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Labor and Manufacturing in the Midwest

Economic Systems Around the Globe

Economic Vulnerability in the Midwest

Energy and Healthcare in Ohio

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Table of Contents

Letter from the Editors

Dear CWRU Journal of Economics Reader,

On behalf of the Editorial Board, I would like to thank you for taking the time to read the third edition of our Journal. This marks the second year since the inception of our club. The Journal was founded with the mission to introduce Case Western Reserve University students to the world of economic research while providing them with experiential learning opportunities. Today, we are proud to have over 40 dedicated, creative, and intelligent members who are dedicated to the world of research. Their work has left us and the faculty of the Department of Economics amazed and inspired.

In a year shaped by geopolitical instability, economic slowdowns, and the U.S. Presidential election, it is paramount to recognize the dynamic nature of economic conditions and the power of research as a tool to analyze and predict future outcomes. The work presented in this volume reflects the adaptability and intellectual curiosity of our members as we navigate these complexities.

This semester marked the launch of our newly expanded structure. Our Journal now comprises three divisions: Research & Editorial, Regional Analysis, and Outreach. Additionally, we began hosting General Body meetings each week, allowing our members to learn about a wide range of topics in economics from various guest speakers. We also hosted literature review training, internship workshops, and networking events. We extend our sincere gratitude to all our guest speakers for sharing their time and wisdom with our members.

Our Editorial Board and Peer Review Boards have thoroughly reviewed and guided our members through their novel and fascinating research projects over the semester. This volume showcases the application of economics to various systems, including manufacturing, energy, and healthcare. The featured studies span different scopes, with some concentrating on Ohio-specific issues and others addressing global perspectives. We thank the students and faculty members who guided our members through their research processes.

We would like to express our heartfelt thanks to the faculty members of the Case Western Reserve University Department of Economics for their guidance and for buttressing the efforts of the Journal through their invaluable expertise and encouragement. Furthermore, we extend our gratitude towards Brooke Hathhorn and Katherine Merritt, our Alumni Advisors who have made time to provide counsel amidst their postgraduate schedules.

It is with great pleasure and enthusiasm that we present the third volume of the CWRU Journal of Economics. We hope you find it as engaging and inspiring as we do.

Sincerely,

Vaishnavi Kumar
President & Editor-in-Chief

Regional Analysis

Assessing Ohio's Renewable Energy Landscape: Challenges, Progress, and Regional Comparisons

Marissa Dewey, Noam Greenberg

Today, climate change still champions as an existential threat to humanity while greenhouse gas production grows rapidly and unheeded each year. Despite these looming issues, many day-to-day amenities which companies and consumers rely on require non-renewable energy sources. Fossil fuels are a finite resource that cannot be replaced as they take millions of years to form. If the consumption of fossil fuels continues to go unchecked, climate change will result in devastating consequences for our planet, such as sea level rise, food scarcity, and more extreme weather events. Renewable energy plays an important role in reducing greenhouse gas emissions. Studying Ohio's renewable energy generation can help policy makers assess how adopting cleaner energy can reduce Ohio's carbon footprint.

Cleveland legislators look to position Cleveland as a leader in renewable energy. Despite facing obstacles at the state level, local authorities are advancing efforts in renewable energy, infrastructure improvements, and land conservation (Engelke, Webster, & Sparkman, 2024). Federal programs like the Inflation Reduction Act present opportunities for Cleveland to secure funding and accelerate progress in its decarbonization goals. According to Cleveland's 2018 climate action plan, the city's current goal is 100% clean renewable energy by 2050 (Engelke et al., 2024). However, these ambitious climate plans have met some pushback in the community with legislation like Ohio Senate Bill 52, which makes it harder to obtain land for wind and solar. Keeping in mind these conflicting opinions within the state, we aim to assess Ohio's renewable energy production in comparison to nearby states and determine whether Ohio is falling behind in the fight against climate change.

To analyze Ohio's renewable energy production, we decided to compare Ohio's progress to nearby states with similar resource availability. This assessment allows us to better determine if Ohio is on par with neighboring states in renewable energy adoption. Our prediction is that compared to nearby states, Ohio's increase in renewable energy remains relatively stagnant. We will look at energy generation over the years for Ohio and surrounding states. All data was collected from the U.S Energy Information Administration, which is a government agency within the Department of Energy that works to provide policy independent and impartial data about a wide range of energy related topics (U.S. Energy Information Administration, 2024).

In Figure 1, we see renewable energy generation remain relatively constant from 2000 to 2010. Michigan, Pennsylvania, and Indiana have produced the most renewable energy in the last decade. Ohio stays near the bottom in renewable energy production along with Indiana until Indiana sees a major uptick in production around 2007-2008. Kentucky has more erratic fluctuations, and although producing more total energy than Ohio, its renewable energy growth also remains relatively flat. Looking just at the current trends, it seems likely that renewable energy generation will continue to grow as the demand for energy increases. It is also possible that due to the republican party's widespread gains in the most recent election, the pattern will not hold. During Trump's last administration, he "removed a broad sweep of environmental regulations and attempted to cut the [EPA's] budget by a third" (Milman & Perkins, 2024), so efforts to continue with the transition to renewable energy may not be a priority in the upcoming years.

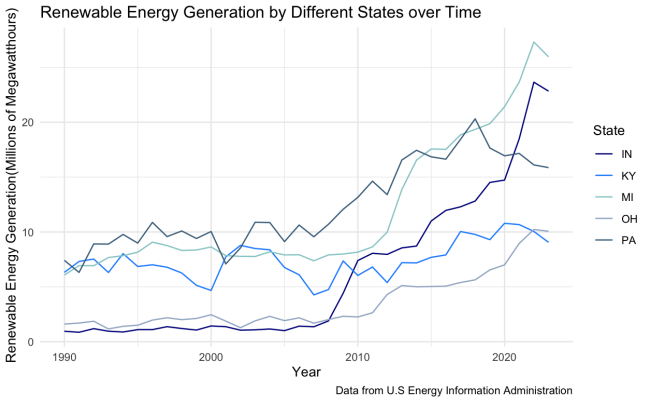

Figure 1:

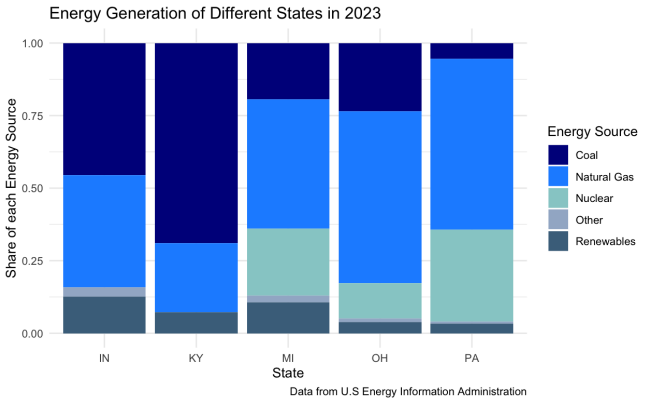

Figure 2:

Figure 2 shows the continuing dominance of fossil fuels. Coal and natural gas comprise the majority of the state's energy mix. Renewable energy sources, although present, make up a relatively small portion of total energy generation. This difference can be explained in part

because of the natural resources available to the states. All the states shown have substantial coal reserves, and Pennsylvania and Kentucky are two of the top 5 coal producing states in the U.S.(*Which States Are the Largest Producers and Consumers of Coal?*, n.d.). In terms of natural gas, these states also all produced at least some natural gas in 2022, but Ohio and Pennsylvania generated vastly more than the others, with 2,197 and 7,431 billion cubic feet respectively (*Natural gas explained: Where Our Natural Gas Comes From*, n.d.). This most likely is a contributing factor to their higher shares of natural gas seen in Figure 2.

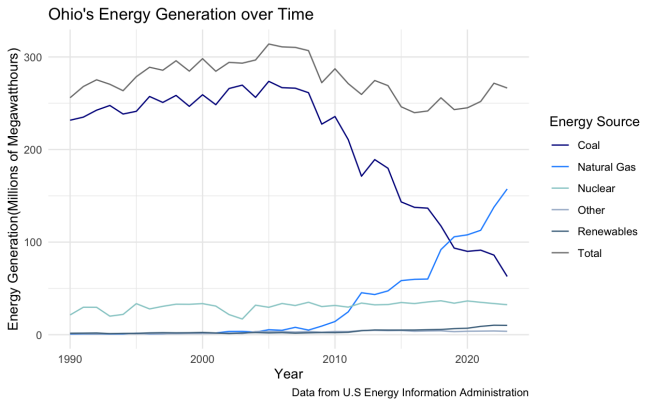

Figure 3:

Figure 3 highlights the different energy sources in Ohio and their productions over time. Coal accounted for a great majority of Ohio's total energy production until about 2017-2018. This is driven by Ohio's need for affordable energy sources to power its strong manufacturing sector with high energy consuming industries like metals fabrication and chemical production (Romich, Bowen, & Civittolo, 2016). It is also important to note that renewable energy accounts for a very small part of Ohio's energy generation. We can observe that renewable energy increases slightly around the same time as coal fell. This may be due to federal environmental regulations such as the Mercury and Air Toxics Standards, Cross State Air Pollution Rule, and Cooling Water Intake Structure Rule (Romich et al., 2016).

Ohio's limited growth of renewable energy generation can be attributed to policy and energy prices. Via the U.S. Energy Information Administration, as of 2022, the average retail electricity price in Ohio was about 11.61 cents per kilowatt-hour, a price which is below the national average (*Ohio Energy Data*, n.d.). For energy consumers in Ohio, the affordability of non-renewable energy reduces the incentive to transition to renewable sources of energy as renewable energy typically requires higher upfront payments (installation, land/siting requirements, specialized infrastructure). Public policy also hinders the transition to renewable energy. Ohio Senate Bill 52, which went into effect in October of 2021 granted county commissions the authority to block or limit wind and solar projects by requiring developers of wind and solar farms to hold public hearings and allowing counties to pass resolutions restricting projects (Zuckerman, 2021). Critics argue that this bill adds unnecessary bureaucracy to renewable energy processes, potentially deterring green energy investment, and in turn discouraging the production of new wind turbines and solar panels (Zuckerman, 2021).

Although Cleveland wants to completely convert to clean energy, for these ambitious plans to be realized, Ohio policy must be improved. Currently, the state offers a 30% federal solar investment tax credit for homeowners and businesses, making solar panels more affordable. Solar installations are also exempt from property tax increases which provides greater incentive for homeowners and businesses to adopt solar energy. However, Cleveland and Cincinnati are the only 2 cities in Ohio that provide solar tax abatements (Orentas & Allen, 2024). State legislature should streamline these programs to make solar energy more attractive everywhere in Ohio.

State legislature should also implement a mandate or goal for every business and home to procure a percentage of their energy from renewable sources in order to drive up demand and investment in solar and wind energy. When establishing Renewable Portfolio Standards (RPS) in 2008, Ohio had a quota requiring 12.5% of all electricity to come from renewable sources by 2026. However, in 2019, House Bill 6 reduced this target to 8.5% by 2026 (*House Bill 6*, n.d.). This RPS is less than all states Ohio was compared with in Figures 1 and 2.

Ohio as a whole seems to be moving backwards, and If no statewide action is taken, Cleveland's efforts may struggle to push the larger shift that Ohio needs to compete regionally in renewable energy production. Until then, Ohio is lagging behind in the transition to a sustainable energy future.

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Zoning Reform and Housing Market Resilience: Lessons from Ohio's Largest Cities

Alex Giordano, Tom Lin

Introduction

Housing markets serve as a barometer of regional economic conditions, with fluctuations in the number of available listings reflecting shifts in supply and demand. The COVID-19 pandemic, in particular, imposed unprecedented challenges on housing markets by constraining supply, influencing migration patterns, and altering economic behavior. While economic recovery has improved listings modestly since 2020, the extent of recovery has varied across cities, highlighting how zoning policies and urban planning frameworks play a critical role in shaping local housing supply.

For Ohio's largest cities—Cleveland, Columbus, and Cincinnati—the pandemic's effects have been compounded by pre-existing regulatory frameworks that either enabled or restricted adaptive responses in housing supply. Furthermore, the economic shocks of the pandemic magnified underlying disparities in local zoning policies. Cities and neighborhoods with more adaptable zoning frameworks were able to mitigate housing shortages more effectively, while those with rigid, outdated policies struggled to address increasing demand. These differences provide a valuable lens through which to examine the relationship between zoning reform and housing market resilience.

Data Collection and Analysis

The data used in this article, sourced from Zillow's Market Heat Index, Realtor.com listings data, and FHFA Housing Price Index records, provides an overview of how supply-demand dynamics evolve under varying zoning frameworks. The combination of these datasets allows for an analysis of both supply-side and demand-side housing market trends across Ohio's largest metropolitan areas.

Using Zillow's proprietary Market Heat Index, we can quantify the competitiveness or scarcity of homes in a given region. The index is calculated by aggregating user engagement, price cut statistics, and pending sales with an index value of 55 or above being considered a seller's market (Zillow.com, 2024). This index sheds light on the relative market pressures faced by each city, indicating how zoning and policy factors might influence overall market stability. Such data is invaluable in guiding policy adjustments aimed at improving market responsiveness.

Realtor.com's listings data provides another layer of insight by capturing active housing supply trends across Cleveland, Columbus, and Cincinnati. This data reveals the extent to which zoning policies have constrained the development of housing stock in key urban areas. For instance, Figure 1 shows the significant decline in active listings in Cincinnati since 2018, highlighting the city's inability to meet growing demand, while Columbus's relatively stable listings may point to the effectiveness of its more adaptive zoning framework (Realtor.com, 2024).

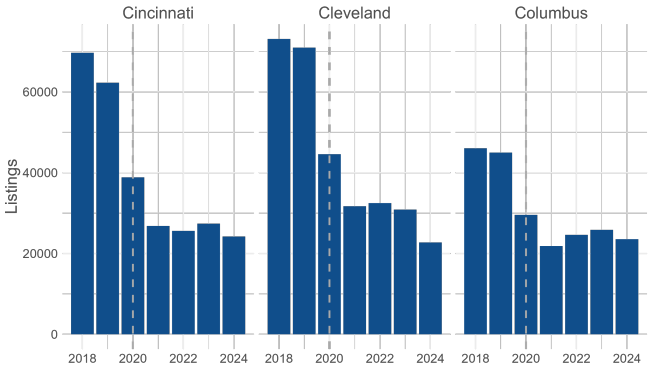

Figure 1: Listings by Year across Counties (2018-2024). The chart highlights trends in active listings across the largest counties in Ohio, showing the impact of zoning policies on housing supply over time. Dashed line denotes the beginning of the pandemic. Source: Realtor.com.

The FHFA Housing Price Index data further complements this analysis by illustrating long-term price trajectories across Ohio's metropolitan areas. By comparing price growth in Cleveland, Columbus, and Cincinnati, we can assess how housing affordability has evolved under different zoning policies and economic shocks. Moreover, the inclusion of housing price trends over time enables a closer examination of how external economic shocks, like the pandemic and 2008 recession, interact with housing markets. These insights not only offer a snapshot of current conditions but also provide a road map for future planning and development strategies that move towards more affordable and equitable housing policy.

The Impact of Restrictive Zoning Laws

One of the shared issues in Ohio's housing markets is the persistence of restrictive zoning laws, particularly those favoring single-family homes (Hanley, 2024). These regulations have limited the development of multi-family and mixed-use housing, thus contributing to a more rigid and often inadequate housing supply across the state. Figure 2 reinforces this notion as Cincinnati and Cleveland have transitioned from a slight buyer's market to a strong seller's market, indicating that housing demand is strong

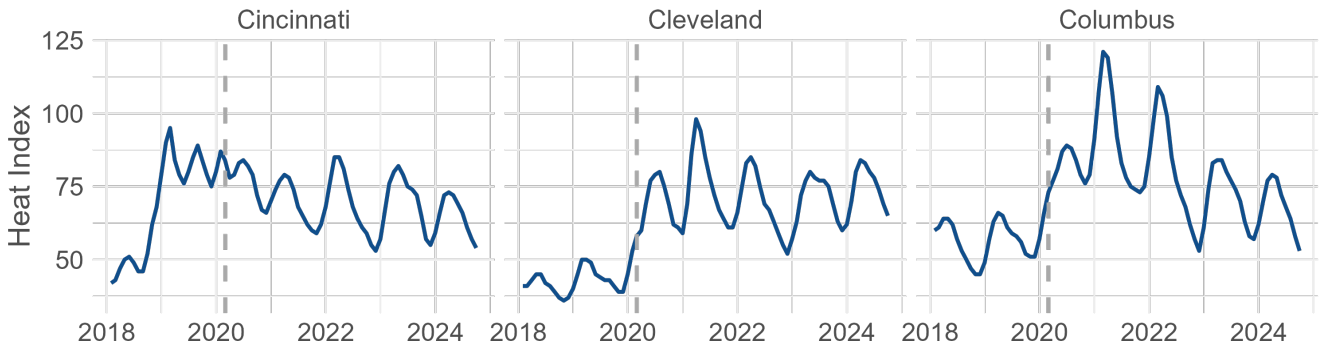

Figure 2: Housing Market Heat Index across Ohio's Major Metropolitan Areas. The heat index values illustrate competitiveness and market scarcity, with higher values indicating stronger seller markets. Dashed line denotes the beginning of the pandemic. Source: Zillow Housing Data.

and supply may not be able to meet it. Columbus, on the other hand, has been able to maintain a more consistent market, which may be due to their more adaptive policies. By constraining higher-density developments, these regulations impact not only the quantity of available housing but also the diversity of housing options, which is essential for accommodating a broad spectrum of income levels and household sizes. Figure 1 clearly shows this, as listings have been unable to recover to pre-pandemic levels.

Cincinnati, for instance, has experienced a marked decline in housing listings since 2018, a trend exacerbated by policies that limit the potential for higher-density development. This is particularly concerning in light of increased migration patterns into urban areas, as the city has struggled to expand housing capacity to meet demand (Cincinnati Department of City Planning & Engagement, 2024). Cleveland's zoning framework, rooted in priorities from a post-industrial urban landscape, continues to limit housing growth by prioritizing low-density, single-family housing. This approach may contribute to its current ranking of 93rd out of the largest 100 cities in the US in terms of private investment, highlighting the need for an overhaul of city planning methodologies (Theodos, Hangen, McDaniel, & Nunna, 2023). This framework has constrained the city's ability to respond to growing demand, slowing the pace of economic recovery (Cleveland City Planning Commission, 2024).

In contrast, Columbus has demonstrated a more flexible approach. The city's policies, which allow for mixed-use developments and multi-family housing, have helped stabilize the housing supply in the face of changing economic conditions (Columbus Department of Development, 2018). Columbus also benefits from a zoning framework that facilitates faster recovery by adapting to new demands more efficiently and height incentives are given to developments meeting specific affordable housing quotas as a way to provide direct support to the specific goals of "affordability, availability and accessibility" (Behrens, 2024).

Discussion and Implications

Increasing affordability and population density are critical for fostering modern urban resilience. These priorities align with the more adaptive policies of Columbus, suggesting a pathway forward for other cities, like Cleveland and Cincinnati, to improve housing market resilience and competitiveness. By adopting similar strategies, cities can better accommodate growing populations, support economic vitality, and promote sustainable urban development.

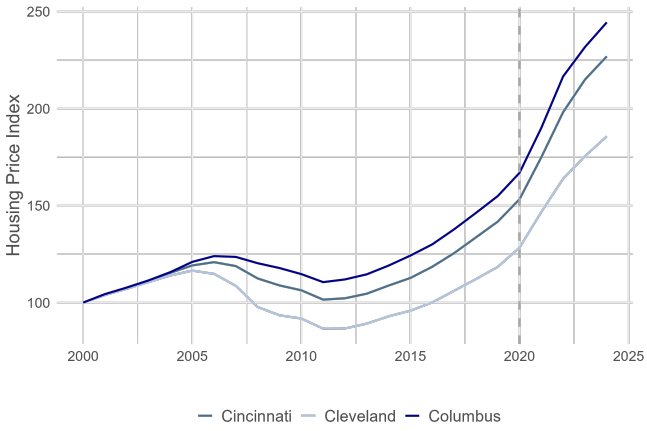

Figure 3: Housing Price Index Trends by Metropolitan Areas (2000–2024). This time series illustrates shifts in housing prices across Cleveland, Columbus, and Cincinnati from 2000. Dashed line denotes the beginning of the pandemic. Source: FHFA.

As illustrated in Figure 3, the time series highlights the significant variations in housing price trends across Cleveland, Columbus, and Cincinnati. Cleveland shows the least increase in housing prices over time, reflecting relatively limited demand and slower economic growth. In contrast, Columbus emerges as the most expensive of the three cities, underscoring the impact of its strong economic expansion and robust demand. Cincinnati falls

between the two, with steady but less dramatic price increases. This signals that restrictive zoning policies, such as those favoring single-family housing, have exacerbated price increases in areas with limited supply flexibility (Federal Housing Finance Agency, 2024).

These differences underscore the varying impacts of economic conditions and zoning policies as well as general migration patterns on housing markets across Ohio, reflecting the unique challenges each city faces in revitalizing their communities and attracting both residents and businesses. The data suggests that cities with adaptable zoning policies—such as Columbus—tend to recover more effectively from economic shocks, which could serve as a model for cities struggling slower recoveries.

Furthermore, recent zoning reform initiatives in Cleveland and Cincinnati indicate a growing recognition of the need to modernize outdated policies. For instance, Cleveland's Planning Commission adopted form based code earlier this year, which focuses on the physical form of buildings and their relationship to one another. Cincinnati's reforms allow for the development of multifamily housing and elimination of parking space requirements within close proximity to central business districts. However, these reforms currently only apply to certain portions of each city, and their success will depend on their implementation and the extent to which they address systemic barriers to housing development, such as affordability constraints and infrastructure limitations.

Conclusion

Ohio's housing markets illustrate the complex relationship between zoning policies, economic conditions, and housing supply dynamics. The contrasting experiences of Cleveland, Columbus, and Cincinnati underscore the need for proactive zoning reforms that balance supply and demand while addressing long-standing affordability issues. Each city's capacity to adapt its regulatory framework will ultimately determine how well it can meet the demands of its residents, promote inclusive growth, and support economic resilience.

Looking ahead, Ohio's urban areas must continue to evaluate and refine their zoning policies in response to evolving economic and demographic pressures. By adopting flexible, equity-oriented reforms, Ohio's cities have the opportunity to create sustainable and accessible housing environments, which are essential for securing their economic futures in an increasingly competitive landscape. Fostering collaboration among policymakers, developers, and community stakeholders will be essential to crafting solutions that align with both economic and social objectives.

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Will The Opportunity Corridor Live Up to its Name?

Elvin Stowell, Aaron Rucker

Introduction

Cleveland's Opportunity Corridor, a newly completed five-lane boulevard, cuts through the city's long-neglected eastern inner core. Stretching 3.5 miles from an interchange with I-490 and I-77 southeast of downtown, the road winds northeast to University Circle and the Cleveland Clinic's main campus.

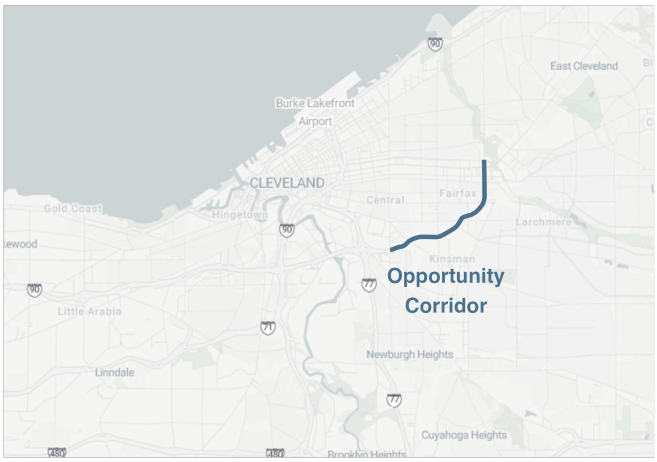

Figure 1: Opportunity Corridor

Initially conceived as a limited-access freeway, the road was built as a full-access urban boulevard aimed at neighborhood revitalization. Its stated goals include "improving the roadway network within a historically underserved, economically depressed area" and "supporting planned economic development" (*Opportunity Corridor Overview*, n.d.). Construction began in 2015 and was completed in 2021 at a total cost of $330 million.

The Corridor's completion has stirred mixed reactions: supporters highlight reduced travel times and business growth along its route, while critics question the equity of its economic impact, arguing that the road primarily serves to improve highway access for affluent employees and residents of University Circle (Castele, 2020; Williams & Chilcote, 2023).

Background

The Opportunity Corridor runs through some of Cleveland's most economically depressed areas. According to the American Community Survey (ACS) 5-year estimates, in the five years leading up to the completion of the Corridor's first stage, the census tracts along its route were among the areas with the lowest median household incomes and highest unemployment rates in both Cleveland and Cuyahoga County. Typical household incomes were around $20,000, below the 2015 poverty level for a 4-person household, and unemployment exceeded 25% in most adjacent census tracts.

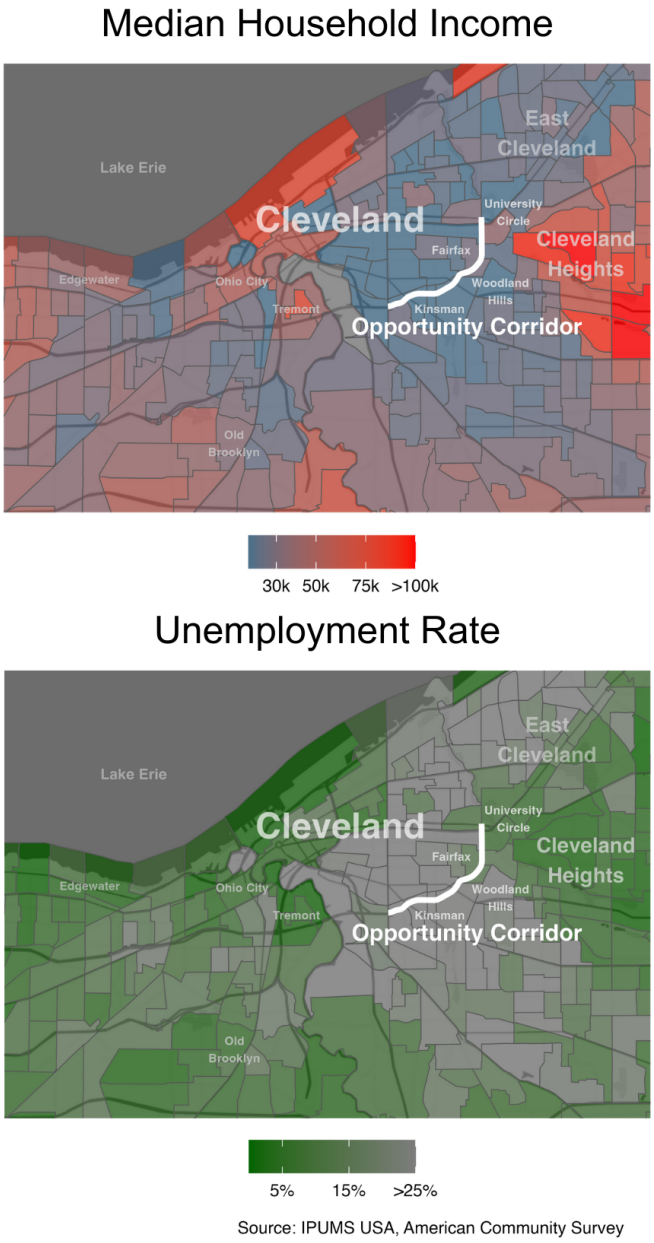

Figure 2: Median Household Income and Unemployment, 2013-2017

Proponents of the Corridor have argued that the new road offers a twofold benefit: cutting travel times for those commuting to and from University Circle and spurring economic development in the struggling neighborhoods it traverses. A key piece of this vision lies in fostering business growth along the Corridor itself.

"The Opportunity Corridor has 10-plus acre sites that

can be assembled if a company wants to come in. There's a lack of these in the city," said Jeff Epstein, Cleveland's chief of integrated development. The city hopes these sizable parcels of land could attract development and create permanent, good-paying jobs. City planners envision a strategic clustering of healthcare and technology jobs near University Circle, with food production and manufacturing hubs taking root further southeast along the Corridor. (Williams & Chilcote, 2023)

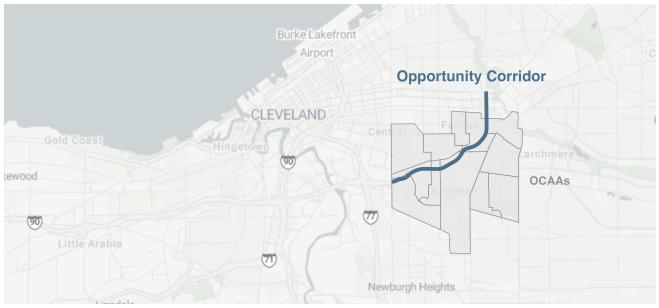

Figure 3: Opportunity Corridor Adjacent Areas (OCAAs)

Signs of Improvement

Now that Opportunity Corridor has been open for several years, have economic circumstances in the area changed?

Anecdotal evidence points to some business growth along the Corridor. Near its northern terminus, new developments have sprung up, including several mixed-rate apartment buildings and a Meijer grocery store. Further down the Corridor, Nor-Am Cold Storage, a regional logistics firm, recently opened a $50 million cold storage facility on the corner of Opportunity Corridor and East 75th Street (Shookman, 2021).

Existing businesses have also reported improvements. Across the road from the new cold storage facility, Orlando Baking Company is actively hiring, and CEO John Orlando reports that delivery times have been trimmed and it's easier for his employees to get to work. Other businesses along the route, including Farm House Foods and Miceli Dairy Products, echo similar sentiments, noting that the new roadway has improved logistics and reduced staff commute times (Williams & Chilcote, 2023). Still, apart from the Cleveland Clinic neighborhood at the northern end of the Corridor, development along the route remains sparse, with many sections still dominated by vacant lots.

Measuring Early Impacts

To observe the immediate effects of the Corridor, we select census tracts adjacent to the Corridor's route, which we define as Opportunity Corridor-Adjacent Areas (OCAAs), as shown in Figure 3. These tracts comprise most of the Kinsman, Woodland Hills, and Fairfax neighborhoods.

We observe a couple of relevant characteristics of these tracts. According to ACS estimates, relative to the rest of Cuyahoga County and national averages, OCAA residents were more than three times as likely to take public transportation to work and 10 to 15 percentage points less likely to hold a high school diploma or a degree of higher education. These data suggest that a new road may not be as useful to poorly educated workers commuting on public transportation. Still, about 75% of those who worked out of the home commuted to work by car, so it stands to reason that the road could have a positive effect on job access and opportunity.

To identify early trends following the Corridor's completion, we compare 5-year ACS estimates from before and after the first stage was completed in 2018.

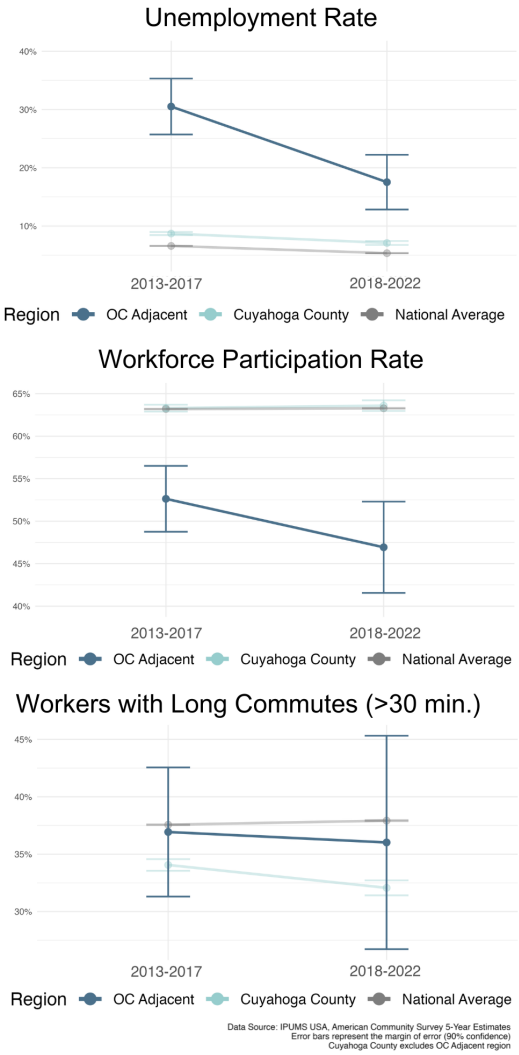

Figure 4: Unemployment Rates, Workforce Participation Rates, and the Proportion of Workers with Long Commutes in Pre and Post-Corridor Periods

From the charts in Figure 4, the evidence is mixed as to whether economic circumstances in OCAAs have improved. We observe a significant decrease in unemployment; the 5-year estimate fell by over a third, from around 30% from 2013-2017 to below 20% from 2018-2022.

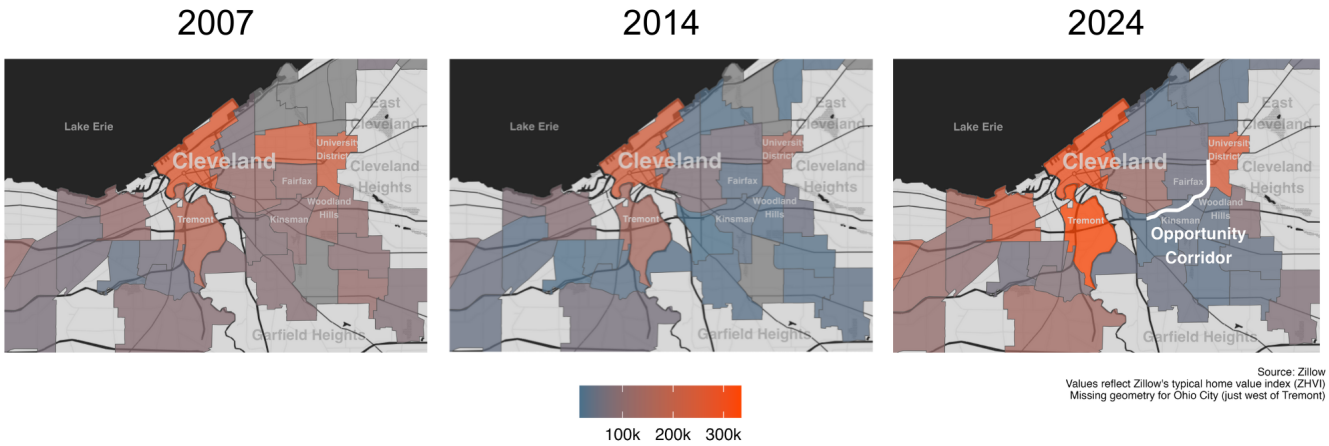

Figure 5: Typical Home Values for Cleveland Neighborhoods

However, this decrease is similar to what we observe in the rest of Cuyahoga County and the nation as a whole. Further, this fall in unemployment is clouded by a coinciding fall in the estimate for labor force participation rate, a trend that we do not see nationally or in the rest of the county. However, this decrease is within the margin of error, and could just be noise. Finally, there is no significant change in the proportion of workers with long commutes of over 30 minutes.

The fall in unemployment is promising, but when taken with decreasing unemployment nationwide and a persistently low workforce participation rate, these trends do not indicate any significant post-Corridor improvements in economic outcomes.

Home values, shown in Figure 5, reflect the poor economic state of Cleveland's eastern inner core and show its decline over time relative to the rest of Cleveland. In 2007, home values between Cleveland's eastern and western core were comparable. Hough, a neighborhood a few miles east of downtown, had among the highest home values in Cleveland. By 2014, the Great Recession had pushed home values down significantly across the city, but there remained relative parity between the east and west sides. In the years that followed, however, home values recovered much faster in western suburbs, while values in the city's eastern inner core stagnated. Now, neighborhoods adjacent to the Opportunity Corridor, such as Kinsman, Woodland Hills, and Fairfax, have home values much lower than most west-side neighborhoods.

In Figure 6, we see that Pre-Great Recession, Fairfax, Kinsman, and Woodland Hills had home values in the top half of all Cleveland neighborhoods. Now, these neighborhoods are in the bottom fourth. There does not appear to be any bump in home values in these neighborhoods related to the Corridor's construction start in 2015, first-stage completion in 2018, or final completion in 2021.

These trends in home values provide further evidence that the Corridor has yet to improve economic circumstances in OCAAs.

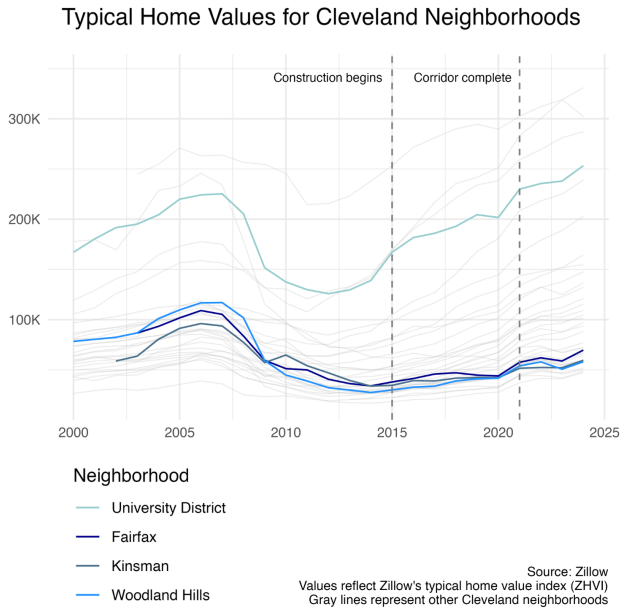

Figure 6: Typical Home Values for Cleveland Neighborhoods, 2000-2024

Conclusion

The Opportunity Corridor was envisioned as a transformative project to spur economic development and improve mobility in some of Cleveland's most economically disadvantaged neighborhoods. Early data show some signs of improvement; anecdotally, there exists some new development and business growth along the Corridor, and we observe a significant fall in unemployment in Opportunity Corridor-Adjacent Areas. However, other indicators we observe for these areas — workforce participation rate, home values, and commute times — show no evidence of improvement. Additionally, much of the observed business growth and development along the Corridor has been confined to areas around the northeast terminus of the Corridor, near the Cleveland Clinic. In general, it appears that progress in reversing the economic challenges

faced by OCAAs further down the Corridor has been limited. Without significant expansion of local, low-skilled job opportunities, the road's effectiveness may be constrained by the low educational attainment and relatively high reliance on public transportation among residents in OCAAs.

Our observations about the potential early effects of the Corridor are purely correlational. To better estimate the causal effects of the Opportunity Corridor on economic outcomes in Cleveland's eastern inner core, future research could use econometric techniques such as Difference-in-Differences or Synthetic Control Models. These methods would allow for a more robust analysis of the Corridor's impact by controlling for confounding factors and isolating the effect of the road.

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Economic Vulnerability Index

Problems of the Heartland: Measuring Economic Vulnerability in the Midwest

Ashley Sah, Ammar Sulemanjee, Manav Bhandary, Joanna Chiu

We explore the use of Bartik instruments to measure exposure to economic shocks, specifically the Great Recession of 2008 and the COVID-19 pandemic, across Metropolitan Statistical Areas (MSAs). We use a regression model to estimate the sensitivity of a MSA's economy to the shock expressed in the Bartik Instrument. Findings indicate varying degrees of economic sensitivity among MSAs, with Cleveland showing the highest responsiveness during the 2005–2010 period. The study reveals significant shifts in economic sensitivity from 2011 to 2016, which may be attributed to differing policy interventions and their effectiveness during post-recession recovery. Our results highlight the impact of localized policy decisions on economic resilience, suggesting that tailored interventions are crucial for managing economic shocks. This study contributes to the understanding of regional economic vulnerability and provides insights that can guide more effective policy formulation.

I. Introduction

Each decade has been characterized by various economic shocks. The 2000s were defined by the bursting of the tech bubble and the subsequent Great Recession in 2008, followed by the ongoing repercussions of the COVID-19 pandemic in 2020. Each of these crises have left a profound impact on communities and economies. To prepare the populace for the next ensuing economic shock, understanding the factors that underpin economic stability has emerged as a pressing necessity. In this context, the economic vulnerability index (EVI) has become an important tool in achieving this goal; this idea conceptually started in 2000 and has evolved since.

Previous literature has mainly implemented standard Generalized Linear Models (GLMs) when developing an EVI. However, this paper seeks to explore the idea of Bartik instruments as the main instrument of economic vulnerability. We aim to prove that Bartik instruments, popularized by Blanchard and Katz (1992), are a robust tool in determining economic vulnerability on the Metropolitan Statistical Area (MSA) level. Urban vulnerability is related to specialization in a city's economy (Mulligan, 2022). He further confirms that high degrees of industrialization directly lead to high economic vulnerability. Bartik instruments leverage national economic trends and regional industry exposure to isolate the effects of economic shocks, making them particularly suitable for this analysis. Additionally, this instrument complements the definition of economic vulnerability – an economy's exposure to a shock.

Understanding vulnerability at the regional level is essential for targeted policy interventions, as the factors driving economic stability and resilience can vary significantly from one Metropolitan Statistical Area to another. By focusing on Midwest MSAs, this study seeks to fill a gap in past literature, offering a more localized perspective on economic vulnerability that can better inform regional economic development strategies.

II. Literature Review

II.I Bartik Instruments

The Bartik instrument was created in 1991 by Timothy Bartik. In the paper *Bartik Instruments: What, When, Why and How*, states that the instrument is the "local employment growth rate predicted by interacting local industry employment shares with national industry employment growth rates."(Goldsmith-Pinkham et. al., 2020). The instrument relies on industry shares within a locality which would quantify a region's economic structure. The paper goes on to prove that the Bartik instrument is numerically equivalent to using industry shares as instruments.

Bartik instruments, when calculated using shares of local industry employment and national growth of the industry, can capture an MSA's exposure to economic shocks. Using Bartik instruments as an indicator of "shock exposure" motivates the question of the impact of shock exposure on outcomes such as changes in real GDP and employment. Finding the correlation between a region's shock exposure and a region's economic outcomes can potentially yield a predictive indicator of vulnerability. Bartik Instruments have been used to measure the regional effects of trade, employment, and wages.

In Bartik's canonical use, the instrument was used to measure the impact of employment shifts on wages (Breuer, 2021). While fixed effects were used to account for regional differences and common trends, there were still major concerns around omitted variable bias and reverse causality (while employment shifts impact wages, wages also impact employment shifts). In an effort to resolve this endogeneity problem, Bartik instruments were developed as an instrumental variable (IV) approach. The basic idea behind instrumental variable approaches is to find another variable, the instrument, that drives part of the treatment variation and only affects the outcome through its impact on the treatment. These Bartik Instruments solve the endogeneity problem by isolating exogenous variation. The instrument isolates the exogenous component of local changes by relying on national trends, which are assumed to be uncorrelated with local

conditions. By using this approach, the Bartik instrument eliminates concerns about reverse causality, and omitted variables.

II.II Bartik vs. Trade

In their seminal work, Economic Vulnerability and Resilience – Concepts and Measurements, Briguglio et al. developed an economic vulnerability index to identify which countries are most vulnerable to exogenous economic shocks. Their index is centered around trade factors: (1) Export Concentration. Dependence on a narrow range of exports gives rise to risks associated with a lack of diversification, and therefore exacerbates vulnerability. (2) Import Dependence. Measured as the ratio of the imports of energy, food, or industrial supplies to GDP; import dependence spotlights an economy's vulnerability to shocks with regard to the availability and costs of such imports. (3) Economic Openness. Inherently, high degrees of economic openness make a country more vulnerable to external factors beyond its control such as global market changes. Economic openness is measured as the ratio of a country's international trade to GDP. Overall results showed that a higher degree of external reliance is associated with a higher degree of economic risk. This approach to index creation has been successful in identifying nations most susceptible to economic shocks.

However, the vulnerability indicators used at the national level do not seamlessly transfer when measuring vulnerability at subregional levels, such as Metropolitan Statistical Areas (MSAs). Index creation for MSAs requires a different approach because the typical export-import-orientated methodology doesn't accurately paint a picture of a regional economy. Unlike countries with diverse economic foundations, MSAs can be specialized and/or heavily dependent on a few industries. The presence of these unique local economic compositions means that Bartik instruments are a more robust measure of economic vulnerability for MSAs. These instruments consider localized industry dependencies, providing a clearer image of regional vulnerability than trade-based metrics, which often overlook the intricacies of regional economies.

II.III Bartik and Industry Diversity

The paper *The Role of Industrial Diversity in Economic Resilience: An Empirical Examination across 35 Years* by Lathania Brown and Robert T. Greenbaum discusses the relationship between industrial diversity and economic resilience through employment stability. The authors use fixed-effects models with data on all 88 Ohio counties between 1977 and 2011 from the Bureau of Labor Statistics and the Census Bureau. The primary model used is the unemployment rate regressed on county-level economic indicators with interaction terms, diversity indexes, national or local shock dummy, and fixed effects. They utilize a diversity index that serves as a measure of industrial diversification and a Herfindahl-like index to measure industry concentration (Kort, 1981). They also calculate location quotients to measure how specialized a local economy is in a particular industry.

Their findings suggest that counties with higher industry diversity tend to experience relatively higher unemployment when the national economy is doing well and have relatively lower unemployment rates when the national economy experiences employment shocks. More concentrated counties tended to have lower unemployment rates but experienced major spikes during shocks. This paper gives insight into employment resilience on a county level specifically in the Midwest. When working towards creating a vulnerability index, preexisting indexes and instruments such as location quotients and the Herfindahl index were examined on whether they would work to create a more accurate vulnerability index. However, we decided instead to utilize Bartik instruments as our primary instrument with some usage of location quotients to supplement.

III. Data and Rationale

Data was collected for 10 Metropolitan Statistical Areas within the midwest. A MSA is a region that consists of a city and surrounding communities that are linked by social and economic factors, as established by the U.S. Office of Management and Budget. We selected these 10 MSAs for our EVI because they are the largest by population in the Midwest, according to the 2020 Census. This choice allows the index to capture insights relevant to a significant portion of the Midwest's population and economic activity, making it representative of the region's overall economic health. Additionally, focusing on the 10 most population dense MSAs in the Midwest unlocks the potential for future comparisons with other highly populated regions in the United States. This allows our index to serve as a benchmark for evaluating large Midwest MSAs relative to large MSAs elsewhere, adding to the identification of unique regional vulnerabilities within a national context. We aim to analyze how economic vulnerability for the MSAs changes over time, so we collected all our data from 2005 to 2022.

Table 1: Midwestern MSAs used for Index Construction

Chicago-Naperville-Elgin	Detroit-Warren-Dearborn
St. Louis	Kansas City
Minneapolis-St. Paul-Bloomington	Columbus
Cincinnati	Cleveland-Elyria
Milwaukee-Waukesha	Indianapolis-Carmel-Anderson

Bartik instruments require data on share of employment within an industry and the national growth rate of an industry. Employment data by supersector for

the MSA level and national level was collected from the Bureau of Labor Statistics.

Industry composition was defined from the supersectors in table:

Table 2: Industry Composition Supersectors

Mining and Construction	Manufacturing
Information	Trade, Transportation, and Utilities
Financial Activities	Professional and Business Services
Private Education and Health Services	Leisure and Hospitality
Other Services	Government

These supersectors represent a complete set. Adding together each of these supersectors provides total employment. From supersector employment data the share by industry was calculated by dividing industry employment by MSA by total employment for that MSA. This was done for each year between 2005 to 2022.

We use real GDP growth as our outcome variable in our regression because it is a good reflection of a states' changed economic activity and indicates improved or deteriorated economic conditions. Real GDP measures the adjusted value for goods and services produced within a state. A high real GDP is correlated with other important economic indicators such as high employment, income levels, and overall standard of living. Real GDP growth is important because it provides a standardized metric for comparing economic performance across states during different time periods, and is a good reflection for improvements in productivity. One unique characteristic of real GDP growth is that it adjusts for inflation, which provides a clearer picture of economic progress because it takes away changes in prices. We collected real GDP growth data from the Bureau of Economic Analysis (BEA).

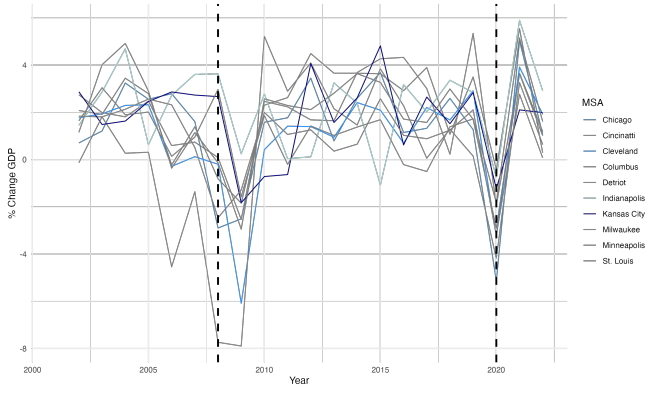

Figure 1: Percent Real GDP Change per MSA over time.

The control variable we use in our regression is per capita personal income (PCPI) per MSA. Per capita income data was obtained from the Federal Reserve Economic Data (FRED) website. Income data represents the general income level and economic health of the population in each MSA. By controlling for income, we mitigate the probability of our index reporting higher levels of vulnerability due to relatively lower income levels in a MSA. Controlling for PCPI helps adjust for regional economic conditions that could impact the outcome independently of the Bartik instrument, strengthening the model's causal inference capabilities and mitigating omitted variable bias.

IV. Methodology

In our analysis, we use Bartik instruments to address potential endogeneity issues arising from feedback loops or two-way causality between the variables of interest, such as regional outcomes and industry growth. The shift-share model, as proposed by Bartik, allows us to isolate exogenous variation in local economic conditions by leveraging national industry-level labor demand shocks, interacted with each region's industry composition. This method mitigates the risk of reverse causality, where regional outcomes could influence industry growth. The Bartik instrument, therefore, offers a more reliable approach to estimating the causal impact of industry-specific growth on regional economic outcomes, ensuring that our findings are driven by exogenous factors rather than local economic feedback mechanisms. The Bartik instrument, used to measure regional industry exposure, is calculated as the summation of the share of employment in each industry within a MSA multiplied by the national growth rate of that industry. This instrument helps isolate local economic changes driven by national industry trends. For a given MSA r, year t, and industry (or supersector) k, let S_{rkt} denote the share of employment in industry k within MSA r at time t. The industry share is calculated by:

$$S_{rkt} = E_{rkt}/E_{rt} \tag{1}$$

E_{rkt} is the employment for supersector k in MSA r and Ert is the total employment in MSA r for year t. Together they relay the individual share of employment for that industry. The national growth rate for an industry k is denoted by G_{kt}. Model 1 shows the calculation for the Bartik instrument, designated by B_{rt} , as the summation of $S_{rkt} \times G_{kt}$ for all supersectors. The Bartik instrument represents the exposure that MSA r faces in year t.

$$B_{rt} = \sum_{k} S_{rkt} \times G_{kt} + \epsilon \tag{2}$$

For each MSA, we ran a regression with real GDP growth as our desired outcome variable (Xrt) with the calculated bartik instruments (Brt) as the primary explanatory variable of interest with a set of controls (Wrt). Model 3 illustrates the regression of interest.

$$X_{rt} = a_0 + a_1 B_{rt} + W_{rt} + \epsilon \tag{3}$$

This regression model gives us a coefficient to the Bartik instrument, α_1. In this context, α_1 symbolizes

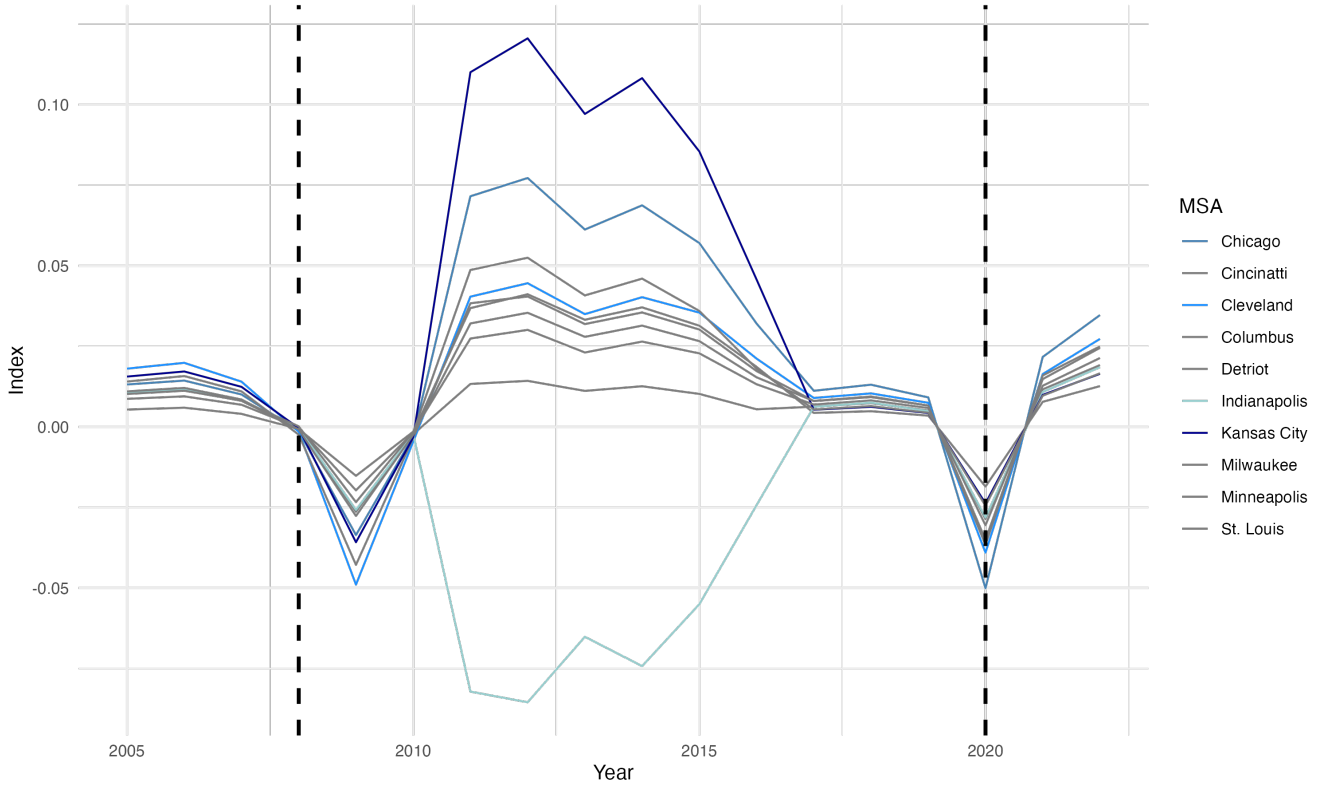

Figure 2: Index values $\alpha_1 \times B_{rt}$ over time. Kansas City, Cleveland, Chicago, and Indianapolis highlighted.

the extent of a MSAs real gdp percent change that is sensitive to economic shocks. The absolute value of α_1, $|\alpha_1|$, represents the magnitude of sensitivity in an MSA's real GDP growth to national industry shocks, regardless of direction. A large $|\alpha_1|$ magnitude indicates the MSA's real GDP growth is more responsive to shocks, implying that these areas possess economies that are heavily dependent on specific industries sensitive to national trends, making them more vulnerable to economic variance. Conversely, a MSA with a small $|\alpha_1|$ magnitude is characterized as a region whose real GDP growth is relatively insulated from national trends, providing more stability during economic shocks.

V. Results and Analysis

Figure 2 describes the absolute value of each city's index during different time periods. As shown in the graph, the Kansas City index rapidly rose between 2010 and 2013, indicating that the area is more vulnerable to economic shocks. However, after 2015, it seems to revert back to its original starting point. Chicago seems to follow this pattern to a lesser extent, and rises exponentially after the Covid-19 pandemic.

Cleveland, which mimics most other MSAs such as Cincinnati, Columbus, Detroit, Milwaukee, and St Louis, seem to rise steadily until 2013 before falling steadily near its original starting point. In addition to Kansas, another major outlier is Indianapolis, which fell significantly between 2010 and 2013 and rose after 2015. Due to the index describing the absolute value, the drop indicates that Indianapolis is more vulnerable to economic shocks.

Following the aftermath of the Great Recession, the magnitude of the index varies significantly across MSAs. Kansas sustains a high magnitude, indicating prolonged vulnerability to external economic shocks. Conversely, Indianapolis exhibits an unusual pattern with large fluctuations in index magnitude, pointing to potential structural instability or localized factors contributing to its economic sensitivity. Cleveland and Chicago demonstrate relatively steady levels, indicating moderate but persistent vulnerability

Tables 3-5 indicate the α_1 values for the MSAs of interest of different 5 year time periods. The estimated α_1 coefficients for 2005–2010 reveal moderate economic sensitivity to shocks across the MSAs. This is most likely due to the recession recovery from the tech bubble financial crisis a few years earlier. Cleveland displays the highest sensitivity (1.0917), suggesting its economy was the most reactive to external shocks during this period. Kansas (0.8621) and Chicago (0.7440) follow, with slightly lower but still notable levels of sensitivity. Indianapolis, with a coefficient of 0.5819, demonstrates the lowest sensitivity, suggesting a more stable economy relative to the others.

All MSAs we observe experienced dramatic changes in their α_1 values during the years 2011-2016. This can be partially attributed to differences in policy interventions and their effectiveness across MSAs during the post-

recession recovery period. Regions with delayed or insufficient interventions faced prolonged vulnerability, reflected in persistently high α_1 values. The Midwest's recovery from the Great Recession was hindered by delayed policy responses, insufficient investment in economic diversification, and reliance on declining industries like manufacturing. These factors, coupled with mismanagement of federal aid and state budget constraints, prolonged economic vulnerability in these MSAs. This variation underscores the critical role of localized policy decisions in shaping economic recovery trajectories.

While Kansas City experienced extreme sensitivity in 2011–2016, the area demonstrated stabilization in 2017–2022, suggesting the effectiveness of potential structural adjustments. Chicago and Indianapolis reverted back to 2005-2010 levels. And Cleveland managed to reduce their sensitivity greater than 2005-2010 levels.

One area of potential further exploration is the use of spatial econometrics techniques in our methodology. Due to numerous factors such as labor market connections, regional trade, economic spillovers, etc. an MSA's economy is interdependent on other MSAs, especially in our paper as we focus on the midwest region. Applying spatial econometric tools can help reveal cross regional vulnerabilities, adding on to an evolving vulnerability index and potentially revealing more robust results.

VI. Conclusion

Quantifying the measure of economic vulnerability and investigating the factors that are correlated to a better or worse response remains crucial for policymakers to reduce an MSA's economic vulnerability and project an MSA's response to potential economic shocks. This research not only provides insights into the economic dynamics of Midwest MSAs but also serves as a foundation for comparing economic vulnerabilities across other regions of the United States. By identifying unique regional challenges, policymakers can better tailor strategies to address specific risks. Moreover, understanding economic vulnerability can help policymakers anticipate and prepare for future economic shocks such as the examples discussed in the paper: the Great Recession in 2008, and the COVID-19 Pandemic in 2020. This can ensure that limited funds are being used efficiently to help the most at-risk regions. Ultimately, by leveraging insights into economic vulnerability, policymakers can implement targeted interventions that strengthen regional stability.

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Table 3: % Change in GDP 2005-2010

	Kansas	**Cleveland**	**Chicago**	**Indianapolis**
$\boldsymbol{\alpha}_1$	0.8621	1.0917	0.7440	0.5819
SE	0.3068	0.3215	0.3151	0.2107
$\boldsymbol{R}^2$	0.7762	0.8185	0.7358	0.7505
P-value	0.0673*	0.0426**	0.0993*	0.0701*

Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.010$

Table 4: % Change in GDP 2011-2016

	Kansas	**Cleveland**	**Chicago**	**Indianapolis**
$\boldsymbol{\alpha}_1$	6.1575	2.2102	3.7744	-4.2491
SE	1.5880	0.7844	1.2824	3.7376
$\boldsymbol{R}^2$	0.8615	0.7262	0.7471	0.3307
P-value	0.0304**	0.0669*	0.0604*	0.3382**

Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

Table 5: % Change in GDP 2017-2022

	Kansas	Cleveland	Chicago	Indianapolis
$\boldsymbol{\alpha}_1$	0.4122	0.6299	0.8306	0.4972
SE	0.0994	0.1802	0.2879	0.2343
$\boldsymbol{R}^2$	0.8552	0.8042	0.7387	0.6400
P-value	0.0255*	0.0396*	0.0633*	0.1239

Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

Research and Editorial

Analyzing Labor Outcomes for Non-College-Educated Workers in the Presence of a Manufacturing Shock: A Case Study of Lee County, Mississippi

Sidharth Jindal

In this article, we examine labor outcomes for high school-educated workers when a demand shock occurs through the lens of a case study. We analyze differences in median high school educated annual income and poverty rates between counties that were exposed to the introduction of a Toyota Factory in Mississippi and counties that weren't. While we found that the manufacturing shock had little association with the median annual income of high school-educated workers, the poverty rate in counties exposed to the factory decreased relative to the control factories.

Introduction

The manufacturing sector is a critical industry in the United States, with many politicians promising to amplify job growth in this sector. Since 2022, manufacturing has accounted for over 10 % of U.S. G.D.P. (U.S. Bureau of Economic Analysis, 2022). Politicians often advertise the implementation of manufacturing infrastructure as a means to provide long-term growth to low-skilled workers, those of whom are typically described as individuals without a college degree. In this article, we aim to assess if this is true – that is, we will discuss if a shock in manufacturing jobs leads to improved outcomes for non-college educated workers. We will discuss this question in the context of a case study through the analysis of the Toyota Corolla Factory in Union County, MS. Before beginning analysis, it is necessary to discuss the history of this factory. In February of 2007, Toyota selected Union County as the location for their new, $1.2 billion dollar assembly plant. Production began soon after, but was then delayed due to the Financial Crisis. Construction resumed in June of 2010, and the first Corollas were produced in late 2011, with production reaching its anticipated rate at the start of 2012. Consequently, 2012 will be used as the "start" year of this factory.

Literature Review

There is a vast array of literature discussing the impact of manufacturing on labor outcomes for various groups. Theory suggests that the introduction of a manufacturing plant is associated with an increase in demand for labor, which consequently increases wages. In particular, manufacturing plants provide jobs to less-educated workers (e.g., high school or less), and since 1980 have provided more than one third of jobs held by men between the ages of 21 - 55 (BFI, 2018). Empirical evidence suggests that the manufacturing industry is a critical factor for developing middle class communities and even leads to more technological growth (Su, 2017). At the country level, there are no instances, in developed countries since 1950, of economic development without an expansion of manufacturing (Szirmai, 2012). This literature suggests that manufacturing is essential for economic development at any level of observation. Manufacturing has studied effects on educational attainment. Areas with a decrease in manufacturing exhibit an increase in educational attainment, and areas with high levels of manufacturing are associated with lower over educational attainment (Donaldson, 2013). However, when automated manufacturing is introduced, low-skilled workers respond by increasing their level of education (Boustan, 2022). From this literature, it is seen that manufacturing both encourages educational attainment when acting as a positive shock to increase demand for highly-skilled workers and discourages educational attainment by providing an increase in demand for low-skilled workers when the work is not highly-technical. There is also a studied connection between manufacturing and income. When manufacturing accounts for more than 15% of the employment in a given region, real income of individuals increases (Donaldson, 2013). However, when the share of manufacturing increases, there is a decrease in real income that can be attributed to a decrease in reliance on the industry (Donaldson, 2013). When low-skilled workers are exposed to automated manufacturing plants, wages decrease. More specifically, a 10 percentage point increase in automated (CNC) machinery is associated with a 9 percent decrease in income for less than high school educated workers (Boustan, 2022).

Methodology

In this article, we will conduct a case study to discuss how labor outcomes for high school educated workers are changed by manufacturing shocks. In particular, we will consider the Toyota Corolla Factory in Union County, MS. The choice of this factory satisfies several necessary criteria. First, the Toyota Corolla Factory began production in late 2011/early 2012, which allows us to use the American Community Survey (ACS) 1-year estimates that began in 2010. Second, the location and demographics are ideal for comparing the factory to similar areas without manufacturing. While the Toyota factory was built in Union County, it was developed (and advertised) as serving three counties – Union, Lee, and

Pontotoc. These three counties are shaded grey in figure 1. The light blue circle represents a twenty mile radius around the factory. This length of radius was chosen because the majority of individuals working at this factory will live within twenty miles of it, and those outside that area face unrealistically long commutes. Clearly, this radius covers most of Union, Lee, and Pontotoc Counties. Further, this radius includes little area from other counties outside of those three. Thus, the location of this factory is positioned in a way that constrains most of the labor force within three counties, which is advantageous in analysis. Finally, the Toyota Corolla Factory employs over 2,000 people. The total population of Lee, Union, and Pontotoc Counties is around 140,000 people. Based on ACS data, we estimate that around 60% of individuals are in the labor force, which indicates that the Toyota Factory alone comprised nearly 3% of the labor force in all three counties. So, based on this, we argue that the Toyota Factory comprises an adequately large level of the labor force and its introduction to these three counties therefore constitutes a shock to the demand for labor. To estimate the impact of the Toyota Corolla

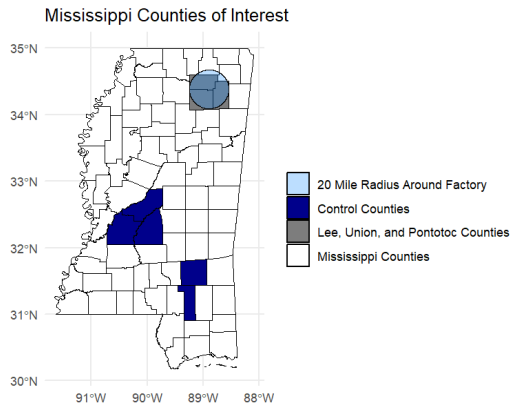

Figure 1: Mississippi counties of interest.

Factory, we aim to use a set of counties as a control. The control counties used were Jones, Madison, Hinds, Rankin, and Forrest . The individuals in these counties, from a labor perspective, are not impacted by the Toyota Corolla factory because they are simply too far away. We aimed to choose control counties that were evenly distributed across Mississippi, but the available counties were severely limited by the availability of ACS data. Using this framework, we can compare differences in labor outcomes between the counties "treated" by the Toyota Corolla Factory, and the control counties. In particular, we will analyze differences in median annual income for high-school educated workers and differences in poverty rates for high-school educated workers between these two areas. Based on the literature, we hypothesize that the shock to labor demand in Union, Lee, and Pontotoc Counties will increase the median high school educated wage relative to Jones County, and will decrease the relative poverty rate as a consequence.

Data

Data on median income by educational attainment by county and poverty level by educational attainment by county is available from the ACS, starting in the year 2010 (U.S. Census Bureau, 2010-2023). Neither Union or Pontotoc counties have data available, so Lee County was chosen to represent being "treated" by the Toyota Corolla factory starting in 2012. Jones, Forrest, Rankin, Hinds, and Madison Counties have data available for 2010-2023 (excluding 2020) as well.

Results

The differences in median high school educated annual income in Lee and the control counties are depicted in the first graph, and the differences in poverty rates between Lee and the control counties are shown in the second. The year the Toyota Factory began production (2012) is labeled, and so is the beginning of the COVID-19 pandemic. Figure 2 shows that the Toyota Factory being built had effectively no impact on the difference in median income for high-school educated workers between Lee County and the control counties. This indicates that the Toyota Factory did not significantly increase/decrease worker wages relative to the control county. Figure 3, on the other hand, does seem to indicate a relationship. When the Toyota Factory was built in 2012, it is seen that the difference in poverty rates between Lee County and the control counties decreased from -6% in 2012 to -18% in 2019. That is, when the factory was built in 2012, Lee County's poverty rate was 4 percentage points lower than in the control counties, while in 2019, Lee County's poverty rate was 18 percentage points lower than in the control counties. This indicates that the Toyota Corolla Factory was associated with a decrease in the poverty rate relative to the control counties, which is evidence in support of our hypothesis, which was that the factory would decrease the relative poverty rate.

Discussion

We will begin by analyzing figure 2. As mentioned above, there was no clear relationship between building the Toyota Factory and the difference in the median wage for HS-educated workers between Lee County and the control counties. One possible explanation for this is that the median income of high school graduates was not affected by the Toyota Factory because Toyota employers did not need to compete with other employers to secure workers by setting higher wages. That is, the market for low-skilled workers was not very competitive, allowing Toyota to offer low wages that did not increase the median income. This explanation is consistent with theory regarding monopsonies, which predicts that areas with few (and especially one) buyer of labor lead to lower wages for workers when compared to perfectly competitive markets

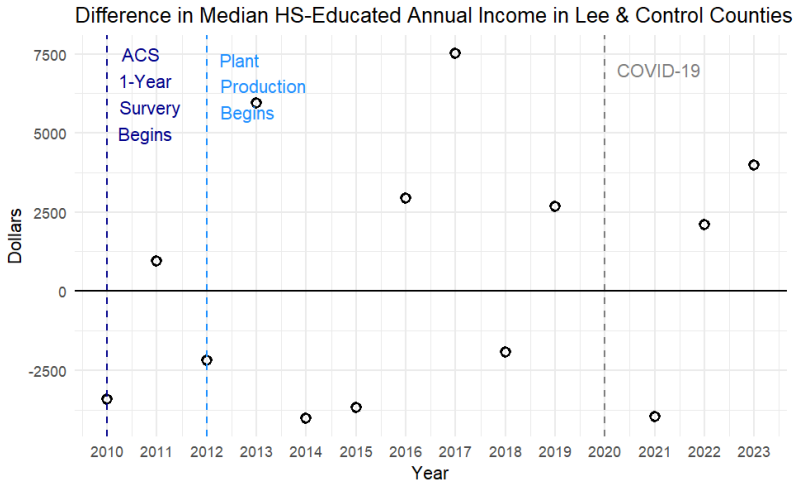

Figure 2: Difference in median HS-educated income between Lee County and the control counties.

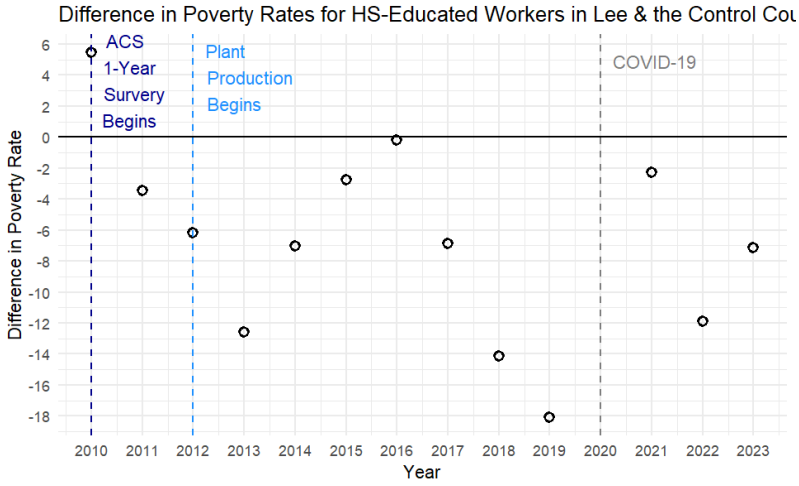

Figure 3: Difference in poverty rate between Lee County and the control counties.

for labor. Next we move to figure 3. We saw that Lee County's poverty rate relative to the control counties decreased by 14 percentage points. At first glance, this result appears to contradict the inconclusive results in figure 2, but further nuance in analysis can provide a possible explanation. When the Toyota Factory began production, the "shock" to labor demand occurred. As explained above, this shock did not lead to a clear directional change in median income. Since the poverty rate decreased, though, it is possible that the jobs created by the Toyota Factory were filled by discouraged workers that entered the labor force in response to the creation of this factory. Since we argue that the Toyota Factory did not change the median income of HS-educated workers relative to the control counties, the wages provided to these formerly discouraged workers likely matched the county median. Further, since these jobs were filled by formerly discouraged workers, many likely exhibited an increase in income that elevated them above the poverty threshold. This then causes the poverty rate to decrease while leaving median income unchanged. There are, of course, many limitations to this model. First, we do not control for other shocks to labor demand in Lee County. There are large fluctuations in the differences between Lee County and the control counties in both figure 2 and 3, so these changes can likely be better explained by assessing other impacts to labor demand in Lee County. Second, we assume that the Toyota Factory had uniform effects on Union, Lee, and Pontotoc counties. It is certainly possible that one of these counties largely absorbed the effects of the factory while the other two experienced relatively little. Finally, we only have two years of data prior to the start of production in the factory, which limits analysis of overall trends.

Conclusion

In this article, we analyzed labor outcomes for high-school educated workers when there is a manufacturing shock via a case study of the Toyota Corolla Factory in Union County, MS. In particular, we compared the labor out-

comes in Lee County (a county within 20 miles of the Toyota Corolla Factory) to five control counties – Forrest, Hinds, Rankin, Madison, and Jones – that are too far from the factory to exhibit any effects. We hypothesized that the median annual income of high school graduates in Lee County would increase relative to the control counties, but after our analysis, no such claim can be made. We hypothesized that the poverty rate of high school graduates in Lee County would decrease relative to Jones County, and we found just that. A possible explanation for the median income behavior is that a lack of competition for securing workers in the Toyota plant allowed Toyota to offer wages equal to the status quo in the county. Finally, we argue that the trend in differences in poverty can be explained by discouraged workers entering the workforce and receiving wages that match the median level.

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The Effect of Ohio's Mid-Sized Metro Areas on Cleveland's Shrinking Urban Population

Giuseppe Llovet-Nava, Jesse Boockvar-Klein

Cleveland has experienced population decline and stagnation over the past 50 years, raising questions about the role of its geographic proximity to growing metropolitan areas like Columbus and Cincinnati. This study investigates whether Cleveland's location exacerbates its population and economic trends by analyzing migration patterns and comparing Cleveland to peer cities—Des Moines, IA, and Buffalo, NY—using U.S. Census data. Results reveal that Cleveland's proximity to larger MSAs modestly influences migration, with 37 percent of its outflow directed to top destinations, slightly higher than its peers. However, the dominance of nearby Akron as a primary destination and positive net commuter inflows suggest the impact of proximity is limited. Broader economic stagnation and demographic shifts appear to play more significant roles in Cleveland's population dynamics, indicating that geographic location alone does not fully explain its challenges.

Introduction

For the last half a century, Cleveland has declined and then stagnated in population. Simultaneously, there are a number of metropolitan areas in Ohio that have been growing very quickly, namely Cincinnati and Columbus. We want to explore the question of whether Cleveland's proximity to these locations has exasperated its downward population and economic trends. In order to do this, we compare Cleveland to other cities with similar outlooks and demographics, and dive into how their migration trends line up. Has Cleveland been a victim of its location?

The literature on migration points to two key factors- the proximity to another location with a more prosperous outlook, and the ease at which people are able to move. In the study Out-of-MSA moves by the data analytics company Unacast, they look at how far people move when they move out of a Metropolitan Statistical Area (MSA). They classified the movers into "bands of outflow", creating seven different bands of distance people move, with the closest being 0 to 10 kilometers away, and the farthest being 1000 to 2000 kilometers away. Unacast found that the majority of people, about 56 percent, move farther than 200km when they move, and another significant chunk, 16 percent, stay relatively close in the 10km to 50km range. However, while these are the overall trends, they found that the trends can differ greatly based on the region. One thing they noticed was that people often move from smaller MSAs to a larger one nearby, meaning location and neighborhood are very important. For instance, they discovered that individuals from the St. Cloud MSA tend to relocate nearby, largely due to its proximity to Minneapolis, whereas those in El Paso, lacking nearby large urban centers, often move much farther when they relocate (*Out-of-MSA moves*, n.d.).

The trend of moving from a smaller MSA to a larger one nearby is especially pertinent to Cleveland. The paper Unpacking Moving by Elisa Giannone, et al, highlights the key detail that lower moving costs, especially in intra-state migration, are a significant player in shaping population dynamics. The closer you are in proximity to another MSA, the lower the moving costs are. This applies to Cleveland, which has the metro areas of Columbus, Pittsburgh, and Toledo (among others) all very close. The paper suggests that this has not bid well for Cleveland, as their economic stagnation and decline has led people to make the life-changing, yet low cost, move to more prosperous locations like Columbus (Giannone, Li, Paixao, & Xinle, 2020). Overall, these papers suggest that Cleveland's proximity to other metropolitan areas has impacted the city negatively.

We hypothesize that Cleveland has been losing population at a faster rate compared to cities with similar outlooks (Des Moine and Buffalo) due to its location geographically as there are other urban areas, such as Columbus, Toledo, and Pittsburgh, close by. The colors in the maps represent population density. The lighter the blue, the higher the population density. (Figure 1)

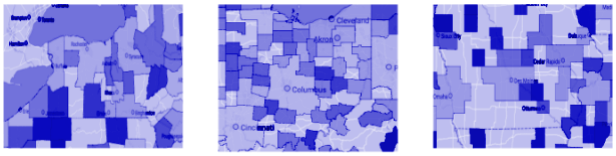

Figure 1: Cleveland, Buffalo, and Des Moines Metropolitan Statistical Areas

Methodology

Tracking migration patterns, especially on local scales such as counties and metropolitan areas, can be difficult. The United States Census Bureau, through the American Community Survey, provides data on migration flows between MSAs across the country. The data used within this exploration was gathered between 2016 and 2020. This was preferred as it would display recent, more relevant relationships between the MSAs without the interruption of large economic changes like those that occurred after the 2008 financial crisis and the post-COVID shocks.

As the focus of the exploration was the city of Cleveland, the Cleveland-Elyria Metro Area was compared to similar metropolitan areas. These comparisons were

found using the Federal Reserve Bank of Chicago's Peer City Identification Tool. A filter was utilized to find cities across the country with a comparable demographic and economic outlooks. The two cities that passed these filters were Des Moines, Iowa and Buffalo, New York. We only selected cities not in Ohio (Cincinnati was also a top comparison).

After the selection of comparison cities, the Census Bureau's Metro Area-To-Metro Area Migration Flow dataset was used to analyze the total emigration and destinations of emigrants from the cities in question. Destinations were ordered by the number of people leaving Cleveland, Buffalo, and Iowa for them. The top four destinations were identified for each of the cities. Additionally, data from the U.S. Census Bureau was used for the population of the Metro areas between 1990 and 2020.

Results

We found in the trends that Cleveland's proximity to other metro areas has a small effect on its total migration.

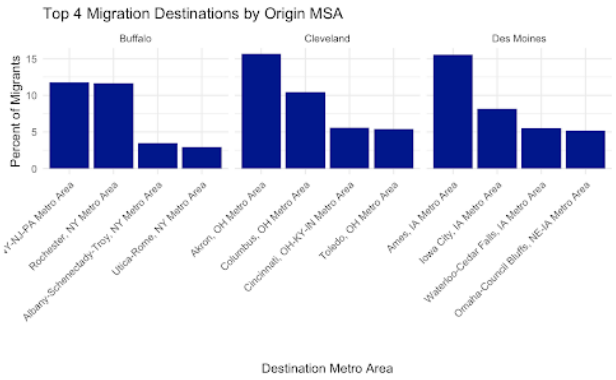

Figure 2: Breakdown of the top four locations people moved to from the three MSAs.

In Figure 2, we find Buffalo to be an outlier as it has two top destinations, New York City metro area and Rochester. While Rochester is the largest MSA that borders Buffalo, NYC is much farther away. Cleveland and Des Moines mirror the Rochester trend, as their top destinations are Akron and Ames, respectively, which are both bordering MSAs. However, we can see that beyond that, Columbus draws a larger share of the migrants from Cleveland (about 10 percent) than Iowa City draws from Des Moines (about 8 percent), as the second most moved to MSA. This suggests that the large size of Columbus, which is a much larger urban area than Iowa City, may incentivize more people to move out of Cleveland, as Iowa City and Columbus are similar distances from the MSA being observed.

This figure shows what percent of total migration is going to the top four destinations. This offers the clearest indication that Cleveland's proximity to other large MSAs may be associated with higher migration levels. 37 percent

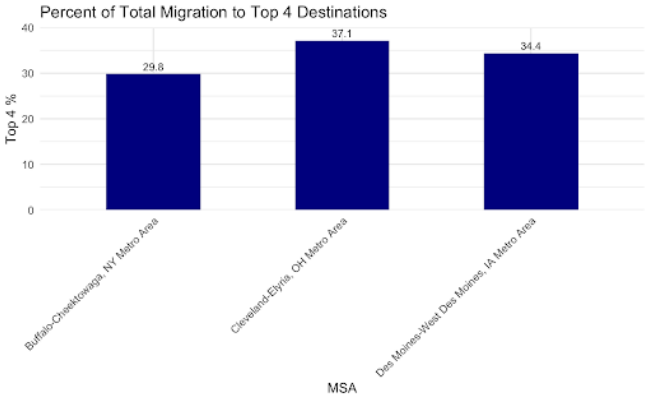

Figure 3: What percent of total migration is going to the top four destinations.

of Cleveland's total migration is directed toward the top four MSAs, which is greater than 34 percent for Des Moines and 30 percent for Buffalo. This suggests that, given that these cities are the most alike according to the Chicago Fed's Peer City Identification Tool, Cleveland's surrounding MSAs may attract more people than Des Moines' and Buffalo's. However, this effect could be marginal given that the spread is 7 percent with only 3 percent separating Des Moines and Cleveland. These graphs have highlighted a dominant trend, in that the plurality of people tend to move as close to where they live as possible. Regardless of the fact that Cleveland is close to a fast growing, prospering city in Columbus, Akron prevails as the number one destination to move, potentially due to proximity.

Another question to address is whether Cleveland experiences a higher overall outflow of residents compared to Buffalo and Des Moines, even if its migration patterns show no unique trends.

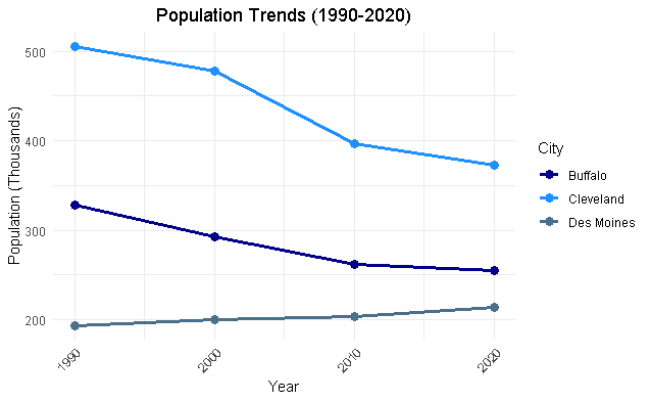

Figure 4: Population changes in each city over last 30 years.

Figure 4 provides some support for that, but it is still unclear. While Des Moines has seen a population increase over the past three decades, Buffalo has followed a similar trend of population decline and stagnation. It's possible that Columbus is affecting Cleveland migration

more from the angle of people moving there when they move to Ohio instead of to Cleveland, rather than people moving out of Cleveland to Columbus. While Columbus is certainly a reason people move out of Cleveland, it is unclear if it has a greater impact than any other large metropolitan area close to an MSA.

In order to further understand the nature and impacts of each location's outmigration, an analysis was conducted of commuter data. Commuter numbers from each city's top migration destination were compared to the magnitude of migration. By subtracting the number of movers from, for example, Cleveland to Akron from the number of people who commute from Akron to Cleveland, we are more able to understand if people who moved to adjacent cities, counties, or MSAs represent complete economic losses to the original location.

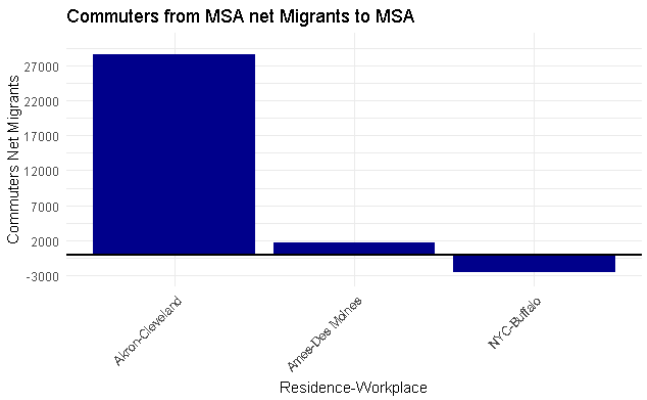

Figure 5: Commuters from each top destination minus migrants to that MSA.

Cleveland receives approximately 28,634 commuters net migrants, implying that, despite the high number of people moving to Akron, this region does not represent an economic drain. Des Moines receives about 1,640 commuters net migrants. This is less of an assurance compared to Cleveland but it still remains positive. Finally, Buffalo is unique in that it loses 2,622 commuters net migrants. This means that the commuters it receives from the New York City metro area are far fewer than the people moving to said area.

Conclusion

Ultimately, Cleveland's location appears to have an inconclusive effect on the people moving out of it. While proximity to larger, more prosperous MSAs like Columbus and Cincinnati offers potential pathways for migration, our findings suggest that this influence may not be as significant as previously assumed. The analysis reveals that while some migrants are drawn to nearby cities, the majority continue to favor closer destinations, such as Akron which may actually dampen the detrimental economic effects of outmigration. This indicates that while the larger MSAs may play a role in shaping migration trends, they do not solely dictate population movements. Furthermore, Cleveland's ongoing challenges, including economic stagnation and demographic shifts, complicate the narrative surrounding its migration patterns. As the city grapples with these multifaceted issues, understanding the nuanced dynamics of migration will be crucial for devising effective strategies aimed at revitalizing its population and economy.

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The Effects of Telehealth Utilization in Healthcare Access in Ohio

Athena Mandal, Allison Su, Eli Davis

In the COVID-19 era, the expansion of telehealth usage has increased dramatically due to the closure of major healthcare facilities and hospital systems. In the state of Ohio, telehealth visits increased from 96 in February 2020 to more than 202,000 visits by July 2020. This resulted in cost-savings and reduction of fuel costs. The frequency of missed appointments has also decreased exponentially due to the increased access of the patient care through telehealth (*New data shows patients save fuel, time and missed appointments with telehealth*, 2020). We obtained our telehealth data from the Ohio Department of Medicaid and our rural information from the Rural Health Information Hub. We modeled the relationship between telehealth usage and income disparities for both metropolitan and non-metropolitan counties in Ohio. We found a negative association in nonmetropolitan areas and a weaker correlation in metropolitan areas. Our research ultimately will allow a better understanding of the relationship between telehealth usage and healthcare access in terms of cost saving methods and income disparities.

Introduction

Telehealth, an approach that has allowed healthcare access to many individuals who otherwise couldn't receive care, has increased exponentially during the COVID-19 era. It is a rapidly growing industry aimed to utilize the intersection of technology and healthcare to create greater access in patient care and the intervention of medical need. The initial creation of telehealth was dated back in the 1950s-60s, where NASA first developed the telemedicine technology for the monitoring of health for the astronauts in space. In our article, we aim to dive into the intersection of telehealth services post COVID-19 with its impact on healthcare access through cost-saving methods and on income disparities (Yardi, 2024).

A study published by the International Journal of Medical Informatics states that the United States saw a 154 percent increase in the usage of telehealth during the first quarter of 2020. Additionally, they found 73 percent of 293 major hospital networks across the United States had adopted telemedicine in 2018. For patient consultancy, 85 percent of the major teaching hospitals have utilized it, along with 49 percent in micro-rural hospitals, and 54 percent in non-profit hospitals (Gaziel-Yablowitz, Bates, & Levine, 2021). According to the United States Department of Agriculture, the state of Ohio will be investing 5.8 million dollars to the rural areas of Ohio to improve access to telehealth and education opportunities.

We consider rural counties as micropolitan and noncore counties as defined by the Office of Management and Budget. Nonrural, or urban, will refer to metropolitan counties, which generally offer a higher density of healthcare resources and greater access to services compared to rural areas (US Census Bureau, 2018). Telehealth has emerged as a potential solution, especially post-COVID-19 by providing remote healthcare services to help address these issues. In Ohio, the rapid adoption of telehealth during the pandemic provided rural residents with increased access to specialists and primary care services. However, the expansion has also highlighted existing barriers such as inadequate broadband infrastructure, which disproportionately affects low-income and underserved areas (Schadelbauer, 2017).

Despite these challenges, telehealth has demonstrated significant benefits in rural settings, particularly through cost savings. By reducing the need for travel, telehealth implementation at Ohio State Wexner Medical Center saved rural patients millions in travel costs alone (*New data shows patients save fuel, time and missed appointments with telehealth*, 2020). Nevertheless, the rural adoption rate continues to lag behind urban centers, and ongoing issues like reimbursement policies and service limitations require further attention (Gillespie, 2024).

This research will investigate the impact of telehealth in rural Ohio, focusing on healthcare access, cost savings, and income disparities. By comparing outcomes in rural versus urban areas, the study will evaluate how telehealth is shaping the future of healthcare equity in the state.

Data

We utilized R to aggregate our telehealth utilization data into a singular map to better understand how the usage of telehealth expands across the state of Ohio in different counties and areas. We hypothesized that the magnitude of the metropolitan counties' telehealth utilization will be significantly larger compared to the rural counties. To further understand the discrepancies, we utilized a scatter plot to represent the differences in the telehealth usage between the metropolitan and rural areas across different counties in Ohio. We hypothesize that metro-area and the high-income group will showcase higher usage in telehealth as we believe that these two groups of individuals will have better access to the services through the internet. We sourced our telehealth utilization data from the Ohio Department of Medicaid that highlights the proportion of telehealth services in comparison with individuals covered on Medicaid throughout different counties in the state of Ohio, and our rural dataset from the Rural Health Information Hub that categorizes each different

counties in Ohio that is represented as metropolitan or non-metropolitan.

Methodology

The telehealth utilization and the health benefit are related with each other along with the income disparities. There are multiple factors that could contribute to this bidirectional relationship. The telehealth utilization could be based on a managed care plan, which is derived from managed care organizations (MCOs). MCOs were implemented to improve overall healthcare access, and with the integration of telehealth, MCOs were expanded across population areas of different income classes. However, this also comes with factors such as restriction access to providers due to the network and in some cases, deniable coverage. This has ultimately led to the variation of how telehealth usage is dispersed across the world.

Result

Figure 1 visually distinguishes metropolitan and nonmetropolitan counties in Ohio using color coding, a classification that is further explored in Figure 2. This differentiation is critical for analyzing telehealth utilization patterns to understand regional disparities in healthcare access and the impact of telehealth services across different socioeconomic and infrastructural landscapes.

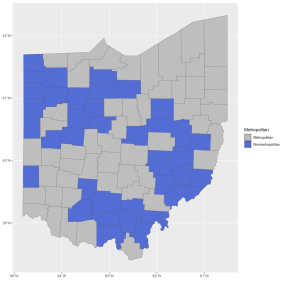

Figure 1: Metropolitan vs. Nonmetropolitan Counties in Ohio

Figure 2 studied relations between per capita income and telehealth usage as a percentage of the population in counties, grouped by their metropolitan status. It is observed from the figure that the low-income and rural groups are the most prevalent users of telehealth in Ohio. We can infer that nonmetropolitan countries have a negative association between income and telehealth usage, suggesting that in rural areas, lower income individuals may be more likely to use telehealth than higher income individuals. This could be attributed to a lack of healthcare facilities in immediate surroundings, making telehealth an attractive affordable choice for lower income individuals. In metropolitan areas, there is a similar negative relation between income and telehealth usage, although the magnitude appears to be weaker. This suggests that external factors may exist in metropolitan areas that subdue the benefits of telehealth in metropolitan areas such as increased proximity to hospitals and other health services centers. Overall, the trend in both county types in Ohio suggest that telehealth has improved accessibility to healthcare for lower income groups.

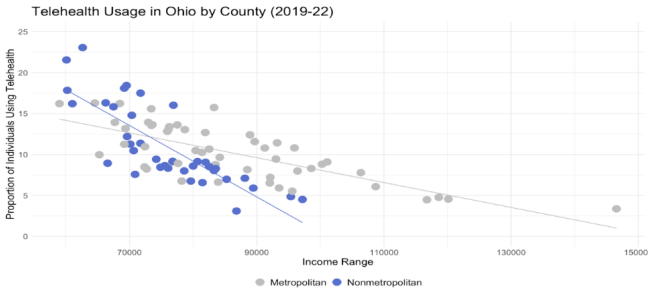

Figure 2: Telehealth Usage in Ohio by County (2019-22)

Conclusion

In conclusion, our study provides a simplified analysis of the relationship between telehealth usage and income across Ohio counties, specifically expanding on the effects in rural and non-rural areas. On examining these disparities, income levels were found to impact telehealth adoption, particularly in nonmetropolitan regions where lower-income populations are more likely to utilize telehealth services. The negative correlation between income and telehealth usage with a stronger effect in nonmetropolitan areas discredited our initial hypothesis that stated telehealth usage would be greater amongst higher income individuals in metropolitan areas. Hence, by identifying and understanding these discrepancies and trends in telehealth usage, policymakers can develop targeted strategies to improve access to telehealth services, particularly for underserved populations, and work towards narrowing the gap in healthcare equity.

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Social Security Privatization: The Case of Chile

Daniel Chase, Neha Hemadri

We examine Chile's four-decade experiment with privatized social security as a potential model for addressing the United States' projected social security funding shortfall by 2037. While Chile's transition from a pay-as-you-go system to private individual accounts offers valuable insights, we conclude that mirroring its privatization model would be inadvisable for the United States given its existing inequalities, labor market complexities, and larger administrative challenges.

Introduction

The U.S. social security system financially supports nearly 60 million retirees, serving as a vital safety net for aging Americans. However, with a growing number of beneficiaries, the system faces a significant challenge, as its funds are projected to run out by 2037 (Goss, 2010). The looming consequences of the current system have pressured policymakers and economists to seek alternative solutions to the current issues social security in the United States may soon face. The answer, surprisingly, may lie within twentieth century Chile.

Chile established its social security system in the 1920s as part of a broader set of labor reforms. However, this system was plagued by inefficiencies and fiscal strain. Efforts were made to replace the faulty system by democratically elected presidents, but these were opposed by powerful interest groups. In the 1970s, an authoritarian wave swept through Chile with the rise of Pinochet's regime, enabling José Piñera, the minister of labor and social security, to finally enact sweeping economic reforms across Chile. In these transitions, Chile's social security system changed to a private individual accounts system (Edwards, 2014).

The debate of whether to privatize or keep public the United States's social security system has been put on the forefront of economic discussion. Social security in the United States is currently structured as a pay-as-you-go (PAYGO) system, where current workers' contributions fund current retirees. A privatized individual accounts (IA) system, in a general sense, would allow individuals to invest their contributions into private accounts rather than directly funding current retirees. Chile's transformation represents one of the longest-standing experiments in social security privatization. As such, it offers valuable insights into both the potential benefits and challenges of such a change occurring in the United States.

This article will examine the current Chilean model as a case study to evaluate the broader implications of such reforms on the labor market. Furthermore, this analysis will explore the potential parallels and differences between Chile's experience and the U.S. context, considering the unique characteristics that might influence similar reforms in the United States.

The Chilean Model

To understand the full scope of Chile's transformation, we must examine the serious problems their PAYGO model faced, particularly an accelerating ratio of retirees to active workers. Though the system encountered a 209% increase in retired individuals between 1961 and 1973, there was only a 53.5% increase in the number of workers. Payroll tax increases reached up to 65% of total wages in some cases, and funds required constant state subsidization, which amounted to almost 30% of state revenues (Borzutsky, 2003). Even still, pensions were inefficient and most retirees lived in poverty.

The reforms toward social security implemented an individual capitalization fund, introduced about 20 AFPs (private pension fund administrators) and protections such as recognition bonds and guaranteed minimum pension. Existing workers could remain on the PAYGO model, but all new workers are required to join the IA model. Workers must contribute 10 percent of earned wage to their IAs, however extra contributions are encouraged through tax exemptions (Ferriera, 2003). The results have been mixed.

The reforms achieved a modest expansion in coverage. About 60% of the labor force was covered by the public pension system pre-reforms. By 1998, this reached 70% (Roffman, 2008), and today it sits at around 75%. The IA models required 10% contribution and policies supporting labor formalization helped broaden overall coverage.

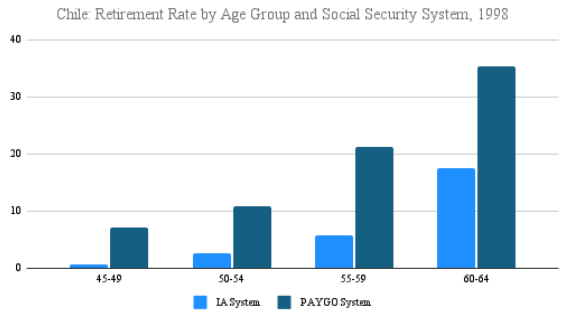

Figure 1: Chilean retirement rate by age group and social security system, via CASEN Survey (1998)

Workers under the IA model faced significantly lower retirement rates than those who remained on the PAYGO model versus switching to the IA model. The disparity was particularly pronounced in older age groups, with

workers aged 60-64 showing a retirement rate of 35.4% under the PAYGO system versus just 17.5% under the IA system, suggesting that the reform may have created conditions that encouraged longer workforce participation.

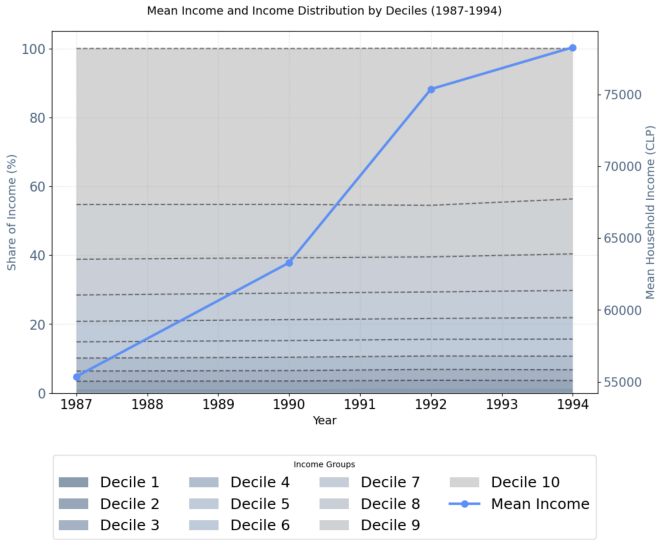

Figure 2: Mean income and income distribution by deciles in Chile, via World Bank (Ferriera, 2003)

The data described in Figure 2 shows a clear rise in mean income over the 1987-1994 period in Chile. These findings convey mixed signals. The mean household income increased substantially from approximately 55,000 CLP in 1987 to 75,000 CLP by 1994, with particularly sharp growth occurring between 1990 and 1992. This significant increase in average income coincided with the period of extended workforce participation under the IA system, suggesting that delayed retirement may have contributed to higher household earnings through prolonged labor market engagement. The data also reveals that this growth pattern was distributed consistently across different income deciles throughout this period, indicating that not one group of earners saw significant growth as opposed to other groups. Nonetheless, wage inequality remained high, with the top 10% of workers earning roughly 45% of income during this period.

Pension savings inequality remains troublesome within the IA model. Data taken from the Superintendency of Pensions (see Fig. 3) demonstrates a persistent disparity between high and low contributors, with high contributors receiving approximately 3 times the pension value compared to low contributors. This inequality stems from the fundamental design of the system, where the 10% mandatory contribution towards IRAs acts as a regressive tax - while the contribution rate is low, it places a proportionally higher burden on low income earners and allows high income earners to accumulate substantially more capital in their accounts (Superintendencia de Pensiones, 2016-2024).

The shaded areas in the graph, representing gaps between self-financed pensions and total pensions, are indicative of how state-subsidization remains crucial for

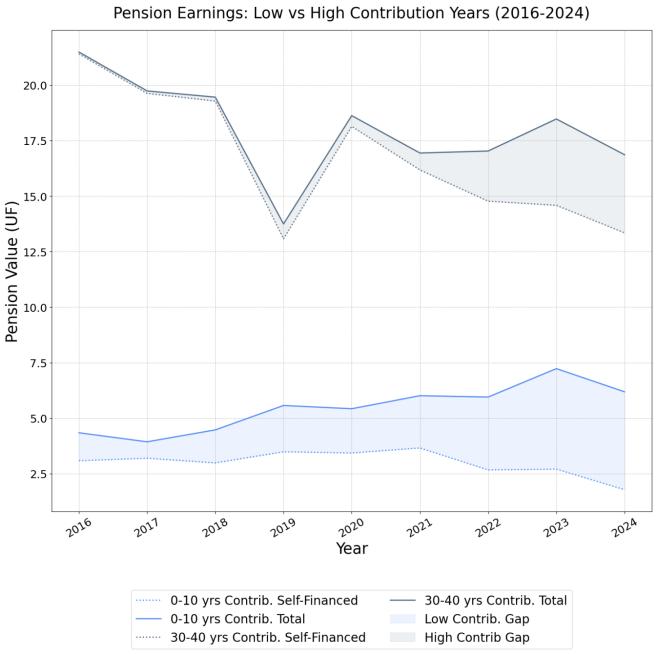

Figure 3: Chilean pension earnings based on years contributed, via Superintendency of Pensions

both groups even in the new model, especially so amidst the COVID-19 pandemic and global recession. Overall, we see a significant gap in savings as a result of income inequality, suggesting that the Chilean model has not achieved its goal of self-sustainable retirement funding for all economic classes.

Implications on US Privatization

Chile's transition from a PAYGO model to privatized social security offers particularly relevant insights for US policy considerations. Like the current US system, Chile's pre-reform program faced unsustainable demographic pressures, with its worker-to-retiree ratio dropping dramatically from 12:1 in 1955 to 2.5:1 by 1979, a trajectory now mirrored in US projections (Thorburn, 2006). Among nations that have attempted social security privatization, Chile's four-decade experience provides the longest-running and most comprehensively documented case study, implemented in a similarly developed financial market system. However, in order to effectively assess the implications of a US privatized system based on the results of Chile's experience, we must carefully contextualize these outcomes for the US environment.

The labor market response to privatization in Chile reveals important structural differences that would affect similar reforms in the US system. Labor force participation rates among older workers are substantially higher in the US compared to Chile (38.4% for ages 65-69 compared to Chile's 28.7%) and part-time work opportunities for transitioning retirees are also more developed. This may indicate that the workforce retention effects might be less dramatic in the US context. Chile's reforms had

particularly strong effects in formal sector employment, where workers could more readily participate in the IA system. The US economy, with its larger service sector and growing gig economy, presents different challenges for implementing similar reforms. The impact on labor mobility and job-lock would need careful consideration given the US employer-based healthcare system

Beyond labor market effects, Chile's privatization experience demonstrates how structural inequalities can be amplified in an individualized retirement system. The data shows high contributors receiving approximately triple the pension value of lower-income contributors, a persistent disparity across the sample period. This trend is especially relevant for the US, where existing income inequality significantly exceeds Chile's pre-reform levels. While Chile's reforms achieved modest expansion in coverage from 60% to 75% of the labor force, the US faces different challenges with its near-universal coverage but wider income disparities. The risk of exacerbating these disparities is further heightened by the role of financial literacy in privatized systems, where higher-income workers benefit from market returns and have the financial literacy to manage investments, while lower-income workers struggle with investment decisions and risk management. In the US, where financial literacy varies widely and financial markets are complex, privatization could worsen these disparities and undermine the social safety net.

The last major consideration is the critical balance between state support and private management. Chile's experience demonstrates that state involvement remained essential, with government subsidies still accounting for a significant portion of retirement support, particularly during economic downturns. This continued reliance on state subsidization raises important questions for the US context, where the scale of the population would require substantially larger financial commitments. While Chile's system of approximately 20 AFPs helped manage individual accounts, the US would face significantly greater administrative challenges given its larger scale and more complex financial markets. These administrative considerations become particularly relevant when considering that the US would need to maintain parallel systems during any transition period, potentially increasing rather than reducing government expenditure in the short to medium term.

Conclusion

While privatization of social security offers potential benefits, Chile's reforms highlight several critical concerns for the U.S. context. The disproportionate impact of market volatility on lower-income earners led to significant disparities in accumulated returns between income groups. The continued need for state support for low-income retirees suggests that privatization failed to achieve true independence from public funding. Furthermore, while the individual accounts system encouraged longer workforce participation, this may have resulted from necessity rather than choice, as workers struggled with the complexity of retirement planning. This takes away from the core idea of what nationalized social security is supposed to be: a safety net for low-income earners who require state support. These outcomes, combined with the U.S.'s existing income inequality and market complexities, suggest that mirroring Chile's privatization model would be inadvisable in the current socioeconomic climate.

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Economic Analysis of Thailand and Vietnam: Post-Pandemic Recovery

Yinyuan Chen, Aizah Kamal

The COVID-19 pandemic revealed contrasting vulnerabilities and strengths within the economies of Thailand and Vietnam, emphasizing shifts in GDP and Gross Provincial Product (GPP) pre-and post-crisis. Although both nations enjoyed steady growth prior to 2020, the pandemic challenged their economic foundations. Vietnam's diversified economic structure and proactive fiscal policies facilitated a quicker recovery (World Bank, n.d.; International Monetary Fund, n.d.), while Thailand, heavily dependent on tourism, faced a more prolonged struggle (SP Global Market Intelligence, 2023). Through secondary data analysis and statistical methods, this study compares the distinct recovery trajectories of these neighboring countries, illustrating how economic diversity and responsive policy measures enabled Vietnam to better withstand the crisis. This analysis sheds light on the importance of economic structure in fostering resilience during global disruptions (World Economic Forum, n.d.).

Introduction

Before the COVID-19 pandemic, Vietnam and Thailand were both on steady economic growth trajectories, largely driven by key sectors: manufacturing and exports for Vietnam, and tourism for Thailand (World Inequality Database, n.d.; Organisation for Economic Co-operation and Development, n.d.). This paper explores how these countries' economic structures and policy responses influenced their recovery after the pandemic, particularly in terms of GDP and GPP (Guidotti & Ardia, n.d.; United Nations University World Institute for Development Economics Research, n.d.). The research aims to analyze the policy decisions that shaped each country's recovery, emphasizing differences in fiscal and monetary strategies (Asian Development Bank, n.d.; World Bank, n.d.).

Literature Review

Before the COVID-19 pandemic, Vietnam and Thailand exhibited distinct economic structures that shaped their trajectories and vulnerabilities (Federal Reserve Economic Data, n.d.). Vietnam experienced rapid economic growth, averaging 7% annually from 2017 to 2019, driven by exports in electronics and textiles and substantial foreign direct investment (World Inequality Database, n.d.; International Monetary Fund, 2019). Vietnam's integration into global supply chains and trade agreements, such as the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP) and the European Union-Vietnam Free Trade Agreement (EVFTA), positioned it as a key manufacturing hub (World Economic Forum, n.d.). Strategic investments in infrastructure and education further diversified Vietnam's industrial base, making its economy less susceptible to global demand shocks (World Bank, n.d.).

In contrast, Thailand relied heavily on tourism, which accounted for about 20% of its GDP pre-pandemic (SP Global Market Intelligence, 2023). The country's status as a top global travel destination fostered growth in sectors like retail and hospitality but left it vulnerable to downturns in international travel. While tourism generated short-term gains, it also highlighted structural weaknesses, as other sectors, including manufacturing and agriculture, remained comparatively underdeveloped (World Bank, 2023).

Vietnam's diversified economic structure, focused on manufacturing and exports, created resilience that shielded it from overdependence on a single sector (Asian Development Bank, n.d.; International Monetary Fund, n.d.). By contrast, Thailand's significant reliance on tourism stemmed from economic policies that prioritized investment in tourism infrastructure over broader industrial development (Organisation for Economic Co-operation and Development, n.d.; World Economic Forum, n.d.). While this approach supported growth in the early 2000s, it also heightened the country's vulnerability to external shocks (World Inequality Database, n.d.). Vietnam's pre-pandemic fiscal conservatism, characterized by low public debt and strong foreign exchange reserves, contrasted with Thailand's more consumer-spending-driven strategy, which relied on tax incentives and public spending (International Monetary Fund, 2019).

The pandemic underscored these structural differences. Thailand's tourism-dependent economy faced a sharp contraction, with GDP declining by over 6% in 2020 (World Bank, n.d.; SP Global Market Intelligence, 2023). The prolonged travel restrictions severely affected recovery efforts. In comparison, Vietnam's manufacturing-driven economy proved more resilient, with a brief contraction followed by a rebound fueled by strong export performance and domestic consumption (World Bank, n.d.; Federal Reserve Economic Data, n.d.). Vietnam's swift policy interventions, including tax deferrals, debt relief, and targeted fiscal support for manufacturing, minimized economic disruptions and facilitated recovery (Asian Development Bank, n.d.; International Monetary Fund, n.d.). Thailand, despite implementing large fiscal stimulus packages and soft loans for small and medium-sized enterprises, struggled due to its reliance on tourism (World Bank, 2023). Public debt surged to nearly 60% of GDP by 2021, raising concerns about long-term fiscal sustainability (SP Global Market Intelligence, 2023).

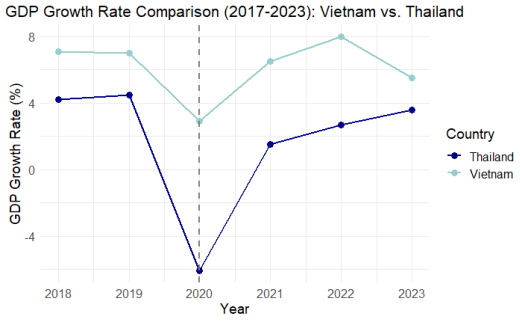

Figure 4: This graph shows the contrasting GDP growth rates between Vietnam and Thailand from 2017 to 2023, highlighting Vietnam's quicker recovery post-2020.

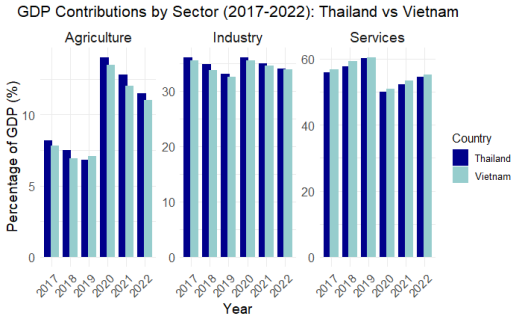

Figure 5: This chart compares the percentage change in the contribution of Thailand and Vietnam to GDP in agriculture, industry and services from 2017 to 2022.

In conclusion, the contrasting economic structures and policy choices of Vietnam and Thailand shaped their pandemic responses and recovery trajectories. Vietnam's diversified industrial base and export-oriented growth model provided flexibility and resilience, while Thailand's tourism dependency exposed its economy to significant vulnerabilities during global disruptions (International Monetary Fund, n.d.; World Economic Forum, n.d.).

Post-Pandemic Recovery

Vietnam and Thailand demonstrated markedly different recovery patterns in the aftermath of the COVID-19 pandemic. Vietnam's manufacturing and export sectors experienced a swift rebound, with GDP growth projected to return to pre-pandemic levels by 2022 (International Monetary Fund, n.d.; Federal Reserve Economic Data, n.d.). This rapid recovery was bolstered by the country's strong industrial base and effective policy interventions (World Inequality Database, n.d.). Conversely, Thailand faced a slower recovery, hampered by its reliance on tourism and the challenges of managing rising public debt (World Bank, 2023; SP Global Market Intelligence, 2023). Reports from the Bank for International Settlements and the World Bank Group highlight the prolonged struggles of Thailand's tourism sector and the broader economic implications of increased fiscal spending during the crisis (Asian Development Bank, n.d.; International Monetary Fund, n.d.).

The graphs below provide a visual representation of trends in GDP growth, the impact on the tourism sector, and unemployment rates for both Vietnam and Thailand.

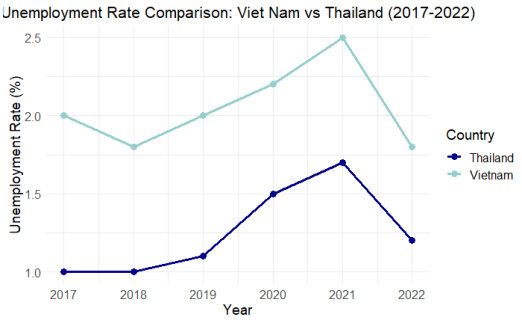

Figure 6: This graph illustrates the differing trends in unemployment rates in both countries, with Thailand showing higher unemployment post-2020.

Methodology

Our study employs a quantitative research design to examine the economic trends in Thailand and Vietnam during the COVID-19 pandemic, focusing on how these countries reacted to the crisis. Using datasets on GDP, tourism, and unemployment rates from 2020 to 2022, we explore the broader economic outcomes and recovery trajectories rather than a direct causal analysis of central bank policies (International Monetary Fund, n.d.; Federal Reserve Economic Data, n.d.). Data was collected from publicly available sources, including Statista, and analyzed through R Studio (Guidotti & Ardia, n.d.). Line plots and bar charts were used to visualize trends and correlations among economic variables and policy responses.

Conclusion

Vietnam's diversified economy and effective policy interventions facilitated a relatively swift recovery post-COVID, despite initial disruptions in exports and manufacturing. Meanwhile, Thailand's reliance on tourism resulted in a more prolonged recovery, exacerbated by increased public debt and slower GDP growth. While these trends highlight the importance of economic diversification and fiscal prudence during global crises, this study is limited by its reliance on aggregate, country-level data, which does not capture regional disparities or the role of province-level variations within each country.

Future research could enhance these findings by incorporating data from additional countries to provide broader comparative insights. Expanding controls to include monetary policy measures and their direct effects on specific sectors could also help isolate their impact on

recovery. Moreover, a more granular analysis, including household-level data, could shed light on the intersection of economic trends and wealth inequality, offering a more comprehensive understanding of policy implications. A focus on structural reforms in sectors like tourism and manufacturing would also provide valuable perspectives on fostering resilience in the face of future global disruptions (International Monetary Fund, n.d.; World Bank, 2023).

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