

III. Methodology

The purpose of this research is to analyze how the principles of Marxism can be applied to science fiction through *Moon*. This study uses an interdisciplinary qualitative approach, combining the political and economic theories of Marxism with traditional film theory in order to display the relationship between Sam Bell and Lunar Industries as analogous to the Marxian struggle between the proletariat and bourgeoisie. This paper further discusses the relationship between *Moon*'s characters and Marxist ideas relating to alienation and dehumanization. Specifically, the two Sam Bell clones shown in the film will be paid close attention to.

A close viewing of the film will take place to fully analyze the Marxian aspects of *Moon* as it pertains to class and labor. Because of the fluid nature of film theory and the inherent interdisciplinary aspects related to film, no single methodology can be used to analyze a film. The analysis of film is defined as "how motion pictures are constructed, how they create meanings, how they affect us, and how they are intricately embedded in the cultural and ideological frameworks we inhabit" (Geiger & Rudetsky, 2013). This definition of film analysis will be applied to *Moon* in this analysis, specifically through the ideological framework of Marxism. Marxist themes are inherently related to *Moon* through its portrayal of labor in a science fiction world, making it a suitable subject for this analysis to take place under.

Moon stands out as a film connected to Marxist principles because it directly displays a worker, who can be described as relatively blue collar. Under classical Marxism, the proletariat is defined as "the class of modern wage labourers who, having no means of production of their own, are reduced to selling their labour power in order to live" (Marx & Engels, 1848). Sam Bell serves as an example of such a wage laborer described by Marx. Though we aren't aware of how he is paid, he lacks means of production of his own, instead producing for a larger entity, Lunar Industries. Analyzing both Sam Bells as objects in terms of Marxist dehumanization as well as distinctive people and comparing interpretations of the two will provide a full analysis of Marxist labor theories and their influence on *Moon*.

As explained by J. Angelo Corlett (1988), a philosopher focusing on class and race from San Diego State University, Marx's theory of alienation arises from the theory of entfremdung, or estrangement from the self as a result of class structures caused by capitalism. According to Marx, there are three main types of alienation. The first form of alienation is that of one being "deprived of the product of one's own labor." A worker is physically alienated from the real- world benefits of their labor; the means of production belong to the

proletariat (Corlett, 1988). Arguably most paramount to alienation as it relates to dehumanization is the second form of the theory, that one loses their humanity as a direct result of the first form of alienation. One is deprived of a part of themself as a result of deprivation of the product of their own labor (Corlett, 1988). Arguably most paramount to alienation as it relates to dehumanization is the second form of the theory, that one loses their humanity as a direct result of the first form of alienation. One is deprived of a part of themself as a result of deprivation of the product of their own labor (Corlett, 1988). This specific form of estrangement lends itself to the dehumanization of laborers, whereby
through alienation, workers are intrinsically dehumanized and become products as opposed to people. Regarding *Moon*, Sam Bell's status as a clone and worker under Lunar Industries will drive Bell's viewing as alienated from his labor and his humanity based on these definitions.

Finally, after being alienated from their labor and themselves, one is alienated from others and becomes a cog in a capitalist machine to produce profit (Marx & Engels, 1975). According to Marx, capitalism transforms labor into a competitive good as opposed to an attempt to fulfill the communal needs of all. In turn, alienation forces workers to compete against each other rather than work together towards a common goal. These three steps in alienation will form the basis for the analysis of *Moon* as both a Marxist film and Sam Bell I and II as Marxist figures of alienation.

Marx contends that the way to dismantle the system of oppression the proletariat is under is through a complete overthrow of the capitalist system surrounding them - a Communist Revolution (Marx, 1848). This fourth aspect of Marxism will complete the analysis, arguing that not only is Sam Bell an alienated worker, but also a symbolically Marxist worker in his overthrow of Lunar Industries at the end of the film.

In studying *Moon*, an in-depth analysis will take place, explicitly tracking Sam Bell I and Sam Bell II as examples of Marxist theories of alienation and estrangement. An analysis of the characters both as objects as seen by their corporation and as unique individuals will form the basis of my analysis. Further analysis will take place regarding the set design, lighting, and other mise-en-scène elements of *Moon*. In "Methodology for Film Analysis - The Role of Objects in Films" (2010), Renira Gambarato analyzes how everyday objects impact how film can be analyzed. She describes and studies not only the physical features of objects that make them important in research involving film, but also in their emotional and symbolic character. Objects can be just as important as plot, characters, etc. in analyzing a film.

Not only are the objects themselves important in analysis, but the context they are placed in by the filmmaker shapes how they can be interpreted by analysts and researchers. The mise en-scène presented and the objects' relations with each other also play a large role in this research. Thus, the analysis of *Moon* will focus largely on how Duncan Jones sets up the setting and deliberately portrays Sam Bell I and II to be seen both as people and as objects by their employer, Lunar Industries, bringing up questions to their identity and displaying them as Marxist figures.

IV. Findings and Analysis

Estrangement From One's Labor

According to Marxist theory, workers are alienated from their own labor through a lack of control over what is produced, since the means of production lay in the hands of the bourgeoisie (Marx, 1844). The worker has no control over what happens to his labor, and how his labor is spent by their virtual "owners," rather it is up to those who own the means of production (the bourgeoisie) to decide what is produced and how much to sell it for, alienating the proletariat from the results of their labor. Such alienation is marked by a lack of control over one's own actions during the production process and being forced into dehumanizing working conditions.

This form of alienation is exhibited directly through Sam Bell's lack of control over not just his work, but his entire life. Being isolated on the moon working a three-year shift, Bell's life is routine, and although he has modes of leisure such as growing plants and creating a detailed diorama, his entire life in space is devoted to working for Lunar Industries. Further, Bell sees no benefit to his labor, with it going to Earth for energy and Lunar Industries for profit. While it can be reasonably inferred that he is paid in some form for his labor, his returns from his labor are decided by Lunar Industries. This direct lack of authority over his own labor exemplifies Sam Bell's alienation from his own labor in *Moon*. Through alienation, Sam Bell loses the ability to make choices as to what to produce, how to

produce it, and what will happen to the products of his labor after it is created, three fundamental parts of the chain of production that workers like Sam are alienated from because of features of capitalism as outlined in Marxist theory (Corlett, 1998).

Sam Bell is under constant watch by Lunar Industries to maintain compliance with company policies and keep security on the lunar base where he lives. He is monitored and tended to by GERTY, an artificial intelligence whose stated purpose is to tend to Sam's needs, grooming him and preparing his meals. However, GERTY has an ulterior motive. Lunar Industries uses the AI as a means of watching Sam and reporting back to them in order to control Sam Bell. For example, following Sam's accident and the "waking up" of a new clone, GERTY communicates, in a live conversation, the situation to Lunar Industries employees. GERTY controls Sam, even forbidding Sam Bell II to go out in order to hide the fact that he is a clone. Such a lack of privacy and control over his own life under the watchful eye of the capitalist Lunar Industries further connects both Sam Bells to an example of an alienated worker.

Fig. 1. "I'm under strict orders not to let you outside." Jones, 2009. Author's screenshot.

To Marx, labor is the key to human self-actualization. According to his writings, work is "the source of human self-definition and human freedom" (Marx, 1844). However, due to alienation from one's labor, work becomes a means by which laborers are forced to undergo constant abuse by the bourgeoisie for the purpose of mere survival. Like this theoretical scenario outlined by Marxist theory, working on the moon is not Sam Bell's passion. This is especially evident through his many hobbies. Throughout the course of the film, he is shown to be a gardener and skilled craftsman, building a small, but intricate model of a small town. Since these skills are separate from Bell's labor, they display his position as an alienated worker. Under capitalism, "one can only look for fulfillment outside of one's work," a mantra that Sam Bell has taken up through his hobbies (Schmitt, 1987). Lunar Industries objectifies Bell as a tool by which to make profit and to Bell, his work is not a genuine life activity, rather simply a means by which to make money to survive (Lefever D. & Lefever T., 1977).

Fig. 2. "Sam's Model." Jones, 2009. Author's screenshot.

Estrangement From Oneself: Sam Bell's Dehumanization

Labor, according to Marx, is more than a process of production, it defines *who* we are as people. What separates humans from animals is not simply biological, but rather, "the animal is immediately one with its life activity. It is not distinct from that activity; it is that activity. Man makes his life activity itself an object of his will and consciousness. He has conscious life activity" (Marx, 1844). When a worker is alienated from his or her labor and from the control over what they produce, they lose their human essence, or *Gattungswesen*, and thus are dehumanized. Workers move from laborers to objects for the bourgeoisie to break down further as they become sub-human entities.

In *Moon*, Sam Bell's estrangement from his own human essence takes a physical form. By being cloned over and over, both Sam Bell I and Sam Bell II are objectified and, through his lack of autonomy, are dehumanized in the process. To Lunar Industries, Sam Bell is not a person and is not even an employee. Sam Bell is an object, like a cog in a machine. The purpose of such an object is to make profit, whether he is happy or not. This relegation to "clone" and not person directly echoes a loss in humanity for both Sam Bells and displays the capitalist goal: profit. It is worth noting that neither Sam Bell I nor Sam Bell II are the "true" Sam Bell, with both being clones. Both are victims of alienation from the self, despite Sam Bell II not performing much labor between his awakening and his escape from the moon.

Fig. 3. "Jesus Christ, There's So Many of Them." Jones, 2009. Author's screenshot.

Fig. 4. "Sam Bell Loses a Tooth." Jones, 2009. Author's screenshot.

The objectification of Sam Bell I is especially apparent through his quite literal deterioration. Throughout the course of *Moon*, Sam Bell I grows increasingly ill, eventually breaking down, losing teeth, and reverting to an infantile state. In this instance, Marx's theory of alienation takes a physical form. When a laborer is alienated from the product of his labor, he loses his species essence, that being his "objective existence as a species" (Simon, 1994). Like the traditional laborer under Marxist doctrine, who loses their humanity through a lack of control over their own production, Sam Bell is dehumanized through his cloning and through his alienation from his own labor. Sam's deterioration is not coincidental, however. He is, as a clone, programmed with an expiration date of three years and at that point, is "sent home," where he is in reality vaporized, and a new clone is woken up. This constant cycle of wake up, work, fall apart, die, for the many clones of Sam Bell further displays their dehumanization and purpose as a profit-making machine for Lunar Industries, reiterating Marxist alienation from the self. The graphic nature of such deterioration as shown through Sam Bell I's quite literal falling apart is even further indicative of the dehumanizing nature of such a programmatic death. Both Sam Bell I and Sam Bell II further lose their humanity through the realization that neither of them are "real" people. Not only are they dehumanized, but they no longer have anything that made them "Sam Bell". Their wife, home, and child that motivated them to perform labor are no longer truly theirs, but rather the original Sam Bell's.

Estrangement From Others

Like his estrangement from his own human essence, Sam Bell's alienation from others takes a literal form. Being on the moon, Sam Bell I is completely incapable of interacting with another person, not considering his encounters with Sam Bell II and GERTY. Bell's physical separation from others furthers his dehumanization. By not being able to communicate with others, Sam is physically isolated, magnifying his already existing animalization. Emotional ties are broken and although there is an illusion of communication, Sam Bell is separated from a fundamental part of human life.

In fact, Lunar Industries are well aware of such alienation from others and take active steps towards damaging Bell's ability to talk to who he believes to be his family. Lunar Industries blocks signals coming from Earth, resorting to pre-recorded clips of Sam's family to give the illusion of sending messages back and forth, with Sam believing that a solar storm took out communication signals. Critics from *The Economist* maintain that such broken radio signals not only cause Sam Bell's loneliness but con him into "slavery", leaving no option for him other than work ("To understand the psychological toll of quarantine, watch space films", 2020, para. 6). By cutting him off from his family, Lunar Industries traps Sam in his current situation with no way of escaping the painful chains of the bourgeoisie.

Marxist doctrine further describes alienation from others in the form of competition between workers. As workers are alienated from themselves due to dehumanization, it is a natural consequence that they are in turn alienated from each other (Marx, 1844). As the proletariat are objectified, labor becomes a competitive commodity, and workers are forced to compete with

each other for advancements. Competition between workers gives power to the bourgeoisie and keeps wages low, like competition between firms bringing down prices. Marx describes such competition as "a means for his individual existence. It alienates from man his own body, external nature, his mental life and his human life" (Marx, 1844). In essence, workers are alienated from their mutual economic interests.

Such competition is clear through arguments between Sam Bell I and Sam Bell II not over wages, promotions, or other business-related dealings, but rather over whether or not they are "the real Sam Bell". When confronted by Sam Bell II on not being a true human, Sam Bell I exclaims, "I'm the original Sam! I'm Sam fucking Bell! Me! Me!" (Jones, 2009). From Sam Bell I's perspective, he is the original Sam Bell. He has been working on the moon for three years whereas Sam Bell II has suddenly appeared. Thus, Sam Bell I is more likely to believe that he is real as opposed to Sam Bell II, who discovered Sam Bell I and thus is more likely to believe that Sam Bell I is a clone and perhaps that he himself is a clone. Such fighting over their identity as a human is representative of their alienation from their humanity and thus their alienation from others.

Fig. 5. "I'm the Original Sam!" Jones, 2009. Author's screenshot

Marxist Revolution

In response to class inequality between the bourgeoisie and proletariat along with alienation among workers, Marx argues that in order to topple this theoretical history of oppression by the upper class, a revolution by the proletariat is the only option. According to Marx, capitalism manifests its own destruction by creating a system by which the bourgeoisie and their wealth depend directly on the labor of the proletariat (Marx, 1848). Thus, it is inherent to capitalism that there be a separation of class between the wealthy bourgeoisie and the proletariat they oppress. However, through alienation, workers come to resent the upper class for such oppression and objectification ("The Communist Manifesto - Bourgeoisie and Proletariat", 2006). Through this cycle, an eventual Communist revolution would take place, toppling the class system and capitalism.

The world portrayed in *Moon* is one that is objectively capitalist, with mining on the moon not run by a government or a collective, but rather by a private corporation, Lunar Industries. The plot of *Moon* is not one solely of alienation, but rather one of a revolution against capitalism. Sam Bell II plays a particularly important role in such, serving as a revolutionary figure who leads the two-man revolution, historically analogous to a figure such as Vladimir Lenin or Mao Zedong. Sam Bell II quickly realizes that Lunar Industries is an abusive figure of the bourgeoisie, countering Sam Bell I by asking, "Do you really think they give a shit about us? They're laughing all the way to the bank!", echoing Marx's rallying cry "Workers of the world, unite!" (Jones, 2009; Marx, 1848). Sam Bell II's crying out for the overturning of Lunar Industries formally begins the revolt that is soon to follow. Sam Bell I, by comparison, serves as the proletariat who has been alienated by capitalistic forces. This dynamic between Sam Bell I and Sam Bell II forms the struggle in *Moon*. Sam Bell II follows his rallying cry with a monologue calling out Lunar Industries for their corruption, foreshadowing the eventual discovery of the many clones hidden from them (Jones, 2009).

In the end, the revolt is successful, leading to the fall of Lunar Industries. In his final action, Sam Bell II shuts off GERTY, emulating the shutting down of HAL-9000 in *2001: A Space Odyssey*, a film by which *Moon* was inspired. In comparing GERTY to HAL, clear parallels emerge. Both robots are intelligent AIs that help control the lives of their passengers and wield considerable influence over their daily lives, with GERTY serving essentially as Sam's servant and "companion" and HAL controlling the life functions of three astronauts in suspended animation. GERTY, like HAL, is revealed to have ulterior motives, being a tool of the bourgeoisie to control Sam Bell and keep him in line. Sam Bell II's disengagement of GERTY is symbolic of the revolution's success in Marxist terms.

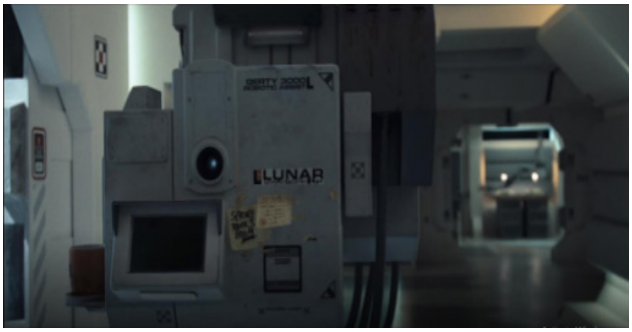


Fig. 6. "GERTY Is Shut Down." Jones, 2009. Author's screenshot.

V. Conclusion

In conclusion, *Moon* is a film that inherently projects Marxist ideas and more specifically the alienation of the worker, through its portrayal of Sam Bell I, a symbol of the proletariat, and Sam Bell II, a symbol of a Marxist revolutionary. Marx's three primary forms of alienation take hold in *Moon*, where Sam Bell I and, to an extent, Sam Bell II are alienated from their labor, their humanity, and other individuals. Sam Bell is a figure whose control in his life, his labor, and his choices are limited by that of the bourgeoisie, and although they are never directly present in the film, Lunar Industries controls Sam's every move. This dynamic between Lunar Industries and Sam is what drives the Marxist themes of *Moon*. Through such a rendering of Marxist alienation within *Moon*, the role of science fiction in making political commentary is further affirmed.

However, this analysis of *Moon* does have significant limitations. While the results outlined in this study can be applied to *Moon*, it is not a statement on the genre of science fiction film as a whole, which can have ranging themes and motifs, some political, but many others completely apolitical. Furthermore, while much of this analysis placed focus on the roles of Sam Bell I and Sam Bell II, the roles of Sam Bell's wife, Tess, and daughter Eve are neglected for the most part, leaving a hole in the knowledge of possible aspects of *Moon* that continue to go unanalyzed. In doing a possible deeper analysis of Sam Bell's marriage and family life, especially relating to the psychological effects of isolation in the face of not truly being yourself and not belonging to such a life, further research may uncover commentary made by *Moon* across disciplines in sociological and familial terms.

While Marxist themes in *Moon* are not ideas that may be incredibly important to the whole of film analysis and media studies, the larger theme of political speech through otherwise apolitical genres, specifically science fiction is one that is of concern to many media scholars who care about the representation of society in non-traditional forms.

References

Barr, M. S. (2012). Science Fiction Language/Political Reporting: Communicating News Via Words From Nowhere Real. ETC: A Review of General Semantics, 69(1), 21–31. Retrieved from https://www.jstor.org/stable/42579165

Baxandall, L., Aufderheide, P., Quart, L., Biskind, P., Cole, L., & Georgakas, D. (1979). MARXIST FILM CRITICISM: A Symposium. Cinéaste, 9(4), 18–25. Retrieved from https://www.jstor.org/stable/42683320

Bishop, K. (2006). Artistic Schizophrenia: How "Fight Club"'s Message Is Subverted by Its Own Nature. Studies in Popular Culture, 29(1), 41–56. Retrieved from https://www.jstor.org/stable/23418071

Corlett, J. (1988). Alienation in Capitalist Society. Journal of Business Ethics, 7(9), 699-701. Retrieved February 20, 2020, from www.jstor.org/stable/25071820

Esping-Andersen, G. (1990). The Three Worlds of Welfare Capitalism. Cambridge: Polity Press.

Fenegan, S., Styler, T. (Producers), & Jones, D. (Director). (2009). Moon [Motion Picture]. United States: Sony.

Gambarato, R. (2010). Methodology for Film Analysis - The Role of Objects in Films. Revista Fronteiras.

Geiger, J., & Rudetsky, R. L. (2013). Film Analysis: A Norton Reader (2nd ed.). Norton. Kleinhans, C. (1998). Marxism and Film. The Oxford Guide to Film Studies, 106–113.

Lefever, D. M., & Lefever, J. T. (1977). Marxian Alienation and Economic Organization: An Alternate View. The American Economist, 21(2), 40–48. Retrieved from https://www.jstor.org/stable/25603121.

Lizardo, O. (2007). Fight Club, or the Cultural Contradictions of Late Capitalism. Jour-

nal for Cultural Research, 11(3), 221–243. doi:10.1080/14797580701763830.

Marx, K. (1844). Estranged Labor, Economic and Philosophic Manuscripts of 1844 (pp. 237-252).

Marx, K. & Engels, F. (1848). The Communist Manifesto. Retrieved from URL. Marx, K. & Engels, F. (1975). Karl Marx, Frederick Engels: Collected Works. (OKS Print.) New York: International Publishers.

Peterson, M. C.E.. (2013). Avatar, Marx, and the Alienation of Labor, Homer Simpson Ponders Politics: Popular Culture as Political Theory (pp. 115 - 130).

Radičevič, T. D. (2010). Corporate capitalism, the end of a doctrine - Abstractionism or creative destruction? SEER: Journal for Labour and Social Affairs in Eastern Europe, 13(1), 137– 148. Retrieved from https://www.jstor.org/stable/43293351.

Reid, T.-L. (2010). Lunar Flair. World Literature Today, 84(3), 53–54. Retrieved from https://www.jstor.org/stable/27871087.

Schmitt, R. (1987). Introduction to Marx and Engels: A Critical Reconstruction. Westview Press.

Shetty, P. (2009). Man on the moon. The Lan cet, 373(9679), 1937–1938. doi:10.1016/S0140-6736(09)61051-5.

Siegel, M. L. (2002). Germinal: Teaching about Class and Industrial Capitalism through Film. Radical History Review, 2002(83), 180–185. doi:10.1215/01636545-2002-83-180.

Simon, Lawrence H. (ed.) (1994). Marx: Selected Writings. Hackett Publishing Company.

The Communist Manifesto - Bourgeoisie and Proletariat. (2006, April 10). Retrieved from https://www.bl.uk/learning/histcitizen/21cc/utopia/methods1/bourgeoisie1/bourgeoisie.ht ml

To understand the psychological toll of quarantine, watch space films. (2020). The Economist. Retrieved from https://www.economist.com/prospero/2020/04/08/ to-understand-the psychological-toll-of-quarantine-watch-space-films.

Valtorta, R.R., Baldissarri, C., Andrighetto, L. and Volpato, C. (2019), Dirty jobs and dehumanization of workers. Br. J. Soc. Psychol., 58: 955-970. doi:10.1111/bjso.12315.

Yates, M. (2011). The Human-As-Waste, the Labor Theory of Value and Disposability in Contemporary Capitalism. Antipode, 43(5), 1679–1695. doi:10.1111/j.1467- 8330.2011.00900.x.

Does the labor force participation rate affect income inequality in American Metropolitan Statistical Areas?

Maria Cabella
Northeastern University

I. Introduction

The Covid-19 pandemic brought about large and damaging impacts on economies around the world. In the United States, despite the rapid improvement in GDP, the irregularities in employment have become one of the main concerns surrounding the economic impact of the pandemic, and indeed prove to be a compelling phenomenon (Henry-Nickie et al., 2022). Past recessions, namely after the mid-1980s, have presented this characteristic– fast productivity-fueled recovery accompanied by labor market sensitivities (Gordon, 2010). In the present period, the pandemic appears to have exacerbated this process by putting millions of Americans at risk of losing their job and worsening their skillset, as unemployment duration continues to be high for certain groups of people, and many have become discouraged to look for a new job.

Under these circumstances, it seems that a slow recovery in employment accompanied by a rapidly growing GDP will lead to unequal gains from growing economic activity. The share of GDP that labor receives is decreasing (Autor et al., 2017, p1), potentially furthering inequality. The rise in skill-biased technology is gradually making middle-skilled workers redundant and at risk of losing their jobs and a substantial source of income permanently (Jaimovich and Siu, 2018). A more generous social safety net might be discouraging lower-income workers from finding a job (Glaeser, 2014, p). All of this has the potential to further income inequality due to their negative impact on the labor force participation rate (LFPR).

The LFPR is particularly useful to analyze employment trends presented during economic recoveries. The LFPR reveals the extent to which workers drop out of the labor force– be it due to discouragement, skill depreciation, or voluntary retirement, among other causes. Discouraged workers have a harder time reentering the labor force, as they struggle to find alternatives that fit their skills, sector, and even geographical location (Binder and Bound, 2019, p.177). The Covid-19 pandemic also has increased the rate at which older workers decide to voluntarily retire, many due to health concerns as the virus spreads (Gregory and Steinberg, 2021).

The time it takes for employment to recover after a recession might affect income inequality through job polarization. This occurs when jobless recoveries are driven by the loss of routine middle-skill jobs and employment at the end of the skill distribution (Jaimovich and Siu, 2018). Job polarization furthers income inequality, as the gap between high-skill and low-skill workers is exacerbated through the disappearance of middle-skill jobs. A decrease in the LFPR is associated with worsening inequality because it means that people have been systematically left out of the labor market, or are actively leaving themselves out of the market. This loss of income accentuates income inequality.

The present study evaluates the extent to which changes in the LFPR have furthered income inequality following past recessions. Inequality will be measured using the Gini Index and the income share of the top 5% in Metropolitan and Micropolitan Statistical Areas (MSAs) within the United States between 2005 and 2019. The focus will be MSAs because they employ a large and diverse part of the American population– 78.7% of the American workforce lives in a MSA as of 2021– and because data are available at this geographi

cal level for this time period. MSA's also include different types of jobs in the manufacturing and service industries, and across income brackets. One shortcoming of limiting analysis to the MSA level is that it excludes rural workers, therefore underrepresenting the impact of a lower LFPR on income inequality for this group. Further research should be conducted to address labor market issues pertaining to the primary sector and rural areas. Furthermore, cities present greater income inequality (Bishaw and Posey, 2016) evidenced by a higher Gini Index than rural areas. Non-college urban workers have been hit harder by technical change than other workers because they hold more middle-skill jobs (Autor, 2019, as cited in Hoffmann et al., 2020, p.66). This introduces bias and implies that results of this study should not be generalized to rural areas. Having said this, greater insight to how changes in the LFPR may have affected income inequality for a majority of the US population during the selected time period is helpful to understand the present implications of changes in LFPR, and inform policy decisions.

The outlook of greater inequality stemming from an uneven economic recovery post-pandemic is concerning. Understanding whether or not jobless recoveries and inequality are directly correlated would allow policymakers and government officials to act accordingly, to address the most pressing needs of Americans in a way that allows for better adaptation to the rapid advances in technology while at the same time creates a social safety net that supports people yet maintains the incentive to find a job for those who are unemployed or discouraged. Structural changes would be necessary in order to prevent a large fraction of the population from permanently leaving the labor force and from furthering income inequality; these potentially include re-training programs for the unemployed and improvements to the schooling system, among other policies that will be discussed towards the end of the study.

II. Literature Review

The labor market, employment, and income inequality are widely studied in the labor economics literature. Before analyzing the relation between the LFPR and income inequality, it is useful to understand the factors that have contributed to the ongoing drop in the LFPR. There is consensus that major decreases in the LFPR have not been driven by the business cycle, but rather, by a combination of secular factors, labor demand and supply factors (Krueger, 2017, p.31). One of the main reasons for this decline is an aging population. As baby boomers reach retirement age, the LFPR has continued to decline consistently. Some estimates suggest that the aging population accounts for around 50% of the decline in the LFPR (Krueger, 2017, p.7). Having said this, it is also worth looking beyond this cause for the decrease in the LFPR in order to analyze its potential implications for income inequality.

Both male and female workers have been susceptible to issues discouraging labor force participation like mass incarceration (Binder and Bound, 2019, p.170), physical ailments and the use of opioids (Krueger, 2017, p.49), and the impact of a greater degree of globalization and increased import competition (Wu, 2022, p.5). The literature reviewed focuses mostly on the effect of these factors on the male LFPR, given that men have experienced labor force exits at a higher rate than women. According to Elsby et al., the decline in LFPR of men without a 4-year college degree has been a key factor influencing the decline in the overall LFPR (Elsby et al., 2019, as cited in Wu, 2022). The decline in male LFPR accounts for around 25% of the decline in overall LFPR between 1997 to 2017 (Krueger, 2017, p.8). Despite the limitations of these estimates, they point to the relevance of understanding the sources of LFPR decline to understand the overall LFPR decline. The lower male LFPR has been concealed by the entry of women to the labor force until the 1990s, as women's LFPR has also declined since that decade for all education levels (Krueger, 2017, p.29). Issues particular to the US, such as lack of family-friendly policies and less flexibility in the workplace have discouraged women from participating more actively in the labor force, explaining almost 30% of the decrease in female LFPR between 1990 and 2010 (Blau and Kahn, 2013, as cited in Krause and Sawhill, 2017). This reversal of the previous positive trend in female participation implies that the economy cannot rely on women to occupy more places in the workforce as it has before. Other factors affecting the overall LFPR should be evaluated in order to understand their potential repercussions on income inequality.

One issue especially pertinent to men and their ability to participate in the labor force is mass incarceration. Mass incarceration decreases an individual's prospects of finding a job in comparison to another individual of similar characteristics but who has not been formerly incarcerated (Binder and Bound, 2019, p.180). Data from Harris County, Texas suggests that

one additional year of incarceration reduces the likelihood of finding employment after completing their term by 3.6 percentage points (Mueller-Smith, 2015, as cited in Binder and Bound, 2019, p.180). One factor that has greatly contributed to the rise of mass incarceration and racial bias against People of Color and Black people is the war on drugs in the 1970s and related policies, such as the Violent Crime Control and Safe Street Act sanctioned in 1994 (Giving Compass, 2022). The number of people incarcerated for nonviolent drug law offenses increased from 50,000 in 1980 to over 400,000 by 1997, i.e.: increased by 800% (Drug Policy, 2020), and since 1970, the total incarceration rate has increased by over 500% (ACLU, 2023). The Covid-19 pandemic prevented incarceration rates from rising more rapidly, but policy changes are needed to continue reducing mass incarceration (Alegria, 2023). Policies that further mass incarceration therefore have likely kept the LFPR lower than possible by way of decreasing likelihood of employment of formerly incarcerated individuals, and may have contributed to a worsening income inequality.

Increased physical ailments combined with higher rates of pain medication use have also likely impacted the LFPR. Within the group of men not in the labor force, nearly 43% report fair or poor health, and 31% of women not in the labor force report fair or poor health. These percentages are high in comparison to employed men and women, of whom only 16% and 11% report said health status respectively (Krueger, 2017, p.17). Relatively poorer health conditions have likely led to a rise in opioid prescriptions. According to Krueger (2017), almost half of prime-age men not in the labor force take pain medication, of whom around two-thirds take prescription medication. In spite of the rise in opioid pain medication prescriptions and usage, there has not been a clear decline in the percentage of men who report experiencing pain (Krueger, 2017, p.23). Studies show that the use of opioids to treat chronic pain may actually worsen pain through greater pain perception (Frieden and Houry, 2016, as cited in Krueger, 2017, p.43). This is particularly concerning, considering that the Covid-19 pandemic has accelerated the upward trend for drug use and overdose deaths in the United States (CDC, 2020). According to Krause and Sawhill (2017), LFPR for prime-age men is 15p.p. lower on average for the ten counties with the highest incidences of 'deaths of despair', a label used by Case and Deaton to describe deaths due to alcohol or drug poisoning, chronic liver disease and cirrhosis and suicide (Krause and Sawhill, 2017, p.6). While there is not necessarily a causal relation between a lower LFPR and higher mortality rates due to drug use, there is evidence to suggest that people not in the labor force report having worse health conditions (Krause and Sawhill, 2017, p.6). The relationship between physical pain, decreases in the LFPR and consumption of opioid-based medications is relevant for the potential impact of a lower LFPR on income inequality. More economically vulnerable populations are more susceptible to the negative consequences of opioid use and are less likely to have access to healthcare (Altekruse, 2020). This might impede more vulnerable groups from finding employment or participating in the labor force altogether, potentially perpetuating income inequality.

The rise in disability insurance stemming from experiencing pain and other physical and mental ailments is cited as a potential factor behind the lower LFPR (Binder and Bound, 2019, p.177). Estimates suggest that about half of all prime age men who are not in the labor force could have applied for disability insurance at some point (Krueger, 2017, p.28). Since the liberalization of the definition of disability in 1984, economists have argued that a higher number of disability insurance and Supplemental Security Income recipients may negatively affect the LFPR. Once people are certified as disabled, they are discouraged from rejoining the labor force, as this would cost them their disabled status and eligibility to receive disability insurance. However, studies have shown that this is unlikely to be a significant driver of a lower LFPR (Krause and Sawhill, 2017, p.21). Binder and Bound (2019) find that greater recipients of disability insurance explain "virtually none of the rise in nonparticipation among high school dropouts and little of the rise in nonparticipation among high school graduates (without college) below age 45".

Changes in social norms surrounding family structure appear to have modified incentives to participate in the labor force, potentially affecting income inequality as well. Binder and Bound (2019) argue that the prospects of starting and sustaining a family is an incentive for the labor supply, especially for men since gender stereotypes and the figure of the "male provider" still exist. The percentage of married men fell substantially between 1970 and 2015. Some factors behind this change include "greater access to contraception, liberalization of family law, changes in home production technology which have reduced gains from task

specialization within the household, and changes to how prospective partners match (for example, the rise of online dating)" (Binder and Bound, 2019, p.182). Autor, Dorn and Hanson (2018) have found that the negative effect of increased imports from China on the LFPR has discouraged marriage and increased the percentage of children living without their fathers. Upon dividing the working population into demographic groups by marital status, Binder and Bound (2019) find that the decline in LFPR within the group of currently married workers represents a minority of the observed decline across demographic groups. While this is not evidence of a causal relationship, it highlights the potential of greater income inequality through lower marriage rates and LFPR.

Having said this, other authors argue that assortative mating induces people of similar educational and work backgrounds to marry, potentially perpetuating income inequality. Greenwood et al. (2016) argue that the rise in the skill premium has increased income inequality and therefore a greater incentive to "match assortatively"– i.e.: marry someone within the same socioeconomic level. In this way, increases in marriage rates could actually further income inequality. Lower marriage rates could potentially decrease income inequality through less assortative matching. According to Greenwood et. al (2016), the forces behind lower marriage rates are "labor-saving technological progress in the home, a rise in the general level of wages, a widening in the college premium, and a narrowing of the gender wage gap". Consequently, non-economic reasons for marriage like love have gained greater importance with the entry of women in the labor force, which delays marriage to find a person that makes them happy and thus brings down marriage rates and increases divorce rates (Greenwood et al., 2016, p.36). Assortative mating can also represent an incentive to go to college, magnifying its effect on income inequality. These effects have the potential to contribute to the growth of income inequality.

Another factor impacting the LFPR is the increase in globalization and trade with countries that have a large supply of low-skilled workers. This is particularly damaging for men with low-skilled wages, as they have faced downward pressure from greater imports (Binder and Bound, 2019, p.167). Estimates from Baily and Bosworth suggest that manufacturing's share of GDP has remained stable during the past fifty years, yet 5.7 million jobs have been lost in this sector between 2000 and 2010 alone (Krause and Sawhill, 2017, p.11). There is evidence from increased competition from Chinese imports between 1990 and 2007/2011 which may have accounted for 18% of the decline in the male LFPR (Wu, 2022, p.5). Having said this, the pressure stemming from trade alone is argued to be an insufficient explanation for the decline in relative wages (Binder and Bound, 2019, p.167). Other studies estimate that the impact of increased trade on relative wages has been great on highly exposed communities, especially in the manufacturing sector, but moderate on the overall population (Autor et al., 2013 as cited in Binder and Bound, 2019, p.167). The effect of Chinese imports on the US labor market also seems to have decreased after 2007 and male LFPR has continued to go down after that period, suggesting that trade has lost explanatory power for workers quitting the labor market in 2023. Regardless of the exact measure of trade's effect on the LFPR, this phenomenon signals the potential for worsening income inequality through the loss of jobs in manufacturing and the greater wage dispersion due to foreign competition.

The factors mentioned so far that affect the LFPR in the US exist against the backdrop of increasingly sophisticated technologies. There is consensus among economists that automation and technological advances have been a greater source of LFPR decline than trade (Krause and Sawhill, 2017, p.12). Researchers from Ball State University found that 13% of manufacturing jobs were lost to trade, and the remaining 87% were lost due to improvements in technology (Krause and Sawhill, 2017, p.12). Structured environments like factories, where workers perform repetitive jobs, have been most susceptible to advances in technology. This is because technology has allowed for higher levels of productivity that do not require the hiring of more labor. Thus, skill-biased technology has helped increase the wage gap between people with high and low skills (Krause and Sawhill, 2017, p.13). Current technologies also have the potential to further automate tasks that are still carried out by human labor. Although less than 5% of existing positions could be completely carried out by technologies, around half of the tasks people perform in existing jobs have the potential to become automated (McKinsey Global Institute, 2017, as cited in Krause and Sawhill, 2017, p.13).

Goldin and Katz's model for skill-biased technological change (SBTC) argues that changes in technology are "factor-augmenting" in that they have raised the productivity of skilled workers more than the productivity of less skilled workers (Acemoglu and Restrepo,

2020, p.356). This can be explained due to technological change being skill-complementing for workers holding advanced degrees, and skill-replacing for workers without said degrees (Acemoglu, 2000, p.64). More recently, Acemoglu and Restrepo have expanded Goldin and Katz's model, since it did not provide an explanation for occupational trends in the labor market of advanced economies that have lost middle-skill jobs (Acemoglu and Restrepo, 2020, p.356). They consider how tasks are assigned to different factors of production (skilled labor, unskilled labor, and capital) and how new technologies change the tasks of production. Their results show that automation and new tasks can affect demand for skills and factor prices, including decline in wages for different types of workers, but only have a small effect on total factor productivity. This is because SBTC's impact on factor productivity has been dependent on task type and therefore has not been even across occupations (Acemoglu and Restrepo, 2020, p.360). The authors also find a robust relation between automation and new tasks with changes in relative demand for skills at the industry level. They conclude that automation has in fact driven the increase in the skill premium and the decline in real wages of less skilled workers (Acemoglu and Restrepo, 2020, p.361). Their research further supports the notion that technological change has increased income inequality.

Despite the negative effect of trade and automation on the LFPR, these changes could also lead to more job opportunities in newer sectors. Krause and Sawhill (2017) argue that there are benefits of technological developments for the economy, which have led to lower consumer prices and therefore greater demand. Trends evaluated by the Bureau of Labor Statistics in 2015 suggest that industries including home health care services, nursing and residential care facilities, food and drinking services and construction will experience the largest job growth (Krause and Sawhill, 2017). Moreover, methods to retrieve employment data are likely not able to capture temporary or odd jobs, which provide unreported income (e.g.: contract, temporary, "under-the-table" work). This means that the more people turn to sporadic, part-time and/or freelance work, the more likely polls may be overestimating the total number of individuals not in the labor force (Krause and Sawhill, 2017, p.22). Having said this, arguments pointing to technology as the culprit of decreases in the LFPR and income inequality are widespread and seem to counter the potential benefits stemming from these developments.

Differences in returns to skill stemming from differences in highest educational attainment underpin the effect of technological change on income inequality. Autor (2014) explains that skill premia change over time given the interaction between supply and demand of skills. He documents an increase in demand greater than an increase in supply of college-educated workers that are more likely to possess cognitive skills. This demand/supply imbalance has increased the return to education and almost doubled the earnings gap between workers with a 4-year college degree and workers with a high school diploma between 1979 and 2012, increasing wage inequality throughout the earnings distribution and not only for the top percentiles (Autor, 2014, p.844). According to Binder and Bound (2019), "between 1973 and 2015, real hourly earnings for the typical 25–54 year-old man with only a high school degree declined by 18.2 percent, while real hourly earnings for college-educated men increased substantially". Some causes for the fall in these wages have been advances in skill-biased technology, a higher degree of globalization, and the decline in bargaining power of labor unions. Lower real wages for less educated workers have also been accompanied by a decrease in the LFPR, particularly among non-college-educated workers (Autor, 2014, p.843). Krause and Sawhill (2017) also explain that a skills mismatch that could be leading to a higher skill-premium and income inequality, since levels of education for the overall workforce have never been higher in terms of schooling years. According to James Bessen the workforce does not lack cognitive skills, but rather on-the-job training for specific required skills (Krause and Sawhill, 2017, p.17). An analysis beyond trade, technology and education is needed for a more complete understanding of their effects and interactions.

Jaimovich and Siu (2018) address the continuing decline in the LFPR, even during economic recoveries, because of job polarization. Job polarization refers to the shift towards non-routine labor, which causes middle-skill routine occupations to gradually disappear and thus polarizes the job distribution towards high-skill and low-skill non-routine labor (Jaimovich and Siu, 2018, p.2). This is very problematic, since around 50% of total employment in 2018 consisted of middle-skill, routine jobs. Job polarization has accelerated since 1980, and the loss of middle-skill routine jobs has been concentrated during recessions (Jaimovich and Siu, 2018). Jaimovich and Siu prove that jobless recover-

ies during the three recessions prior to the one starting in 2020 were driven by the loss of these jobs, and not due to job losses in industries that rely more heavily on physical force, or that require lower educational attainment. According to the authors, educational attainment is better correlated with cognitive work rather than with non-routine work (Jaimovich and Siu, 2018, p.19). A big fraction of work that used to be manual has been replaced by technology, not because it was manual, but because it was routinely and replicable by machines.

Jaimovich and Siu use data for aggregate employment (all civilian non-institutionalized individuals, aged 16 and over, seasonally adjusted and normalized by population). The data shows that before the mid-1980s employment recovered "within two quarters of the turning point in aggregate output and income", yet employment continued to fall for 17 months during the 1991 recession, and for 23 months during the 2001 and 2008 recessions (Jaimovich and Siu, 2018, p.4). Further state-level data for the United States and data for a set of developed countries supports the authors' hypothesis. Moreover, wage growth has remained largely stagnant between 1979 and 2009 for middle-skill, blue-collar and clerical/sales male workers, in contrast to an increase of over 10% in wages for high-skill professional, managerial, and technical occupations and low-skill service occupations (Acemoglu and Autor, 2011, as cited in Wu, 2022, p.11). This implies that there is potential for job polarization to continue widening the wage gap and furthering income inequality. Decline in relative wages for workers in middle-skill occupations was also greater than for workers in high or low skill occupations, which according to Wu discourages labor force participation (Wu, 2022, p.11).

One of the consequences from skill-biased technology and the rise in skill-premia for cognitive, non-routine work is greater wage dispersion. Autor et al. (2017) analyze this issue in the context of a decreasing share of GDP going to labor. They propose a "superstar firm" model that leads to a smaller number of firms concentrating profits with a low share of labor, leading to decreasing returns to labor. Most non-traded sectors have been affected by this process, but industries more exposed to import shocks have been the most susceptible to greater market concentration (Elsby et al., 2013, as cited in Autor et al., 2017, p.1). Autor et al. (2017) provide three main reasons for the decline in labor's share of GDP. The cost of capital relative to labor has fallen given lower prices of information and communication technologies (adjusting for quality). This change in relative costs has encouraged a movement towards capital adoption and away from labor. Production processes that require a fixed amount of overhead labor also encourage lower use of labor in industries that have a "winner take most" characteristic– those made up of a small number of firms controlling most of the market. Moreover, new technologies have increased "network effects", and firms that have been more successful at implementing new production processes have benefited from technological change (Autor et al., 2017, p.1). The authors also look at the correlation between industry concentration and changes in productivity, and find that industries that have become more concentrated have also experienced the greatest increase in productivity (Autor et al., 2017, p.5), and the largest fall in labor share (Autor et al., 2017, p.7). This trend implies that greater income inequality lies ahead unless stronger antitrust policy is implemented.

Economists have also studied the role of reservation wages in LFPR declines and the rise of income inequality. Wu (2022) evaluates the fall in the LFPR and increased wage dispersion in relation to the role of expected earnings relative to earnings of other individuals in the labor market. She concludes that "labor force exit rates decline with a worker group's expected earnings but increase with their reference earnings" (Wu, 2022, p.3). Reference earnings are defined as the "average earnings in a state across all prime-age workers" (Wu, 2022, p.3). The effect of relative earnings on the decision of whether to exit the labor force is present among non-Hispanic White men but not among non-Hispanic Black and Hispanic men. Eberstadt's findings paint a similar picture and show that the LFPR for prime-age men is consistently higher for foreign-born men compared to native-born men conditional on education (Krause and Sawhill, 2017, p.17), implying that the reservation wages for non-Hispanic White men are higher than those of non-Hispanic Black and Hispanic men. Wu (2022) also provides historical data as evidence for the negative relation between the relative earnings of a particular group of workers and changes in their LFPR. Her results are consistent with evidence from other studies that link relative earnings to job satisfaction, prospects of marriage, mental health, and productivity, which are also factors that may influence the decision to remain in the labor force or not (Wu, 2022, p.4). Evidence from Card et al. (2012) and Breza et al. (2018) support her argument since they find that a worker's perceived relative earnings raise job satisfaction and productivity respec-

tively, theoretically incentivizing labor supply (Wu, 2022, p.6). Her results suggest that changes in relative earnings and potentially social status stemming from it explain 44% of the growth in labor force exit among men without a college degree between 1980 and 2019 (Wu, 2022, p.31).

Changes in labor and capital income have also contributed to greater wage dispersion and income inequality. Hoffmann et al. (2020) find that the capital to labor income ratio has increased among high-earning individuals. Although capital income makes up a small fraction of total income, its distribution is more skewed than the distribution of labor income, and its increase has magnified the greater dispersion of overall income (Hoffmann et al., 2020, p.57). Returns to capital have gained significance after the year 2000, since "high-earning individuals increasingly have a higher fraction of their incomes coming from capital income" (Hoffmann et al., 2020, p.59). Still, labor income continues to be the main factor furthering income inequality, having accounted for most of its rise between 1980 and 2020 (Hoffmann et al., 2020, p.54), as variance in the labor-correlated component of capital income rises steadily over time (Hoffmann et al., 2020, p.59). The authors also explain that the combination of higher between-group income inequality, e.g.: between high and low educated workers, and higher within-group inequality, e.g.: greater inequality among those with a college degree have combined effects that worsened overall income inequality and wage dispersion (Hoffmann et al., 2020, p.). The authors conclude that regardless of the income source, the growth in inequality is closely related to education (Hoffmann et al., 2020, p.65).

Interestingly, Hall and Petrosky-Nadeau (2016) present a different thesis. Following their reasoning, a lower LFPR should not lead to worse income inequality, because they find that the driver behind a lower LFPR is the drop out of workers at the higher end of the income distribution (Hall and Petrosky-Nadeau, 2016, p.1). They use a probability model to compare labor force outcomes of people with different demographic characteristics. Results show that the decline in prime-age workers is uneven across the earnings distribution: the lowest quartile experienced a 0.8p.p. decrease in the LFPR, while the second and third quartiles fell 2.4p.p. and 3.2p.p. respectively, and the fourth quartile had a 2.0p.p. LFPR decline (Hall and Petrosky-Nadeau, 2016, p.2). This is reasonable, considering the greater share of income coming from capital for people at the higher end of the spectrum, and the heavier reliance on labor income of low-income populations as discussed in Hoffmann et al. (2020). However, it is worth noting that these results were most relevant for workers between 16 and 24 years old, while workers over 55 years old at the high end of the income distribution have increasingly participated in the labor force (Hall and Petrosky-Nadeau, 2016, p.4). Declines in LFPR of young individuals at the higher end of the spectrum may be a consequence of young people choosing to pursue a higher educational degree.

The US stands out in the world as the country with the largest decrease in LFPR, the highest measured return to skill (Autor, 2014, p.845), and the greatest degree of income inequality among G7 countries (Schaeffer, 2020). There are several factors behind the decline in the LFPR. Changes in leisure preferences, family structure, health, and access to healthcare as well as the increase of mass incarceration rates have affected labor supply tremendously. The greater degree of globalization has hurt US labor demand, as domestic workers cannot compete with low foreign wages. Technological and productivity improvements have also decreased labor demand in certain sectors, particularly manufacturing, and for middle-skill jobs performing repetitive tasks, resulting in greater job polarization. The literature suggests that if the downward trend in LFPR continues, income inequality could be exacerbated overtime, as fewer people will work in middle-income jobs, and more people will become recipients of high or low incomes. Whether there is causation between the two variables is unknown, but the potential link between LFPR and income inequality is worth evaluating.

III. Data Description

The present paper uses panel data corresponding to Metropolitan and Micropolitan Statistical Areas (MSAs) in the United States, spanning from 2005 to 2019. The two sources of the data are the NHGIS (National Historical Geographic Information System) and the US Census Bureau. The data is divided into three groups: 2005-2009 (Period 1), 2010-2014 (Period 2), and 2015-2019 (Period 3). Each group is defined by the average values for the selected variables during their respective time periods.[1] The first group contains

1 Note: data from the US Census Bureau for Period 1 presents a 5-year average ending in 2010 rather than in

953 observations of Metropolitan and Micropolitan statistical areas, the second contains 930 observations, and the third contains 938 observations. The number of observations is enough to avoid issues with degrees of freedom and is convenient for regression analysis. The present data selection has been chosen for this study because it is complete, it provides insight on the US labor market and income inequality and allows for more detailed analysis than data for larger observational levels.

The dependent variables in this study are the Gini Index, and the Top 5% income share, both measuring the degree of income inequality in MSAs. The main independent variable is the labor force participation rate (LFPR). The LFPR has been chosen as a proxy for jobless recoveries– the more jobless a recovery is, the more jobs will be lost permanently and the greater the quantity of discouraged workers, decreasing the LFPR. A lower LFPR over time potentially signals a slower recovery in employment and a greater likelihood of experiencing a jobless recovery. Similarly, changes in the employment rate may affect income inequality, insofar as employment (labor) is the main source of income for workers in the US (Autor et al., 2017). This variable does not necessarily account for the changing earnings distribution, but it is worth evaluating the relationship between employment and income inequality.

In order to test the hypothesis, the following control variables are included: per capita income, which has been modified by taking its natural logarithm in order to normalize it; the percentage of households with income below the poverty line during the past 12 months; the percentage of households with public assistance income; educational attainment, measured as the percentage of the population aged between 25 and 64 who have completed a Bachelor's degree or higher; sex, measured as the percentage of the population that is female; marital status, measured as the percentage of the population that is married; and race, measured as the percentage of the population that is White. These variables all potentially affect income inequality– particularly, it is expected that the greater the percentage of households below the poverty line, the greater the degree of income inequality (McKnight, 2019, p.20). Marital status also has the potential to magnify income inequality through assortative matching, i.e.: people get married within the same socioeconomic level (Greenwood et al., 2016). Marriage between two high-earning individuals boosts their household income, further polarizing the earnings distribution and increasing income inequality.

Conversely, the greater the percentage of households that are recipients of public assistance income, the lower income inequality that is expected. If more people receive supplemental income from the government, this could help mitigate the earnings gap between those at the very low and high end of the earnings distribution. The higher the level of educational attainment could also be negatively correlated with income inequality, as it allows people to gain a higher skill-premium. If a majority of the population has a higher education degree, this could imply that there will be less income inequality in that MSA. This may not necessarily be the case, given within-group income inequality (e.g.: between people with college degrees), so the inclusion of this variable would help test this relationship (Hoffmann et al., 2020). Lastly, minority groups often have fewer opportunities to obtain high-paid jobs, whether that be due to discrimination or because they are trapped in a poverty cycle, therefore sex and race have been included to control for these differences.[2]

Overall, the data collected has several strengths; namely it is complete, it contains sufficient observations to build a strong model, and is disaggregated in detail. The substantial degree of disaggregation can prove to be useful to conduct further analysis regarding income inequality and jobless recoveries. However, the data consists of averages over the corresponding five years of each period, and this could reduce the visibility of changes in the variables occurring within each period. Data for the proportion of discouraged workers at the MSA level could not be found, and this would have been useful in order to assess the extent to which slow recoveries in employment and job polarization affect the quantity of discouraged workers, and to test whether the number of discouraged workers affects income inequality on its own. Still, the data is largely useful and presents more advantages than limitations for this analysis.

2009, and a 5-year average ending in 2015 rather than in 2014 for Period 2.

2 Note: only an indicator for "White" has been included in the regression for race, in order to account for differences between White people and People of Color, and to simplify the analysis.

The descriptive statistics for the data can be found in the Appendix. Two tables of descriptive statistics have been included: Table 1, corresponding to Period 1 (2005-2009), and Table 3, corresponding to Period 3 (2015-2019). These periods will be the focus of this study because they are the furthest apart in time and will show the most variability. Some interesting characteristics of the data are the decrease in the average LFPR (62.01% to 59.61%) and the increase in the average employment rate (91.81% to 94.36%), which could both be a consequence of the increase in discouraged workers and the slow recovery in employment during and after the Great Recession; the increase in the average percentage of the population pursuing a Bachelor's degree or higher (22.08% to 24.11%); and the increase in the maximum percentage of households that are recipients of public assistance income (10.77% to 25.31%).[3] The average percentage of households that have received income below the poverty line in the past 12 months, which is around 15.50% for both Period 1 and Period 3. The average Gini Index remained stable between the two periods around 0.45, yet the average income share of the top 5% increased from 19.95% to 21.13%. Racial composition remained stable between the two periods, and so did the percentage of men and women. Next, the Appendix contains two correlation tables for each period. These show the negative relationship between the Gini Index and the LFPR– Period 1 presents a correlation of -0.356 for these two variables, and Period 3 a correlation of -0.320. The relation between the LFPR and the income share of the Top 5% is also negative, with coefficients of -0.170 and -0.193 for Period 1 and Period 3 respectively. The appendix also contains histograms for the distribution of the LFPR and the Gini Index, as well as a scatterplot showing the effect of a change in the LFPR on the Gini Index. The distributions of the Gini Index for Period 1 and for Period 3 are skewed right in both cases, with a peak between 0.42 and 0.44 during Period 1, and a slightly higher peak for Period 3, between 0.44 and 0.46. Meanwhile, the distribution for the LFPR is skewed left, with peaks between 60 and 65 for both periods. Lastly, two scatterplots present the negative relation between the Gini Index and the LFPR, illustrated by the line of best fit and consistent with the correlation tables, suggesting that a higher LFPR is associated with a reduction in income inequality, measured as the Gini Index value. Further analysis will tell whether this conclusion is significant or not.

IV. Hypothesis and Econometric Model

My hypothesis is that a lower LFPR increases income inequality, measured by the Gini Index and the income share of the top 5% in American MSAs. In other words, when the LFPR decreases in a given MSA, it is expected that the Gini Index and the income share of the top 5% will increase within that MSA.[4] This is because a smaller LFPR could signal an increase in discouraged workers and because it indicates that less people are receiving income, either in the form of wages or unemployment benefits. The logic behind my hypothesis stems from Jaimovich and Siu's paper concerning job polarization, discussed in the literature review. The authors explain that jobless recoveries and job polarization occur due to the loss of middle-skill, routine jobs. The consequent increase in unemployment duration, as seen in the past three recessions prior to the pandemic, increases the likelihood of people dropping out of the labor force due to skill depreciation, discouragement, and/or unemployment benefits disincentivizing job seeking and finding. Therefore, it seems that jobless recoveries have the potential to increase income inequality through the reduction of the LFPR.

In addition, employment is included in this study as a control variable for the models. Similar to the LFPR, the more individuals that are employed, the more people that will receive regular income in the form of wages. In this way, employment could "cap" the degree of income inequality– a better employment rate indicates that less people are receiving no or very low income, which would worsen income inequality greatly. Having said this, LFPR and employment fail to address how income is distributed among those within the labor force and among those who are employed. To illustrate, a worker at a fast food restaurant will make significantly less money than an investment banker, hence the shortcoming of using the variables LFPR and employment as the sole determinants of income inequality.

Further control variables are necessary to test

3 Note: These figures correspond to MSAs in Puerto Rico.

4 Note: For this section, the values for the Gini Index have been multiplied by 100 so they range from 0 to 100, in order to obtain larger coefficients that are easier to interpret.

of sex, marital status, and race on income inequality. Controlling for these three variables accounts for the existence of gender-based and race-based discrimination, and for the effect of marital status as a form of "insurance" at the household level. All in all, the inclusion of the present control variables is relevant in order to avoid neglecting other important determinants of income inequality, which may bias the estimates of the regression coefficients in my models.

The economic models obtained from conducting a fixed-effect regression on the panel data for the selected variables are the following:

y1=10.78 - 0.0837x1 + 0.06x2 + 0.373x3 + 3.01x4 - 0.116x5 + 0.0676x6 + 0.0237x7 - 0.0645x8 - 0.0247x9

y2=-2.685 - 0.0544x1 + 0.0734x2 + 0.137x3 + 2.433x4 - 0.00986x5 + 0.028x6 - 0.0447x7 - 0.0581x8 - 0.0295x9

where:

y1 = Gini Index
y2 = Top 5% Income Share
x1 = LFPR
x2= Employment Rate
x3 = Households Below Poverty Line
x4 = Per Capita Income
x5 = Households with Public Assistance Income
x6= Educational Attainment
x7 = Sex
x8 = Marital Status
x9 = Race

V. Empirical Findings and Policy Implications

The results of the two fixed-effect regressions are displayed in the following two tables.

Table 5. Fixed-Effect Regression results for Income Inequality and Labor Force Participation Rate

	(1) Gini Index	(2) Gini Index	(3) Gini Index	(4) Gini Index	(5) Gini Index	(6) Gini Index	(7) Gini Index	(8) Gini Index	(9) Gini Index
LFPR	-0.322***	-0.286***	-0.173***	-0.0875***	-0.101***	-0.109***	-0.108***	-0.0847***	-0.0837***
	(0.0197)	(0.0210)	(0.0227)	(0.0249)	(0.0245)	(0.0244)	(0.0241)	(0.0233)	(0.0233)
Employment Rate		0.0878***	0.206***	0.102***	0.0954***	0.0688**	0.0693**	0.0621**	0.0600**
		(0.0224)	(0.0257)	(0.0272)	(0.0268)	(0.0270)	(0.0271)	(0.0265)	(0.0265)
Households Below Poverty Line (%)			0.307***	0.375***	0.384***	0.392***	0.393***	0.377***	0.373***
			(0.0283)	(0.0274)	(0.0268)	(0.0266)	(0.0262)	(0.0270)	(0.0273)
Per Capita Income (log)				3.739***	3.694***	3.421***	3.398***	3.066***	3.010***
				(0.569)	(0.559)	(0.558)	(0.572)	(0.573)	(0.569)
Households with Public Assistance Income (%)					-0.123***	-0.113***	-0.112***	-0.113***	-0.116***
					(0.0393)	(0.0387)	(0.0386)	(0.0384)	(0.0388)
Educational Attainment: Bachelor's Degree or Higher (%)						0.0617***	0.0628***	0.0693***	0.0676***
						(0.0194)	(0.0199)	(0.0200)	(0.0199)
Female (%)							-0.0346	0.0285	0.0237
							(0.0876)	(0.0869)	(0.0866)
Married (%)								-0.0656***	-0.0645***
								(0.0192)	(0.0190)
White (%)									-0.0247**
									(0.0118)
Constant	64.25***	53.93***	31.25***	-3.180	-1.076	3.068	4.860	7.753	10.78
	(1.194)	(2.765)	(3.504)	(5.837)	(5.824)	(6.042)	(8.419)	(8.299)	(8.540)
Observations	2820	2820	2820	2819	2819	2819	2819	2818	2818
R^2	0.182	0.195	0.284	0.369	0.375	0.380	0.380	0.387	0.389
Adjusted R^2	0.182	0.194	0.283	0.368	0.373	0.378	0.378	0.385	0.387
F	267.8	131.2	121.1	131.8	128.6	119.6	104.5	100.7	91.51
rmse	1.056	1.049	0.989	0.929	0.925	0.921	0.921	0.915	0.914

Note 1: Robust standard errors are displayed in parenthesis.
Significance levels: * p<0.10, ** p<0.05, *** p<0.01
Source: Steven Manson, Jonathan Schroeder, David Van Riper, Tracy Kugler, and Steven Ruggles. IPUMS National Historical Geographic Information System: Version 15.0 [dataset]. Minneapolis, MN: IPUMS. 2020; U.S. Census Bureau

The results support the hypothesis that a decrease in the LFPR increases income inequality– the coefficient for x1 in Model 1 is -0.0837 and is statistically significant at the 1% level. That is to say that a decrease of 1p.p. in the LFPR increases the Gini Index by 0.0837 on a scale of 0 to 100. The coefficient for x1 in Model 2 is -0.0544 and is statistically significant at the 10% level. In other words, a decrease of 1p.p. in the LFPR increases the income share of the top 5% by 0.0544p.p. If the LFPR is indeed a good proxy for jobless recoveries, given that it accounts for the increase in labor force exits following a slow recovery in employment due to middle-skill job losses, the results also suggest that jobless recoveries further income inequality.

Having said this, the employment rate has the opposite effect on income inequality than the expected one– an increase in the employment rate of 1p.p. leads to an increase in the Gini Index of 0.06, and an increase in the income share of the top 5% of 0.0734p.p. Both coefficients for the employment rate are statistically significant at the 5% level. This relationship between employment and income inequality holds even when the LFPR is dropped. The reason behind the positive relationship between employment and income inequality is possibly the difference in job types available in the labor market. It seems that the greater the employment rate, the more varied the jobs that people will work in. The greater this variety, the more likely that there will be higher and lower-paid jobs, greater wage dispersion and income inequality. The fact that people continue to be employed even in the face of job polarization suggests that a higher employment rate will not necessarily reduce income inequality, because the type of jobs that are available are increasingly different in terms of how much they pay.

The effect of income per capita on income inequality is similar to that of employment– the richer a MSA is the greater the income inequality. An increase in per capita income of 100% increases the Gini Index by 3.01 and increases the income share of the top 5% by 2.433 p.p. These results are statistically significant at the 1% level and are of practical significance, as they evidence the increasingly unequal distribution of gains from economic growth, which are in part a consequence of improved skill-biased technologies and differences in task types at work. Moreover, the greater the percentage of households with income in the past 12 months below the poverty line, the higher the Gini Index and the higher the income share of the top 5%: an increase of 1p.p. in the percentage of houses with income below the poverty line during the past 12 months increases the Gini Index

Table 2. Summary Statistics: Metropolitan/Micropolitan Statistical Area Data (2015-2019)

	Mean	SD	Skewness	Min	p5	p25	p50	p75	p95	Max
Gini Index	0.45	0.03	0.44	0.38	0.41	0.43	0.45	0.47	0.51	0.59
Top 5%	21.13	2.35	0.64	14.51	17.54	19.59	21.04	22.52	25.21	31.04
Labor Force Participation Rate (%)	59.61	6.93	-0.72	22.47	47.89	55.59	60.13	64.33	70.12	79.12
Employment Rate (%)	94.36	2.30	-2.29	75.72	90.78	93.46	94.70	95.79	97.08	98.58
Households Below Poverty Line (%)	15.53	6.44	2.66	4.52	8.57	11.61	14.28	17.93	25.97	61.55
Households Recipients of Public Assistance Income (%)	2.43	1.71	5.98	0.21	0.97	1.53	2.08	2.91	4.54	25.31
Per Capita Income in the Past 12 Months (2019 dollars)	28105.35	6159.97	0.72	7308.00	19198.00	24301.00	27469.00	31198.00	38725.00	60746.00
Bachelor's Diploma and Higher (%)	24.11	8.95	1.04	7.29	13.02	17.45	22.14	29.20	41.00	67.41
Married (Except Separated) (%)	49.69	5.33	-0.55	27.88	39.86	46.55	50.15	53.31	57.82	62.99
Female (%)	50.27	1.71	-2.70	34.03	47.43	49.69	50.55	51.21	52.21	53.92
White (%)	81.59	14.39	-1.50	14.39	52.48	75.33	86.38	92.23	96.23	97.77
Black or African American (%)	9.28	12.70	2.22	0.00	0.51	1.38	3.77	11.52	37.33	77.62
American Indian (%)	1.38	4.47	9.29	0.00	0.07	0.22	0.38	0.86	4.61	75.90
Asian (%)	1.92	3.16	6.80	0.00	0.22	0.61	1.03	2.05	5.91	42.66
Hispanic or Latino (%)	13.49	19.00	2.72	0.07	1.52	3.04	6.23	13.97	56.89	99.75
Observations	938									

Source: Steven Manson, Jonathan Schroeder, David Van Riper, Tracy Kugler, and Steven Ruggles. IPUMS National Historical Geographic Information System: Version 15.0 [dataset]. Minneapolis, MN: IPUMS. 2020
US Census Bureau

by 0.373 over 100, and the income share of the top 5% by 0.137. Both coefficients are also significant at the 1% level. This is consistent with the initial hypothesis that links poverty and income inequality, and implies that poverty reduction initiatives are necessary to help decrease income inequality in US MSA's.

Similarly, a greater percentage of households that receive public assistance income helps reduce the Gini Index– an increase of 1p.p. in the percentage of households with public assistance income reduces the Gini index by 0.116– yet it does not have a statistically significant effect on the income share of the top 5%. Additionally, supporting the findings of the literature, the higher the percentage of people with a Bachelor's degree and the higher t, the higher the degree of job polarization and the greater the degree of income inequality, measured by the Gini Index. An increase of 1p.p. in the percentage of people obtaining a Bachelor's degree or higher increases the Gini Index by 0.0676, and this coefficient is significant at the 1% level. This is likely because higher educational attainment for a relatively small fraction of the population increases their skill premium, while lower-income workers have the same or even lower wages. However, educational attainment is not a significant determinant of the income share of the top 5%. This can be explained by the fact that once a certain educational level is attained, other factors play a role in determining income, and what share of the total income goes to the Top 5%.

Moving on to marital status, this variable reduces the Gini Index for households: an increase of 1p.p. in the percentage of the population that is married reduces the Gini Index by 0.645 and is significant at the 1% level, while the same increase in the percentage of the population that is married reduces the income share of the top 5% by 0.0581p.p and is significant at the 5% level. This implies the opposite effect of assortative matching discussed in the literature review, and rather presents marriage as a form of "insurance" income for the spouse that exited the labor force or is unemployed.

Furthermore, results suggest that sex does not have an effect on income inequality, and the likely reason for this result in my model is that most MSAs have the same proportion of women and men, around 50% each. The lack of variability is a disadvantage in this case. Finally, race has a significant effect on income inequality, and the data evidences the existence of racial inequality in terms of income. A 1p.p. increase in the percentage of White people is accompanied by a 0.0247 lower Gini Index, and this coefficient is significant at the 5% level. Also, a 1p.p. increase in the percentage of White people reduces the income share of the top 5% by 0.0295 p.p., and this effect is statistically significant at the 10% level. In other words, the greater the percentage of White people in an MSA, the less income inequality that it will experience. Conversely, the greater the proportion of People of Color, the greater inequality experienced by a MSA. These results are concerning because they not only point to the unequal gains from economic activity, but also highlight racial disparity in terms of income.

As previously mentioned in the Data section, a shortcoming of the model is the lack of data at the MSA level for variables such as unemployment measures that include discouraged workers like U-4, technological development, and degree of globalization. This may bring forth issues of omitted variable bias, and my models would be overestimating the explanatory power of LFPR in determining income inequality. The results of this study confirm the negative relationship between the LFPR and income inequality, and suggest that jobless recoveries indeed have the potential to worsen the already increasing income inequality. One important policy implication of this analysis is that the US government should be mindful of the evolution of the LFPR during periods of economic recovery, especially since the longer unemployment duration is, the more likely that part of the workers who have lost their jobs will drop out of the labor force. This could worsen income inequality in metropolitan and micropolitan areas, and continue to polarize society.

The literature suggests different strategies to help prevent the continuation of the downward trend in LFPR, like providing better parental leave support, addressing the issue of mass incarceration and fighting the opioid crisis. The particular focus of the present analysis is set on jobless recoveries. Since they have been largely caused by the loss of routine, middle-skill jobs, due to advances in technology and higher skill-premia, policy suggestions in these areas may provide more effective solutions. For example, retraining unemployed workers in non-routine jobs can help mitigate the potential consequences of jobless recoveries and avoid decreases in the LFPR. Evidence in favor of this stems from the potential "skills mismatch" described in the literature. The gap between the skills employers seek and those that employees provide

could be improved through training programs that align organizational and worker needs.

Beyond this, providing better and more updated education from a younger age seems crucial to avoid further income inequality. A revision of school curricula geared towards the promotion of analytical and STEM-focused education could lead to greater interest in cognitive and non-routine jobs, rather than manual and routine, and help mitigate income inequality. Finally, the changes brought about by skill-biased technology and job polarization have made higher levels of educational attainment more necessary. Having said this, the cost of education in the United States is very high and not affordable for everyone, and income inequality cannot be improved solely by providing better education. If the educational system is not capable of providing fair and quality instruction from a young age and for a wide sector of the population, inequality will inevitably continue to rise. Therefore, introducing an additional tax for the Top 5% income earners with the purpose of funding educational initiatives would help mitigate income inequality in a more straightforward way and would promote greater opportunities and equality for those who want to progress.

References

Acemoglu, Daron.(2002). Technical Change, Inequality, and the Labor Market. Journal of Economic Literature, 40 (1): 7-72. DOI: 10.1257/0022051026976

Acemoglu, D., & Restrepo, P. (2020). Unpacking skill bias: Automation and new tasks. AEA Papers and Proceedings, 110, 356–361. https://doi.org/10.1257/pandp.20201063

Alegria, M. (2022, June 13). Criminal justice overview: Mass incarceration. Giving Compass. Retrieved March 23, 2023, from https://givingcompass.org/topics/criminal-justice/criminal-justice-overview-mass-incarceration?landingPage=%2Ftopics%2Fcriminal-justice

Mass incarceration. American Civil Liberties Union. (2022, February 15). Retrieved March 23, 2023, from https://www.aclu.org/issues/smart-justice/mass-incarceration#:~:text=Since%201970%2C%20ur%20incarcerated%20population,outpacing%20population%20growth%20and%20crime

Altekruse, S. F., Cosgrove, C. M., Altekruse, W. C., Jenkins, R. A., & Blanco, C. (2020). Socioeconomic risk factors for fatal opioid overdoses in the United States: Findings from the mortality disparities in American Communities Study (MDAC). PLOS ONE, 15(1). https://doi.org/10.1371/journal.pone.0227966

Autor, D. H. (2014). Skills, education, and the rise of earnings inequality among the "other 99 percent". Science, 344(6186), 843–851. https://doi.org/10.1126/science.1251868

Autor, D., Dorn, D., Katz, L. F., Patterson, C., & Reenen, J. V. (2017). Concentrating on the fall of the Labor share. American Economic Review, 107(5), 180–185. https://doi.org/10.1257/aer.p20171102

Binder, A. J., & Bound, J. (2019). The declining labor market prospects of less-educated men. Journal of Economic Perspectives, 33(2), 163–190. https://doi.org/10.1257/jep.33.2.163

Bishaw, A., & Posey, K. G. (2016, December 8). A comparison of rural and Urban America: Household Income and Poverty. The United States Census Bureau. Retrieved March 23, 2023, from https://www.census.gov/newsroom/blogs/random-samplings/2016/12/a_comparison_of_rura.html#:~:text=The%20poverty%20rate%20for%20people,rural%20households%20than%20urban%20households

Centers for Disease Control and Prevention. (2020, December 18). Overdose deaths accelerating during COVID-19. Centers for Disease Control and Prevention. Retrieved March 23, 2023, from https://www.cdc.gov/media/releases/2020/p1218-overdose-deaths-covid-19.html

Drug Policy Alliance. (2022). A history of the Drug War. Drug Policy Alliance. Retrieved March 23, 2023, from https://drugpolicy.org/issues/brief-history-drug-wa

Glaeser, E. (2014, August 11). Secular joblessness. CEPR. Retrieved March 23, 2023, from https://cepr.org/voxeu/columns/secular-joblessness

Gordon, R. J. (2010). Okun's law and Productivity Innovations. American Economic Review, 100(2), 11–15. https://doi.org/10.1257/aer.100.2.11

Gregory, V., & Steinberg, J. (2021, December 9). Labor force exits and COVID-19: St. Louis Fed. Saint Louis Fed Eagle. Retrieved March 23, 2023, from https://www.stlouisfed.org/on-the-economy/2021/october/labor-force-exits-covid19

Hall, R., & Petrosky-Nadeau, N. (2016, February 1). Changes in labor participation and household income. San Francisco Fed. Retrieved March 23, 2023, from https://www.frbsf.org/economic-research/publications/economic-letter/2016/february/labor-force-participation-and-household-income/

Hoffmann, F., Lee, D. S., & Lemieux, T. (2020). Growing income inequality in the United States and other advanced economies. Journal of Economic Perspectives, 34(4), 52–78. https://doi.org/10.1257/jep.34.4.52

Jaimovich, N. and Siu, H.E.; Job Polarization and Jobless Recoveries. The Review of Economics and Statistics 2020; 102 (1): 129–147. DOI: https://doi.org/10.1162/rest_a_00875

Krause, E., & Sawhill, I. (2017, May). What we know and don't know about declining labor force participation: a review. The Brookings Institution. Retrieved March 24, 2023, from https://www.brookings.edu/wp-content/uploads/2017/05/ccf_20170517_declining_labor_force_participation_sawhill1.pdf

Krueger, A. B. (2017). Where have all the workers gone?: An inquiry into the decline of the U.S. labor force participation rate. Brookings Papers on Economic Activity, 2017(2), 1–87. https://doi.org/10.1353/eca.2017.0012

McKnight, A. (2019, July). Understanding the relationship between poverty, inequality: a review of existing evidence. Centre for Analysis of Social Exclusion. Retrieved March 24, 2023, from https://sticerd.lse.ac.uk/dps/case/cp/casepaper216.pdf

Schaeffer, K. (2021, May 27). 6 facts about economic inequality in the U.S. Pew Research Center. Retrieved March 23, 2023, from https://www.pewresearch.org/fact-tank/2020/02/07/6-facts-about-economic-inequality-in-the-u-s/#:~:text=Income%20inequality%20in%20the%20U.S.,for%20Economic%20Cooperation%20and%20Development

Steven Manson, Jonathan Schroeder, David Van Riper, Tracy Kugler, and Steven Ruggles. IPUMS National Historical Geographic Information System: Version 17.0 [dataset]. Minneapolis, MN: IPUMS. 2022. http://doi.org/10.18128/D050.V17.0

Wu, P. (2022). Wage inequality and the rise in labor force exit: The case of US prime-age men. Federal Reserve Bank of Boston Research Department Working Papers. https://doi.org/10.29412/res.wp.2022.16

Table 2. Summary Statistics: Metropolitan/Micropolitan Statistical Area Data (2015-2019)

	Mean	SD	Skewness	Min	p5	p25	p50	p75	p95	Max
Gini Index	0.45	0.03	0.44	0.38	0.41	0.43	0.45	0.47	0.51	0.59
Top 5%	21.13	2.35	0.64	14.51	17.54	19.59	21.04	22.52	25.21	31.04
Labor Force Participation Rate (%)	59.61	6.93	-0.72	22.47	47.89	55.59	60.13	64.33	70.12	79.12
Employment Rate (%)	94.36	2.30	-2.29	75.72	90.78	93.46	94.70	95.79	97.08	98.58
Households Below Poverty Line (%)	15.53	6.44	2.66	4.52	8.57	11.61	14.28	17.93	25.97	61.55
Households Recipients of Public Assistance Income (%)	2.43	1.71	5.98	0.21	0.97	1.53	2.08	2.91	4.54	25.31
Per Capita Income in the Past 12 Months (2019 dollars)	28105.35	6159.97	0.72	7308.00	19198.00	24301.00	27469.00	31198.00	38725.00	60746.00
Bachelor's Diploma and Higher (%)	24.11	8.95	1.04	7.29	13.02	17.45	22.14	29.20	41.00	67.41
Married (Except Separated) (%)	49.69	5.33	-0.55	27.88	39.86	46.55	50.15	53.31	57.82	62.99
Female (%)	50.27	1.71	-2.70	34.03	47.43	49.69	50.55	51.21	52.21	53.92
White (%)	81.59	14.39	-1.50	14.39	52.48	75.33	86.38	92.23	96.23	97.77
Black or African American (%)	9.28	12.70	2.22	0.00	0.51	1.38	3.77	11.52	37.33	77.62
American Indian (%)	1.38	4.47	9.29	0.00	0.07	0.22	0.38	0.86	4.61	75.90
Asian (%)	1.92	3.16	6.80	0.00	0.22	0.61	1.03	2.05	5.91	42.66
Hispanic or Latino (%)	13.49	19.00	2.72	0.07	1.52	3.04	6.23	13.97	56.89	99.75
Observations	938									

Source: Steven Manson, Jonathan Schroeder, David Van Riper, Tracy Kugler, and Steven Ruggles. IPUMS National Historical Geographic Information System: Version 15.0 [dataset]. Minneapolis, MN: IPUMS. 2020
US Census Bureau

Table 1. Summary Statistics: Metropolitan/Micropolitan Statistical Area Data (2005-2009)

	Mean	SD	Skewness	Min	p5	p25	p50	p75	p95	Max
Gini Index	0.44	0.03	0.45	0.35	0.39	0.42	0.44	0.46	0.50	0.56
Top 5%	19.95	2.26	0.73	14.40	16.60	18.50	19.90	21.30	23.60	31.40
Labor Force Participation Rate (%)	62.01	6.55	-0.67	31.00	50.80	58.30	62.50	66.40	71.60	83.40
Employment Rate (%)	91.81	2.97	-1.90	69.80	86.70	90.60	92.20	93.60	95.60	98.50
Households Below Poverty Line (%)	15.81	6.95	2.48	4.17	8.28	11.50	14.33	18.17	28.13	60.27
Households Recipients of Public Assistance Income (%)	2.44	1.21	1.79	0.13	1.05	1.63	2.21	2.92	4.79	10.77
Per Capita Income in the Past 12 Months (2009 dollars)	22334.31	4747.40	0.54	6022.00	15794.00	19578.00	21901.00	24792.00	30319.00	48394.00
Bachelor's Diploma and Higher (%)	22.08	8.29	1.12	7.15	11.79	16.18	20.30	26.80	38.12	63.94
Married (Except Separated) (%)	52.78	5.51	-0.63	31.73	42.26	49.82	53.08	56.61	60.86	67.46
Female (%)	50.53	1.65	-2.91	34.74	47.97	50.04	50.81	51.42	52.32	54.93
White (%)	82.33	14.21	-1.42	15.50	53.60	75.36	86.65	93.31	96.91	98.71
Black or African American (%)	9.40	13.02	2.15	0.00	0.28	1.10	3.60	12.02	38.57	82.35
American Indian (%)	1.28	4.24	9.57	0.00	0.08	0.21	0.36	0.78	4.34	72.69
Asian (%)	1.55	2.88	7.95	0.00	0.16	0.50	0.84	1.67	4.45	43.40
Hispanic or Latino (%)	10.95	17.92	3.12	0.17	0.92	1.84	4.17	10.56	48.67	99.87
Observations	953									

Source: Steven Manson, Jonathan Schroeder, David Van Riper, Tracy Kugler, and Steven Ruggles. IPUMS National Historical Geographic Information System: Version 15.0 [dataset]. Minneapolis, MN: IPUMS. 2020
US Census Bureau

Table 4. Correlation Table for Metropolitan/Micropolitan Statistical Area Data (2015-2019)

	Gini Index	Top 5%	LFPR	Employment Rate	Households Below Poverty Line (%)	Households Recipients of Public Assistance Income (%)	Per Capita Income in the Past 12 Months (2019 dollars)	Bachelor's Degree and Higher (%)	Female (%)	Married (%)	White (%)
	b	b	b	b	b	b	b	b	b	b	b
Gini Index	1										
Top 5%	.702	1									
LFPR	-.320	-.193	1								
Employment Rate	-.454	-.167	.494	1							
Households Below Poverty Line (%)	.598	.227	-.543	-.709	1						
Households Recipients of Public Assistance Income (%)	.113	.0187	-.267	-.425	.374	1					
Per Capita Income in the Past 12 Months (2019 dollars)	-.143	.0800	.526	.534	-.747	-.236	1				
Bachelor's Degree and Higher (%)	.159	.195	.429	.322	-.309	-.119	.728	1			
Female (%)	.297	.203	.0318	-.126	.148	.00332	.0403	.117	1		
Married (%)	-.611	-.284	.316	.535	-.659	-.219	.373	-.0468	-.0591	1	
White (%)	-.464	-.234	.181	.478	-.416	-.0808	.176	-.000738	-.205	.586	1
N	937										

Sources: Steven Manson, Jonathan Schroeder, David Van Riper, Tracy Kugler, and Steven Ruggles. IPUMS National Historical Geographic Information System: Version 15.0 [dataset]. Minneapolis, MN: IPUMS. 2020 US Census Bureau

Table 3. Correlation Table for Metropolitan/Micropolitan Statistical Area Data (2005-2009)

	Gini Index	Top 5%	LFPR	Employment Rate	Households Below Poverty Line (%)	Households Recipients of Public Assistance Income (%)	Per Capita Income in the Past 12 Months (2009 dollars)	Bachelor's Diploma and Higher (%)	Female (%)	Married (%)	White (%)
	b	b	b	b	b	b	b	b	b	b	b
Gini Index	1										
Top 5%	.664	1									
LFPR	-.356	-.170	1								
Employment Rate	-.253	-.0997	.541	1							
Households Below Poverty Line (%)	.672	.264	-.526	-.511	1						
Households Recipients of Public Assistance Income (%)	.0784	-.0609	-.216	-.366	.328	1					
Per Capita Income in the Past 12 Months (2009 dollars)	-.215	.0519	.515	.412	-.761	-.286	1				
Bachelor's Degree and Higher (%)	.157	.183	.433	.307	-.246	-.167	.662	1			
Female (%)	.223	.124	.0817	-.0807	.149	.00419	-.0151	.0514	1		
Married (%)	-.599	-.246	.266	.348	-.578	-.201	.279	-.201	-.00437	1	
White (%)	-.442	-.216	.178	.329	-.359	-.0673	.176	.0659	-.0990	.549	1
N	951										

Sources: Steven Manson, Jonathan Schroeder, David Van Riper, Tracy Kugler, and Steven Ruggles. IPUMS National Historical Geographic Information System: Version 15.0 [dataset]. Minneapolis, MN: IPUMS. 2020 US Census Bureau

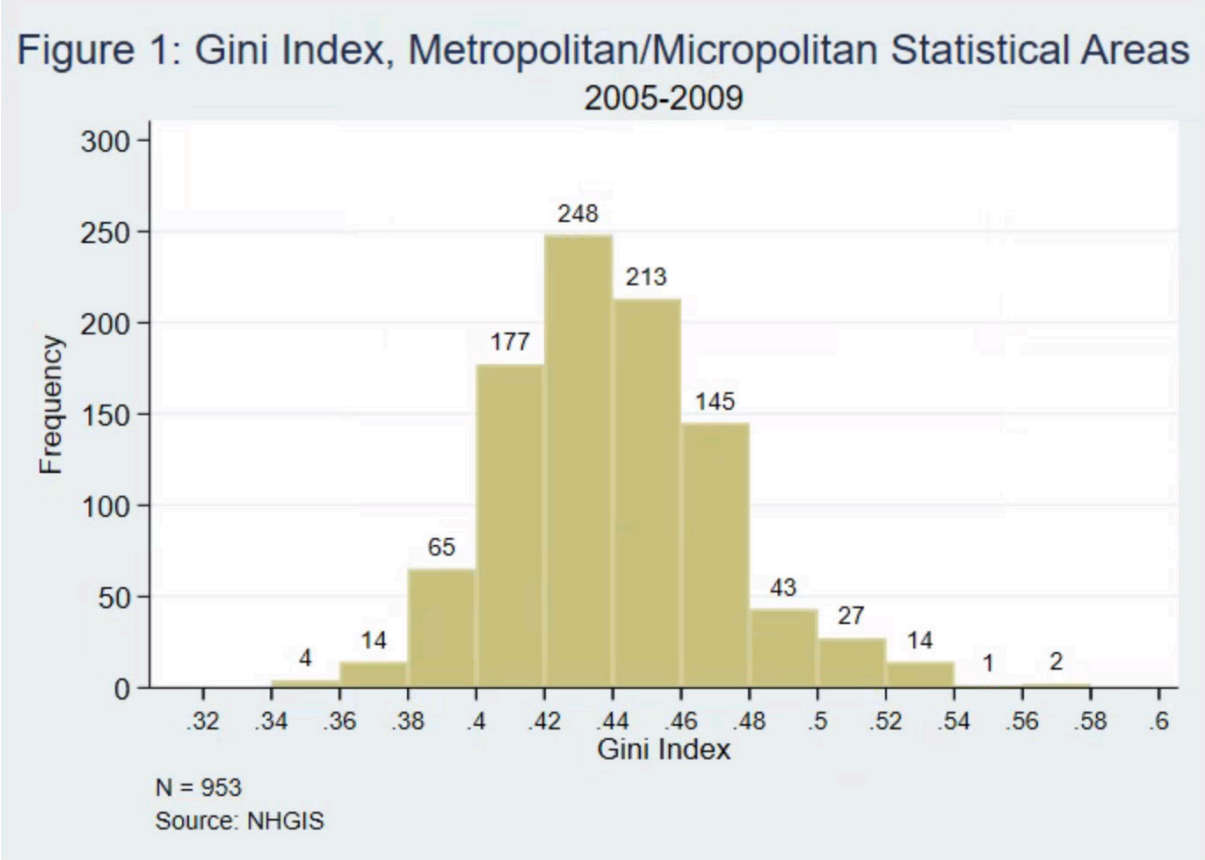


Figure 1: Gini Index, Metropolitan/Micropolitan Statistical Areas
2005-2009
Frequency
0
50
100
150
200
250
300
4
14
65
177
248
213
145
43
27
14
1
2
.32
.34
.36
.38
.4
.42
.44
.46
.48
.5
.52
.54
.56
.58
.6
Gini Index
N = 953
Source: NHGIS

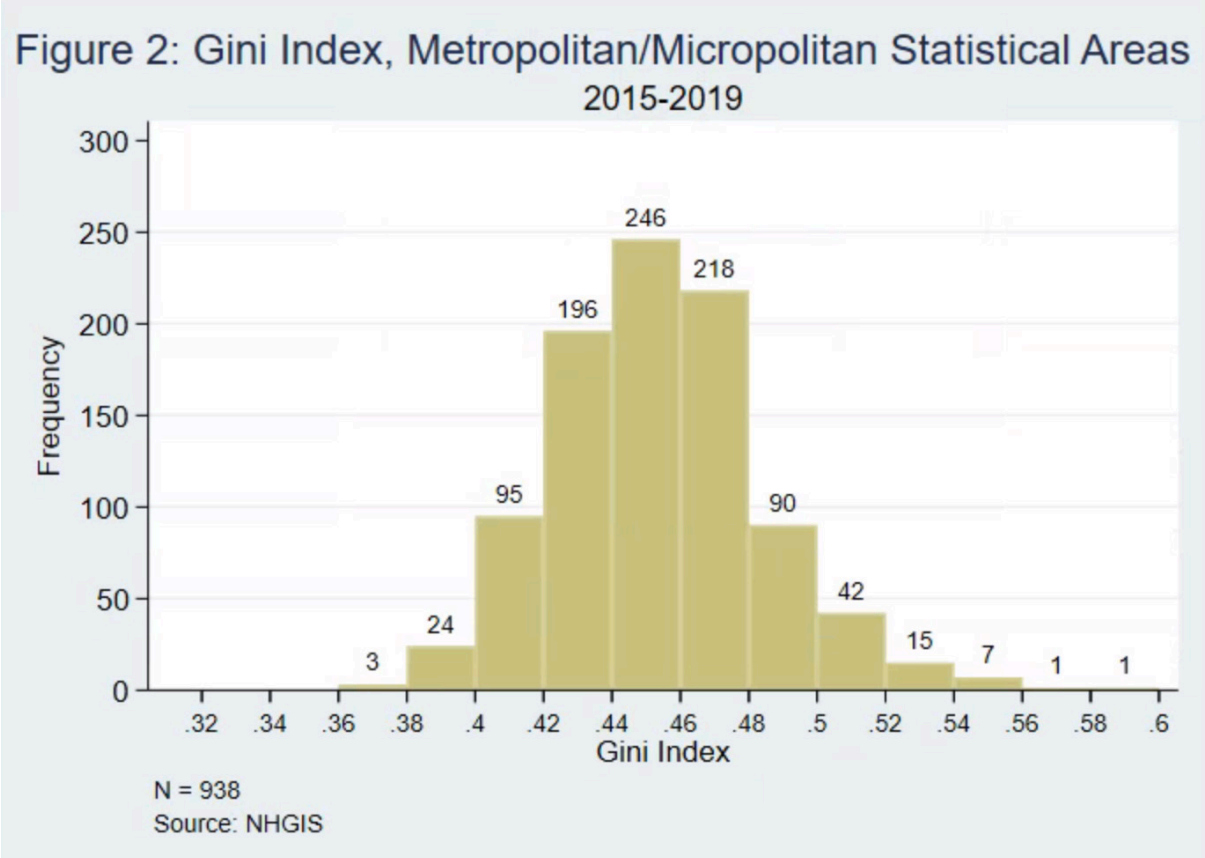


Figure 2: Gini Index, Metropolitan/Micropolitan Statistical Areas
2015-2019
Frequency
0
50
100
150
200
250
300
3
24
95
196
246
218
90
42
15
7
1
1
.32
.34
.36
.38
.4
.42
.44
.46
.48
.5
.52
.54
.56
.58
.6
Gini Index
N = 938
Source: NHGIS

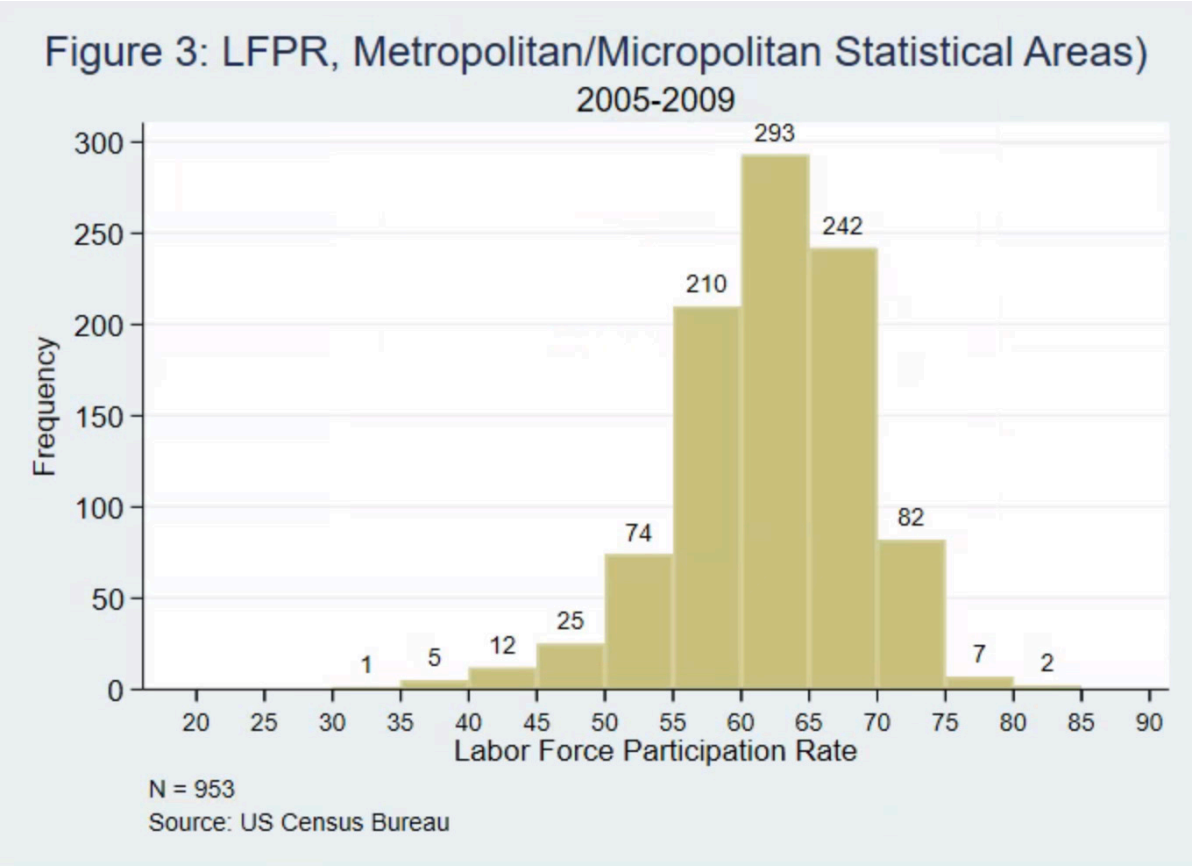


Figure 3: LFPR, Metropolitan/Micropolitan Statistical Areas)
2005-2009
Frequency
300
250
200
150
100
50
0
1
5
12
25
74
210
293
242
82
7
2
20 25 30 35 40 45 50 55 60 65 70 75 80 85 90
Labor Force Participation Rate
N = 953
Source: US Census Bureau

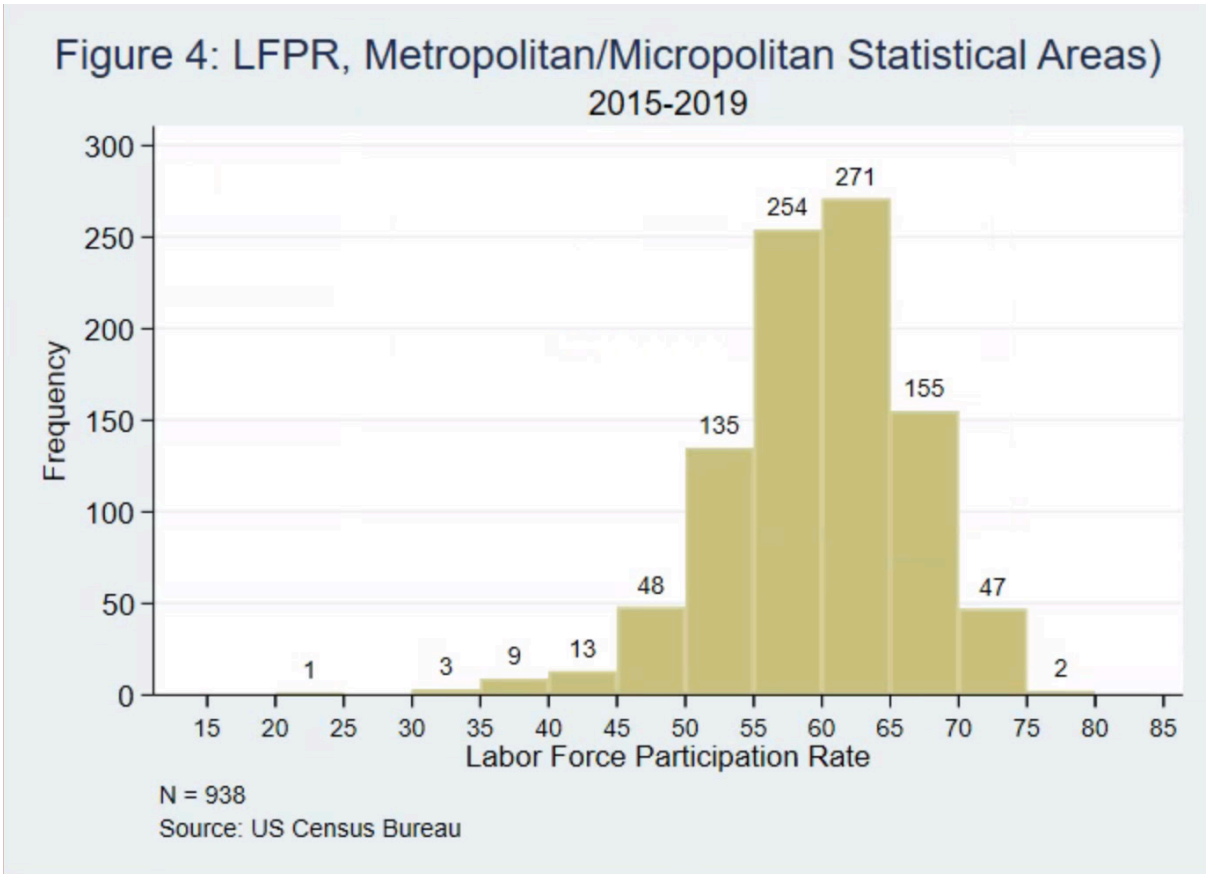
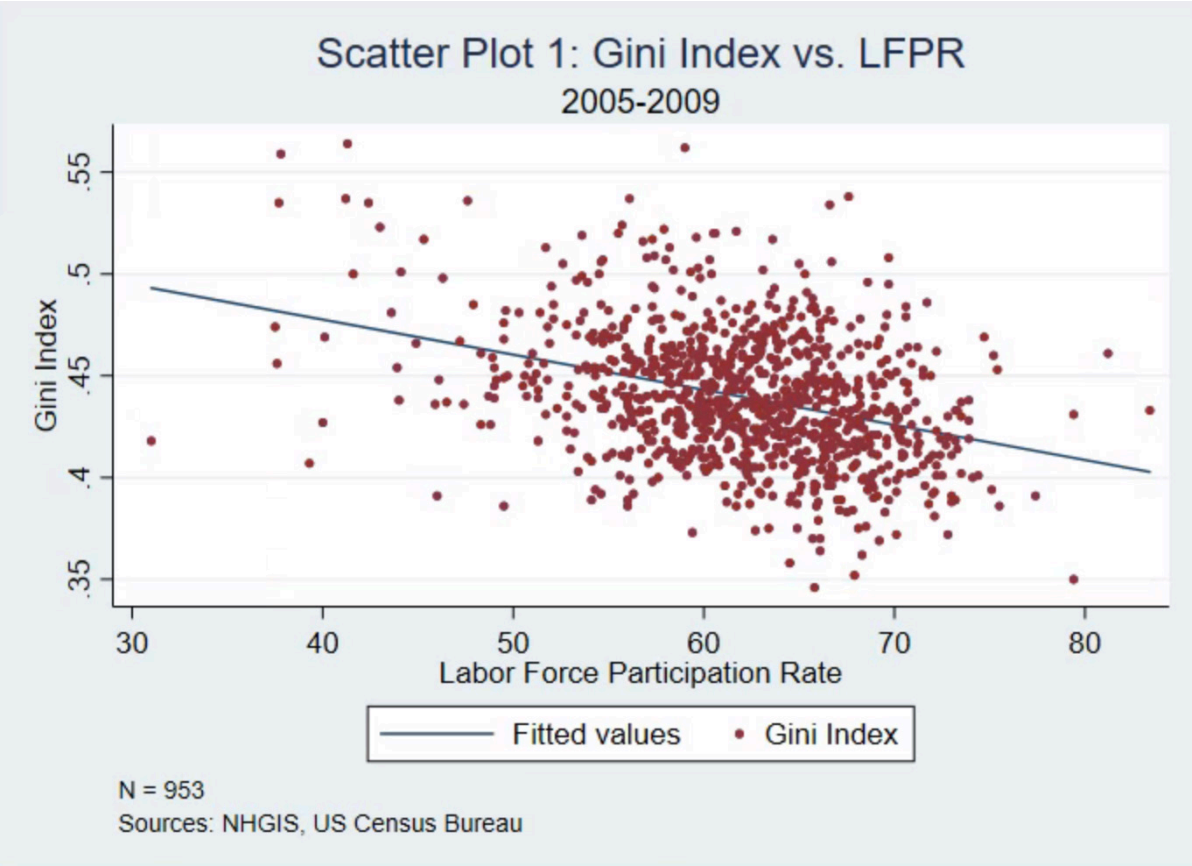
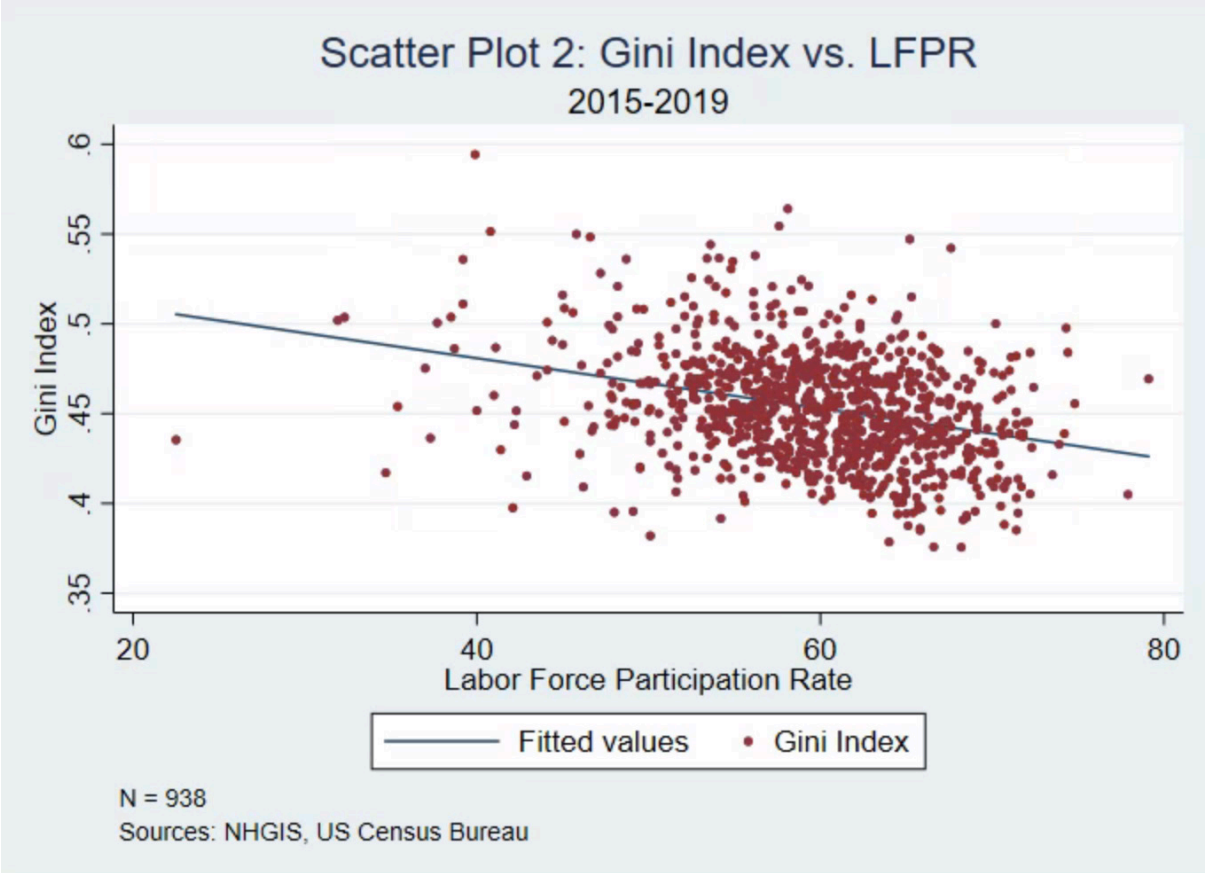


Figure 4: LFPR, Metropolitan/Micropolitan Statistical Areas)
2015-2019
Frequency
300
250
200
150
100
50
0
1
3
9
13
48
135
254
271
155
47
2
15 20 25 30 35 40 45 50 55 60 65 70 75 80 85
Labor Force Participation Rate
N = 938
Source: US Census Bureau


Scatter Plot 1: Gini Index vs. LFPR
2005-2009
Gini Index
.35
.4
.45
.5
.55
30
40
50
60
70
80
Labor Force Participation Rate
Fitted values
Gini Index
N = 953
Sources: NHGIS, US Census Bureau


Scatter Plot 2: Gini Index vs. LFPR
2015-2019
Gini Index
.35
.4
.45
.5
.55
.6
20
40
60
80
Labor Force Participation Rate
Fitted values
Gini Index
N = 938
Sources: NHGIS, US Census Bureau