

4-2016

Using Pittsburgh as a Model for the Revival of Detroit- An Application of the City Growth and Industry Mix Model

Steven Warda

Grand Valley State University, wardast@mail.gvsu.edu

Follow this and additional works at: <https://scholarworks.gvsu.edu/honorsprojects>



Part of the [Architecture Commons](#)

ScholarWorks Citation

Warda, Steven, "Using Pittsburgh as a Model for the Revival of Detroit- An Application of the City Growth and Industry Mix Model" (2016). *Honors Projects*. 530.

<https://scholarworks.gvsu.edu/honorsprojects/530>

This Open Access is brought to you for free and open access by the Undergraduate Research and Creative Practice at ScholarWorks@GVSU. It has been accepted for inclusion in Honors Projects by an authorized administrator of ScholarWorks@GVSU. For more information, please contact scholarworks@gvsu.edu.

Using Pittsburgh as a Model for the Revival of Detroit-

An Application of the City Growth and Industry Mix Model

Steven Warda

Advisor: Leslie Muller, PhD, Assistant Professor of Economics

Grand Valley State University

1 Campus Drive, Allendale, MI, 49401

Introduction

Images of crumbling infrastructure and abandoned buildings are often evoked when one thinks of the city of Detroit, Michigan. The Motor City was once an area of massive population growth and a place of opportunity for blue-collar workers to receive employment in the booming automobile industry and be lifted into the middle class. High rates of population growth starting at the beginning of the twentieth century led to rapid development of the city. By 1950, the city had reached a population of 1.85 million people and employed 1.193 million people. However, the city would begin to suffer population losses beginning in the 1950's, as well as a period of declining market share in the automobile industry which forced decreased production and loss of jobs (MacDonald, 2013, p. 8). The overarching trend of decline has continued to the present day, making Detroit a prominent example of a damaged postindustrial city.

Why is Detroit often viewed as one of the worst cases of urban decay? Many other American cities have faced similar issues of deindustrialization, yet are not perceived to be as distressed as Detroit. Cities within a region of heavy manufacturing- known as the "Rust Belt"- often faced the exact same issues as Detroit, including population and employment losses which led to abandonment, loss of tax revenue, increased crime, and a remaining population largely composed of impoverished or otherwise low income citizens. Rust Belt cities were those whose primary industry was in manufacturing, often encompassing northeastern and mid-western cities surrounding the Great Lakes. While there were many cities in this region that could be classified under this name, some of the most prominent ones include Cleveland, Buffalo, Baltimore, Pittsburgh, and Detroit. Of these cities, Detroit is often viewed as the worst case study of the effects of deindustrialization on a city.

The objective of this paper is to determine which factors have caused Detroit to be struggling the way it is today. In order to do this, I compare Detroit with a Rust Belt city that has once shared many of Detroit's problems but since then has undergone substantial regional economic growth. The city of Pittsburgh, Pennsylvania shared many similarities to Detroit in the period of the booming manufacturing industry. Known as the Steel City, Pittsburgh remains as the headquarters of the U.S. Steel Corporation. By the 1950's, General Motors and U.S. Steel were one of the most prominent and profitable industries in the manufacturing sector (Ohanian, 2014, p. 2). However, both the automobile industry and the steel industry became subject to increased foreign competition starting in the 1960's, resulting in a declining global market share for both sectors in the last half of the twentieth century. For the auto industry, the market share of the "Big Three"- General Motors, Ford, and Chrysler- dropped below 50% around the year 2007, and as such was under severe financial distress during the Great Recession (Lin, 2014, p. 46).

Pittsburgh is a city that has largely shifted its primary industry structure from steel manufacturing to one centered on education and health care services. Through increased entrepreneurial activity, the city has also been able to adapt a diversified industry structure in the fields of technology and financial services. In recent years, the city of Pittsburgh has topped the list of Quality-of-Life Rankings in publications such as *Money*, *Forbes*, and *Places Rated*. The Economist Intelligence Unit ranked Pittsburgh as the most livable city in the continental United States in both the years of 2005 and 2013. In 2014, the city of Pittsburgh ranked second on the list of "America's Smartest Cities" released by Forbes magazine, which is attributable to the large growth rate in the proportion of residents possessing at least a bachelor's degree (Tripp Umbach, 2014, pp. 43-45; Kotkin & Schill, 2014). The overall economic well-being of the city

today provides suggestive evidence that some crucial actions were taken to transform the economy of Pittsburgh beginning in the 1980's. Meanwhile, Detroit today still struggles with high rates of poverty, crime, and unemployment.

This study is largely an extension of the city growth and industry mix model constructed by Lin (2015). The model provides a comprehensive view of the factors which explain a city's growth or a city's decline. While the author does illustrate how Detroit's decline can be explained by the model, missing from the analysis are specific strategies for the city's improvement. Lin also compares the cities of Detroit and Pittsburgh on the basis of industry types and human capital stock, but this analysis is brief and not the primary focus of the study. Thus, the goal of this research is to expand upon Lin's initial discussion by providing more detailed narratives of the economies of Detroit and Pittsburgh. Specifically, the subjects of tax policy and human capital stock- both of which are components to the model- will be described more closely as it relates to both cities, and how these variables were important to Pittsburgh's recovery and are applicable to Detroit's current situation. This study finds that Pittsburgh was able to undergo economic revival due to successful tax policy measures and investment in research and development at the university level which promoted the growth of human capital. Meanwhile, Detroit's history of poorly constructed tax policies and a lower stock of human capital play a role in explaining the problems the city still faces today. Learning from the successes of Pittsburgh, this study will describe specific strategies for economic growth in the city of Detroit as well as highlight recent strides the city has made that follow in the footsteps of Pittsburgh's recovery.

Review of the Literature

MacDonald (2013) studies the history of population and employment losses in Detroit starting in the 1950's. The author finds that Detroit's losses in population and employment didn't become significantly more severe than other struggling cities until the beginning of the twenty-first century. Using census data from 2000 to 2010 for 17 northeastern metropolitan areas, the author finds significantly larger declines in the number of manufacturing jobs in the metro Detroit region, which decreased from 488,000 to 200,000, a 52.5% loss. Meanwhile, the population of the central city declined by 24.9%, which was 8.1 percentage points greater than the population losses in Cleveland, the city with the second greatest losses in population in that decade. Detroit's particularly substantial losses in population and employment in the first decade of the twentieth century is at least partially attributable to the housing market crash and the Great Recession. While never experiencing a substantially large housing boom, the median price of a single-family home in Detroit appreciated from \$73,000 to \$82,000 between 2004 and 2007, but fell to \$24,000 in 2009 and bottomed out at \$16,000 by May of 2011. Social conditions also worsened with higher poverty rates- a 10.1 percentage point increase from 2000 to 2010- and higher murder rates (pp. 15-19). The author ultimately finds that Detroit's serious signs of economic and social distress became particularly apparent in the 2000-2010 decade.

While there have been numerous proposed causes of Detroit's social and economic decline, Lin (2014) proposes one primary cause which is very applicable to the city of Pittsburgh and other Rust Belt cities. The author views most of Detroit's issues as having been rooted from the city's overreliance on the automobile industry and lack of development in more diversified industries. Further, Ohanian (2014) found that firms within the automobile, steel, and rubber industries in the Rust Belt were nearly oligopolies, possessing a majority of the global market

share in these industries. This led to price mark-ups well above cost and lack of incentives for innovation to improve productivity levels and reduce costs. This also created little incentive for entrepreneurship in these cities, as industry diversification did not seem necessary when employment levels were so high in their primary industry. The behaviors of these manufacturing firms combined made Rust Belt cities very susceptible to economic decline once foreign competition grew. Such competition grew particularly strong in the auto and steel industries in the 1980's, forcing large firms such as U.S. Steel and General Motors to decrease production levels and begin laying off workers. In Detroit, automakers often moved production plants to Southern states to take advantage of lower costs of labor (Lin, 2014, p. 47). The decreased production in Detroit and Pittsburgh's primary industries transpired to losses in employment and population and a general downward economic decline in the period of deindustrialization in the 1970's and 1980's. These cities lost a significant share of their population because there was a lack of employment opportunities due to the absence of other industry types in the region.

This literature suggests that Detroit and Pittsburgh were once cities with very similar problems, but Detroit today is far worse off than Pittsburgh or any other former Rust Belt city. This finding suggests that in order to properly compare the two cities, we must address the root cause of both of their declines, which was their overreliance on one industry type. Further, as a way to find strategies for the improvement of Detroit, we must focus our attention on the ways in which Pittsburgh was able to diversify their industrial structure. The model which follows provides a framework with which to compare both of these cities and investigate how Pittsburgh was able to solve its issue of an undiversified industry structure.

The City Growth and Industry Mix Model

Lin (2015) provides a framework to cohesively understand how a city is able to grow and develop. This model is shown in figure 1, which has been replicated from the author's original work. The city growth and industry mix model establishes that the primary goal for a city is to have a well-diversified mix of industries. This is to avoid the economic volatility that is associated with over-reliance on one industry which thereby makes the city more resistant to adverse economic conditions. This will insure that unemployment rates remain low, thus preventing population losses. Since tax revenue is mostly derived from residents within a city, strong population levels will insure large enough tax revenues to fund city services, such as the police force and bus system, as well as infrastructure, such as street lighting. High quality city services incentivize people to locate within the city, thus creating a higher population and tax base. High population and employment levels in American cities are often synonymous with a large stock of human capital, often measured by the proportion of the working-age population with a four-year college degree or more. A well-educated workforce, through research and entrepreneurship, will allow a city's industry structure to remain diversified through the creation of new ideas and start-up firms. Thus, the model ultimately feeds back into the diversified industry structure. As long as this condition holds true, the city will be allowed to grow, as the model is self-reinforcing.

Just as the city growth and industry mix model can be used to explain how a city grows, it can also be used to explain how a city declines. As explained earlier, Detroit and Pittsburgh's overreliance on one industry prompted losses in employment and population once the period of deindustrialization took hold. The loss of population reduces the tax base and places severe fiscal pressure on the city government. If severe enough, this may translate to lower quality city

services. This creates a viscous cycle of further population loss and decrease in tax base, as fewer people are willing to move into a city that is not as well maintained. A city with underfunded resources, such as the police force, is also more susceptible to increased crime rates, further decreasing the desire to locate in the city. Population losses are indicative of a “brain drain,” where an educated workforce leaves the city to pursue better employment opportunities. A lack of human capital dampens entrepreneurialism and creation of new ideas, so the city’s root issue of a poor industry mix remains unsolved. The story that this model tells of how a city declines is quite descriptive of what was happening in Detroit and Pittsburgh during the period of deindustrialization.

From the general ideas presented in the model, there appears to be two ways in which city policymakers can reverse the trend of city decline and even promote city growth based on the ideas within the model. Since the industry mix of a city and its population are the core variables within this model, policymakers should hope to achieve a growing population as well as a diversified industry structure. However, there is no direct way a policymaker can increase the population size of a city or increase the types of industries which exist in the city. However, there are two variables within the model that can be manipulated in a more direct way that will eventually lead to these desired outcomes. One of those variables is tax revenue. Local tax policies can significantly influence the amount of revenue the city receives. Taxes play a large role in shaping economic incentives, especially as it relates to locating within a city. Therefore, an ideal tax policy is one which minimizes adverse economic incentives yet still is able to bring in sufficient amounts of revenue to keep city services and infrastructure of good quality. The second variable that can reverse the trend of city decline is the stock of human capital, which can often be influenced at the college and university level through research and development.

Colleges and universities often drive the direction of a city's economy, as they can influence the amount of skilled workers within the city. A more highly educated and skilled workforce will promote the growth of entrepreneurship and ideas, which can eventually help create a diversified industry structure.

The Deindustrialization of Detroit and Pittsburgh

The city growth and industry mix model explains the losses of population and employment in both Detroit and Pittsburgh during the period of deindustrialization. Because both cities relied too heavily on their respective industries, foreign competition led to employment losses and lack of alternative employment opportunities. As a result, the population of the central cities began to decline. Figure 2 shows the trend in the population sizes of Detroit and Pittsburgh from 1950-2014, while Figure 3 shows the percentage change in population over time for each city. An analysis of these figures reveals that both cities have experienced similar proportional declines in population, especially after the 1960's. However, after the year 2000, there is a significant differential in the percentage decrease in population loss. While Pittsburgh experienced a relatively modest 8.6% reduction in population (28,859 people) from 2000 to 2010, Detroit suffered a 25% reduction in population, corresponding to a loss of 237,493 people. A 2014 Census Bureau estimate puts Detroit's population at 680,250 people, which is only 36.8% of the population that existed in 1950.

A comparison of unemployment rates between the two cities highlights the employment losses which occurred in these cities, particularly in the 1970's and 1980's. Figure 4 shows unofficial county-level unemployment rate data from 1976-1989 while figure 5 shows official

county-level unemployment rate data after 1990.¹ Figure 4 reveals that the decline of the steel industry culminated in Pittsburgh in 1983, where the county unemployment rate was 12.9%, 3.3 percentage points greater than the national average. Both Wayne County (containing Detroit) and Allegheny County (containing Pittsburgh) continued to have unemployment rates higher than the national average throughout most of the 1980's. Considering the nation was already undergoing an economic recession in the early 1980's, the circumstances in both cities appeared to be particularly severe. Further, the unadjusted unemployment rate for the Pittsburgh MSA was 18.2% in January 1983. U.S. Steel, Bethlehem Steel, and Weirton Steel were forced to close entire plants, displacing thousands of steel workers (Toland, 2012).

After the collapse of the steel industry in the early 1980's, the Pittsburgh area has seen lower unemployment rates, beginning particularly after 1990, as shown in Figure 5. In fact, the unemployment rate for Allegheny County has remained below the national average from 1990-2014. Meanwhile, Wayne County continued to observe unemployment rates higher than both the national rate and the rate for Allegheny County from 1990-2014 (with the exception of the rates for all three areas being approximately equal in the year 2000). Figure 3 also demonstrates that while the city of Pittsburgh continued to lose population, this was at a much lower rate, particularly beginning in the 2000-2010 decade. Meanwhile, the city of Detroit began to lose population at an increasing rate within the same decade.

The final measure that will be used in the preliminary comparison between Detroit and Pittsburgh is that of real per capita personal income. Such a measure may gain a sense of the quality of life in these cities within the time period of 1969-2014. As a standard to compare

¹ Due to a change by the Bureau of Labor Statistics in the methodology used to calculate unemployment rates after the year 1990, the two data sets cannot be directly compared to one another.

these values, the per capita personal income for the entire metropolitan portion of the United States was used. The data from 1969-2014 is presented in figure 6.² Before 1980, Wayne County in most years surpassed the national per capita personal income, but after 1980 has consistently fallen well below the national value. The largest differential was in 2012, when the Wayne County personal income per capita fell \$2,860 below the national figure. Meanwhile, the Allegheny County real personal income per capita fluctuated between falling above and below the national figure, but after 1990 began to grow at a much higher rate than both Wayne County and the metropolitan region of the United States.

The significantly lower unemployment rates, coupled with the rise in per capita incomes, provide suggestive evidence that the Pittsburgh region began to recover from the decline of the steel industry and has shown signs of economic growth since the 1990s. The next sections illustrate how Pittsburgh began to improve its initial problems of high unemployment and declining population, while Detroit continues to experience these problems to this day.

Tax Policy

Tax policy is of critical importance to the discussion of promoting economic growth and population stabilization in a city because altering taxes help shape a person's incentives as to whether or not to locate in a city. Taxes are also the source of funding government services such as the police force and infrastructure, and the quality of public services is another crucial factor in a person's location decision. Policymakers in struggling cities such as Detroit thus face a dilemma as it relates to tax policy: how to keep taxes affordable (to prevent incentives to leave the city) while also finding the funds to provide public services in the face of declining tax

² Nominal per capita personal incomes were converted to real per capita personal incomes using the Consumer Price Index, with 1982-1984 serving as the base period.

revenue. The following discussion will argue that the flaw in Detroit's tax policy was that policymakers only focused on preventing the decline in tax revenue by raising taxes and creating new tax types, thereby incentivizing more people to leave the city. However, the city of Pittsburgh avoided this issue by selectively choosing which types of taxes to increase as to prevent the incentive for citizens and firms to leave the city. Using Pittsburgh and other suggested proposals, this section will lastly discuss how Detroit can improve their tax policies moving forward.

The concerns surrounding Detroit's tax policy since the 1960's involve the numerous types of taxes the city of Detroit has implemented in addition to the heavy burden low income citizens face and, correspondingly, the increased rates of property tax delinquency. Consequently, city services and other responsibilities of the city government have suffered. While Detroit implements an ad valorem property tax, this is quite common across most municipalities within the state of Michigan. According to a 2013 report from the Citizens Research Council of Michigan, property taxes composed 24% of total government revenues. Meanwhile, the municipal income tax made up the largest share of revenue at 37%. The income tax was instituted in 1962 as a response to declining property values, and the rate was raised in 1968 and again in 1982 (Lin, 2014, p. 50). Only 21 other Michigan cities have implemented a municipal income tax, but Detroit has the highest tax rate at 2.5% for residents of the city and 1.25% for non-residents working in the city. In 1990 under Public Act 100, Detroit was the only city in Michigan allowed to implement a five percent utility users' excise tax, applicable to telephone, electric, steam, and gas services. The tax composed 8% of total government tax revenues in 2010. In 1996, Detroit implemented a casino wagering tax on the three casinos operating within the city, which has generated significant amounts of revenue, composing 31%

of Detroit's tax revenues in 2010 (CRC Michigan, 2013, pp. 21-25). McDonald (2014) claims that Detroit was able to delay its declaration of bankruptcy in 2013 by implementing this tax, as the tax lifted the city out of a budget deficit in the last half of the 1990's. He further argues that taxes such as these were only short-term solutions to Detroit's chronic issues (pp. 14, 19).

While Detroit has been able to produce revenue from these new tax types, their property tax policy has been characterized by high rates and high tax delinquency rates, all of which have led to a decline in city services which have made the city for many an unattractive place. Detroit was also a city that had a significantly greater decline in the housing market during the Great Recession compared to the national average, where housing prices declined sharply from 2006 to 2009, and the recovery period has been particularly slow for the neighborhoods. Moreover, compared to the average sales prices within Detroit neighborhoods in 2006 (excluding Midtown), the corresponding 2014 figures are only 22 to 36 percent of the 2006 values. (Sands & Skidmore, 2015, p. 8). These low property values shrink the tax base, translating to a decline in taxable residential value of \$1.4 billion, or 24.6 percent, between the fiscal years of 2008 and 2012 (CRC Michigan, 2013, p. 5).

The Great Recession exacerbated the issues and distortions already present in Detroit's property tax policy. Two sources of tax distortion, property assessment limitation and tax delinquency, have led to large amounts of unrealized tax revenue and thereby less money to spend on quality infrastructure and city services. One source of tax base distortion is rooted from state law (Proposal A passed in 1994) which prevents the taxable value of property (TV) to grow beyond the rate of inflation or five percent, even if the state-equalized value (SEV) - a reflection of the actual assessed value of the property- is increasing well above this rate. There has been a gap between the SEV and TV since 2000, leading to a loss of \$633 million in

residential property tax revenue from 2003 to 2008 and \$214 million from 2009 to 2014. In addition, the Headlee Amendment of 1978 restricts the actual amount of tax revenue a city can receive, and amounts exceeding this limit require rate reduction. A study by Hodge et al. (2015) finds that the taxable value cap led to both horizontal and vertical inequities. Because of the provision that resets the TV to the SEV when pieces of property change owners, the tax burden has shifted towards new homebuyers. Further, a quantile regression analysis found that residents who owned property before 1994 had 16 to 52 percent lower effective property tax rates compared to new homeowners. The authors also found vertical inequity in that lower-valued homes often paid higher effective property tax rates than corresponding higher-valued homes (p. 654). Further, results from the 2008 State of the State survey found that lower income residents within the state of Michigan faced relatively higher effective property tax rates compared to middle and high-income property owners (Skidmore et al., 2010, pp. 518, 529).

Detroit's historically high tax rates and high overall tax burden has ultimately led to high foreclosure rates. Today, Detroit is charging the highest property tax rate allowed by state law at 19.9520 mills. This rate does not include the additional taxes levied for debt service and for funding the public library (CRC Michigan 2013, p. 15). A 2015 study by the Minnesota Center for Fiscal Excellence found that all of these taxes for homestead properties in Detroit translate to an effective tax rate of 3.325 percent, which is the highest rate within the 50 largest cities in the United States and twice the national average of 1.561 percent (Sands & Skidmore, 2015, p. 26). This very high tax burden that is shared amongst the city's mostly low income residents have led to high rates of tax delinquency.

In 2014, 54 percent of the Detroit taxpayers were classified as delinquent, though this figure has decreased to 30 percent in 2015 (Sands & Skidmore, 2015, p. 23). In mid-2015 and

early 2016, Wayne County officials addressed the issue through foreclosing on these delinquent properties and selling them off at an auction. Foreclosure is the result of three or more years of unpaid property taxes. 28,000 properties were put up for auction in fall 2015, and 14,000 of them failed to sell, even at a starting bid of \$500 (MacDonald, 2016). Since 2005, there have been around 139,000 mortgage and tax foreclosures, and 50,000 more foreclosures are expected in March 2016 (Kurth and MacDonald, 2015; MacDonald, 2016). It is estimated that about 66,000 parcels of lands in Detroit are publicly owned, most of which are vacant. These parcels are much more of a liability than an asset, as the city is not making any tax revenue off of them and often cannot even sell them for \$500 (CRC Michigan, 2013, p. 18). A potential argument that can be made from these observations is that if the property taxes were lowered for these struggling low-income residents, the subsequent decrease in tax delinquency rates could be enough to offset the decrease in tax revenue from an individual tax-paying household, as more households would then be able to pay these taxes. In fact, if the delinquency rate went down enough, the city could potentially see an increase in tax revenue from lower rates.

The high rates of tax delinquency, coupled with other limitations on potential government revenues such as state mandates, have led to significantly decreasing amounts of government revenue for the city of Detroit. The city is also one which has many more responsibilities besides providing public services and infrastructure. Covering 139 square miles, Detroit has a large geographic area to serve, and still has the largest population of all cities in Michigan. In addition, much of the budget is dedicated to legacy costs, which is a challenge to fund due to retired employees far outnumbering the amount of active employees. In fact, rising health care and pension costs have made Wayne County about \$2 billion short in meeting current and future

defined benefit plan costs; for example, the county has only contributed \$10 million of an estimated \$1.3 billion of total retired employee health care costs (Wisely & Lawrence, 2015).

The city also has taken responsibilities of goods and services commonly provided on the regional and county levels in other metropolitan areas, most notably the bussing system and water and sewage system. The Detroit City Council has been characterized as stubborn in allowing these responsibilities to be shifted to regional authorities on the grounds that outsiders were trying to take away Detroit assets. Examples include council members resisting the transfer of Belle Isle Park to the State of Michigan and a convention center being transferred to a regional authority. By refusing these offers, the city has retained the liabilities associated with these structures such as large operating and maintenance costs (Eisinger, 2013, p. 5; Galster, 2012, pp. 264-265). Fortunately, the City of Detroit was largely relieved of the costs of their water system starting in June 2015 with the passing of the Great Lakes Water Authority deal. The agreement states that users of the water system within the metropolitan area will collectively pay the city \$50 million a year to use the system and have a say on how to maintain the system (Kampe, 2015). This deal should provide substantial reductions in the city's costs for years to come. Still, Detroit has historically struggled to reach deals such as these and still holds a lot of responsibilities besides providing basic city services.

Referring back to the city growth and industry mix model, an inevitable outcome of decreased tax revenue, in whichever way this may arise, is a lack of funds for quality city services to provide its residents. The extremely poor quality of such services became apparent upon its declaration of bankruptcy in July 2013. Average police response times in that year were 58 minutes in contrast to the national standard of 11 minutes. Around 40% of the city's streetlights were out of order. The city needed 225 busses a day to stay on scheduled times, yet

there were only 140 in 2013. 242 of the city's 300 parks were forced to close down. Compared to the national standard of 8 minutes, EMS response times averaged above 15 minutes in 2013 (Helms et al., 2014). Such poor quality city services have created a vicious circle, as it has driven more people away from the city and consequently has decreased the tax base which is used to fund such services. While the bankruptcy proceedings did help improve these services, it is clear that the city's poor tax policy combined with low quality city services have created incentives for more and more people to leave the city.

One of the overarching issues with Detroit's tax policy since the 1960s was that a good deal of the new types of taxes led to adverse incentives. Municipal income taxes lead to a disincentive to work, ad valorem property tax rate increases lead to a disincentive to live or establish a business within the city, and corporate taxes lead to a disincentive to invest. Instead of raising government revenues to continue to provide city services in the midst of a declining population and industrial sector, the tax policies led to the unintended effects of driving out more citizens and businesses, leading to gradual declines in property and income tax revenues (Lin, 2014, p. 50). In the years of 1979-1980, the City of Pittsburgh restructured its property tax policy in a way which minimized adverse incentives to leave the city. Thus, the city's actions during this time period can serve as a model for potential tax policy decisions Detroit can make moving forward.

Traditionally, the property tax levied on a piece of property is based on both the value of the piece of land itself in addition to any improvements that are made on the land, such as construction of a new building. In 1879, Henry George published a work titled *Progress and Poverty*, where he advocated that property taxes only be based on the value of the land itself and not on any improvements made on the land. The justification for its efficiency is based on

concepts in welfare economics. In the market for land, the supply of land is perfectly inelastic, as it is fixed in nature and cannot be altered by price levels. Therefore, if the consumers of such land are taxed, the suppliers actually bear the full tax burden by having to accept a lower equilibrium price. However, since perfectly inelastic parties do not change quantity supplied or demanded to changing price levels, there is no change in the equilibrium quantity. As such, there is no deadweight loss. However, in the market for buildings, suppliers do respond to changes in prices and increase production if prices are higher. The same tax rate applied to consumers will lead to a lower equilibrium price as before, but suppliers respond by decreasing production, leading to a deadweight loss in the market. In summary, pure land value taxes have their appeal in that no deadweight loss occurs compared to a traditional property tax (Cohen & Coughlin, 2005, pp. 359-360, 364-365).

While land value taxes are very appealing to many economists, there are challenges to its proper implementation and as such, pure land value taxes aren't common. However, the state of Pennsylvania has pioneered what is called the split-rate or two-tier property tax, where the tax on the piece of land is higher than the tax on buildings and other structural improvements. This policy greatly reduces the incentive for property owners to neglect their property and can actually create the incentive for owners to improve their properties, knowing that they will not bear a larger tax burden should the total assessed value of their property go up (Hartzok, 1997, p. 206). Moreover, this tax policy type has been advocated as a way to prevent urban sprawl, as land use would be denser and less land will be underutilized in highly valued areas (Cohen & Coughlin, 2005, p. 366). As of 2013, 17 cities within the state of Pennsylvania employ some form of land value taxation (LVT), but the cities of Scranton and Pittsburgh are most notable in that the two-rate approach was applied back in 1913 (Center for the Study of Economics, 2013;

Hartzok, 1997, p. 206). A major change to this tax policy occurred from the years of 1979-1980 when the tax rate on the land was raised to more than five times the amount on the rate of buildings and structures. Similar to Detroit, the period of deindustrialization- specifically the continued shrinkage of the steel industry- burdened the city government with less tax revenue, and some new source of revenue was essential for fiscal stability (Oates and Schwab, 1996, pp. 1, 8-9, 20-21).

Unlike Detroit's policies of creating new taxes and raising existing taxes on income, Pittsburgh raised the ratio of the tax on land to buildings in order to gain more revenue and also to minimize adverse incentives and deadweight losses associated with any tax. Oates and Schwab (1996) argue that this policy decision was an effective form of differential tax analysis, as the increase in the land value tax was the most desirable alternative to an increase in any type of tax rate increase. By raising the tax rate on land, the effective tax rate on buildings and structural improvements actually decreased. The authors measure the average annual value of new building permits before and after the tax change occurred, and found that the permits rose in value by 70 percent in the 1980's relative to the period of 1960-1979. At the same time, however, Pittsburgh was undergoing an urban renewal project called Renaissance II which contributed to rapid commercial building activity, and there were also low vacancy rates in the Central Business District. While the authors do find these factors to be the most significant to driving up commercial property values, they also find that the land value tax policy reform prevented the incentive for developers to not want to build new buildings and structures in the area, which would have happened if the tax on structural improvements were raised. Using previous literature which suggests that business location decisions are quite sensitive to the state and local tax levels, the authors conclude that the land value tax reform helped stabilize the fiscal

condition of the city by raising revenues without deterring the construction of new structures or incentivizing business to not locate in the city, a phenomenon common to other tax rate increases (pp. 7, 10, 11-12, 19-22).

While this case study of Pittsburgh only focused on incentives associated with business location decisions and structural improvements, it is reasonable to apply these principles to residential location decisions, as both citizens and businesses respond to incentives. Further, the tax reform successes in Pittsburgh can be reasonably applied to future tax policy suggestions for the city of Detroit, specifically relating to the taxation of residential and commercial property. Detroit also has unique restraints on its ability to tax, such as the state mandated taxable-value cap, so other proposals to solve such issues will also be discussed. Solving many of these reform measures will, however, require state legislation. This includes implementing some form of a land value tax, a decision that cannot be made at the municipal level. Sands & Skidmore (2015) consider how the tax burden would shift if a pure land value tax were implemented in Detroit, holding property values and total revenue constant. Using 2015 city data, they state that the average tax payments are \$327 for residential properties, \$1,812 for commercial properties, and \$1,474 for industrial properties. After the hypothetical implementation of a land value tax, 232,149 residential parcels of land will see a reduction in taxes, with the average tax decreasing to \$156. This does, however, come at the expense of more commercial and industrial parcels facing a tax increase over a tax decrease (pp. 33-34).

The results of the land value tax scenario, along with the case study of Pittsburgh, provide convincing evidence of the potential gains Detroit can have by switching to either a pure land value tax system or some form of split-rate property tax system. The significant decrease in the tax burden for the Detroit residents could lead to a significant decline in the tax delinquency

rate which would lead to an increase in government revenues from more people paying their taxes. Lightening the heavy tax burden on those low-income residents susceptible to delinquency could be a significant step forward in raising government revenues. While this would come at the expense of commercial and industrial properties having to pay a higher rate for land value, they would not be taxed at all for any improvements made to their properties, thus creating an incentive for development. The case of Pittsburgh showed how these positive incentives were enough to offset the increases in the land value tax. In addition to providing a potentially greater amount of revenue, a land value tax would also discourage the urban sprawl that has been characteristic of Detroit since the period of deindustrialization. If property owners that neglect their parcels were to be taxed more heavily on mere ownership of the land rather than improvements, such owners are more likely to forfeit their land to owners who wish develop their property. Therefore, this tax policy could likely lower the delinquency rate, decrease incentives to leave the city, and encourage long-run development of properties owned by firms.

While the case study of Pittsburgh does provide policy suggestions for Detroit, there are property tax policy concerns unique to the city and the state of Michigan. One of these is the taxable value cap implemented by Proposal A in 1994. As discussed earlier, the restriction of the taxable value to increase above the rate of inflation has created large sums of lost potential revenue in addition to many sources of horizontal and vertical inequities in the property tax burden. As a solution to this more unique issue to Detroit, Sands & Skidmore (2015) argue that some state intervention is required. If the taxable value of property was increased to match its state equalized value, the city government could yield substantial revenues from recovering properties whose state-equalized values are exceeding the taxable value, effectively growing the

tax base (p. 43). Hodge et al. (2015) also suggest that the horizontal and vertical inequities would gradually be reduced (p. 255).

Either instituting a land value tax or eliminating the taxable value cap are two solutions that could broaden the property tax base, reduce the tax delinquency rate, and reduce inequities present in the distributions of the tax burden. While impossible to predict, a broadening of the tax base and lower delinquency rates should lead to substantial increases in tax revenue to fund the deteriorating city services. Sharing the ownership and responsibilities of city resources, such as the recent regionalization of the water and sewage system, should provide substantial cost savings to promote infrastructure improvement. As it relates back to the city industry and growth model, improved city services reduces the incentive to leave the city and may even promote population growth, creating a positive cycle of tax base growth and further improvements to city infrastructure.

Stock of Human Capital

A well-implemented tax policy is not enough to generate sustained economic growth. Referring back to the city growth and industry mix model, increased tax revenues and improved city services only directly affect the total population of people inhabiting the city. While a stagnant or even increasing population is one of the primary outcomes of interest for Detroit, promoting a diversified industry mix is another very important outcome. While Pittsburgh implemented tax policy provisions that may have prevented dramatic sprawl of citizens and businesses, it was through their investment in research and development that yielded an increased stock of human capital and thereby industry diversification and economic growth. Detroit, however, has a proportionately smaller stock of human capital. In order to find ways to

promote the growth of human capital in Detroit, we will use the Pittsburgh experience as our model. While an improved tax policy can provide improvement to some of Detroit's more immediate problems, such as poor city services, an increased stock of human capital is essential to the economic sustainability of a city.

Abel and Deitz (2011) of the Federal Reserve Bank of New York provide a comprehensive overview of the relationship between the presence of colleges and universities in a city, the corresponding stock of human capital, and the amounts of economic growth and stability within the city. While the framework they provide is theoretical, they provide past empirical research as evidence of these relationships. In general, they argue that metropolitan regions with relatively high stocks of human capital- quantified by the number of residents holding at least a four-year college degree- tend to also have relatively higher amounts of GDP per capita, a common measure of regional economic growth. A simple linear regression model using United States metropolitan area data from the Bureau of Economic Analysis found a moderate correlation between the stock of human capital and GDP per capita. As it relates to the cities of Detroit and Pittsburgh, the authors also review past studies which found that regions with higher existing amounts of human capital are also better able to undergo economic reinvention during times of shifting national industry structure (pp. 1-2). This correlation is consistent with the city growth and industry mix model, which predicts that a city with a large stock of human capital should eventually lead to an industrial mix that is well diversified to handle shifting industry structures in the national economy. While correlation doesn't necessarily imply causation, the presence of human capital does seem to play at least some role in the economic well-being of a city.

Abel and Dietz give two primary reasons as to why colleges and universities promote the growth of the stock of human capital, and thereby increased economic growth measured by GDP per capita. The most noticeable reason is that universities produce degrees and thereby promote a skilled labor force. However, another equally important reason is that a good deal of research and development undergone in the U.S. is performed at colleges and universities. Breakthrough discoveries and technological advancements incentivize skilled workers to migrate into the region to take advantage of the jobs created from such activities. It may also attract businesses and start-up firms to locate in the region to utilize the talents of the university students performing the research. Thus, investment in research and development can yield large returns for a region through greater employment opportunities and creating an inviting culture for start-up firms and existing firms to locate, thus diversifying the industry mix.

As a method to quantify the stock of human capital, Abel and Deitz (2012) as well as Lin (2015) use the measure of the working-age population (25 years old and above) within a geographic area of interest that have earned at least a bachelor's degree, which is measured and provided by the American Community Survey. Figure 7 presents these values for the cities of Detroit and Pittsburgh as well as the U.S. from the years 2009-2014. As demonstrated in the figure, the percentage of the population (25 years and older) with a bachelor's degree or higher for Pittsburgh has been much greater than Detroit for all years surveyed. On average, Pittsburgh had a proportion that was 22.5 percentage points greater than Detroit. In addition, this proportion continues to grow for Pittsburgh- increasing 4 percentage points from 2009 to 2014- while remaining largely stagnant for Detroit. On average, Pittsburgh has been 6.5 percentage points above the U.S. figure while Detroit has been 16 percentage points below the U.S. figure.

While these values are estimates from surveys rather than census data, it is clear that Pittsburgh in general today has a much more educated community compared to Detroit.

The pathways in which a city promotes its stock of human capital proposed by Abel and Deitz (2011) can be used to explain the large differences in the education level between Detroit and Pittsburgh today. These differences can primarily be explained by colleges and universities of a region promoting the stock of human capital through research and development. The economy of Pittsburgh is strengthened by its two prestigious and well-known universities, The University of Pittsburgh and Carnegie Mellon University. The University of Pittsburgh, or Pitt, is a public institution that was established in 1787 and is among the oldest academic institutions within the United States. Thus, the university has long been intertwined within the fabric of the city. The university is well known for its medical research endeavors, such as the development of the polio vaccine, changing the way in which breast cancer is treated, and also improving surgical techniques for human organ transplantation (Tripp Umbach, 2014, p. 26). Its main campus is situated within the city of Pittsburgh in the Oakland neighborhood, but additionally has four other regional centers throughout western Pennsylvania. Carnegie Mellon University (CMU) is a private institution, established in 1900, that has also become nationally recognized as a leader in research endeavors, most notably in the fields of computer science, engineering, and technology. Further, the Carnegie Mellon School of Computer Science is ranked first in the U.S. by the U.S. News and World Report, tied with three other institutions. Both of these institutions are classified as having very high research activity by the Carnegie Classification of Institutions of Higher Education. As of 2016, The University of Pittsburgh has an undergraduate enrollment level of 18,757 students and CMU has an undergraduate enrollment level of 6,309 students.

The city of Detroit has been strengthened by Wayne State University (WSU), which interestingly also carries a Carnegie classification of very high research activity. Established in 1868, Wayne State University is a public institution that is best known for having the largest single-campus medical school in the nation. This specialization has helped serve the mostly underinsured or uninsured population, as faculty physicians have given around \$60 million a year in uncompensated care, according to the university's website. As of 2016, the school has an undergraduate enrollment level of 18,347 students, quite similar to Pitt. Detroit also has a smaller private institution, The University of Detroit Mercy, but is arguably not of the same national prestige as CMU. Further, the school has a much smaller undergraduate enrollment of 2,762 students as of 2016. On the graduate level, this institution is best known for its College of Health Professions, especially in Nurse Anesthesiology (U.S. News and World Report, 2016). However, because this institution has small enrollment levels and is not classified as possessing very high research activity, WSU will be the primary university that is compared to the Pitt and CMU.

While Detroit and Pittsburgh both contain at least one institution with very high research activity, there are large differences between the impacts such research activities have made upon their respective cities. There are also differences in the ways these institutions have interacted with private institutions within the city to promote economic growth. In addition, Pitt and CMU have each had access to much more resources, specifically federal grants, as a way to drive economic growth. The two institutions each asserted unique roles by specializing in particular research fields- for Pitt, this was in medical research and health care. For CMU, this was in engineering and computer science. Through the research and development undergone by these universities, the city of Pittsburgh was able to increase its stock of human capital and begin a

period of economic revival starting in the mid-1980's through the development of a diversified industry structure. As this relates back to the city growth and industry mix model, a city that is able to have a diversified industry portfolio will ultimately achieve economic growth through employment opportunities, general population growth, and growth in the stock of human capital. We will thus turn to exploring the research endeavors of each of these institutions from the 1980's onward as a model for how Detroit can increase its stock of human capital to promote economic revival.

The University of Pittsburgh School of Medicine (Pitt SOM) is a good case study of how research and development can promote increased human capital, as the institution made substantial strides during the collapse of the steel industry and the recessionary period of the 1980's. Before the mid-1980's, the Pitt SOM had only moderate amounts of research activity and was not as nationally recognized as it is today. Dr. Arthur Levine, dean of the School of Medicine since 1998- in collaboration with nine other leaders affiliated with the School of Medicine- published a 2008 article that described the rise of the School of Medicine through a close partnership with the University of Pennsylvania Medical Center (UPMC). The cooperative relationship between the school and the city's prominent medical facilities began to strengthen in the 1970's. During this time, Pitt's SOM was only affiliated with five independent private hospitals to serve as teaching hospitals. One of which was the Western Psychiatric Institute and Clinic (WPIC), which underwent major restructuring upon a \$5 million grant from the Richard King Mellon Foundation. The newly appointed chair, Dr. Thomas P. Detre (one of the authors of the article), implemented business practices to improve the efficiency of the hospital and to modernize their research in biological psychiatry. He also formed an agreement with Pitt SOM which clearly defined the roles and responsibilities of each party in the partnership. The WPIC

would use revenues to reinvest in improving the quality of services and infrastructure as well as investing in research and development in growing fields such as neuroscience, imaging, and genetics. Such research efforts led to increased “clinical volume and community interaction, which became a de facto marketing strategy” (pp. 816-818).

The restructuring of the WPIC and increased research efforts through the university led to nationwide recognition and dramatic increases in research funding from the National Institutes of Health (NIH). Dr. Detre's business model for the WPIC largely translated to the structure of the UPMC. The UPMC was formed as a result of changes in Medicare legislation in 1983, which implemented flat-rate prospective payments that threatened the potential revenues of the individual hospitals. Hospital mergers occurred throughout Pittsburgh in the 1980's and 1990's, and the coalition of five independent hospitals evolved into The University of Pittsburgh Medical Center, which today is composed of 20 hospitals and 400 outpatient sites. Dr. Detre helped further the partnership of the Pitt SOM with the UPMC by becoming the senior vice chancellor (SVC) of all six health science schools within the University of Pittsburgh, striving to apply his business model with the WPIC to the Pitt SOM. Specifically, he focused on creating funds for cancer research as well as organ transplantation, two growing fields of study. In 1985, Pitt opened the University of Pittsburgh Cancer Institute (UPCI). Investment in transplantation research resulted in more than half of all liver transplantations occurring within Pittsburgh by the year 1988 (Levine et al., pp. 819-820). These advancements are particularly substantial considering the “bottoming out” of the economy just years earlier.

It was largely through the interdependent relationship of the Pitt SOM and UPMC that made both institutions so successful, sharing the same goal of promoting research activity. UPMC has provided a great deal of funding to the Pitt SOM for research and teaching programs,

averaging \$92.7 million annually from FY 2001- FY 2007. With this strong commitment to research efforts, prominent physician-scientists were attracted to the region to perform research, thus promoting an increased stock of human capital. The research has also prompted the expansion of the UPMC, creating job opportunities and incentivizing physicians to seek jobs in the area. In fact, UPMC is the largest employer of western Pennsylvania, which has translated to massive growth in employment in the education and health care sector. A 2014 Economic and Community Impact Report of the University of Pittsburgh by Tripp Umbach found that in FY 2012-2013, the University of Pittsburgh's research expenditures in total have created 9,218 jobs through the hiring of research officials as well as indirect jobs such as labor to construct new facilities (p. 16). As figure 8 shows, employment in the education and health care sector of Allegheny County has continued to increase in the 2001-2014 period, averaging around one fourth of the total employment in all private industries in the county. Figure 9 shows the level of employment in the education and health services sector as a percentage of all private industry jobs within Allegheny County from 2001-2014. From this figure, it appears that roughly one fourth of all private industry jobs in the county are in from this sector, and the mostly flat nature of the curve indicates that this proportion is remaining steady.

The case study of the University of Pittsburgh Medical School and the UPMC provide many lessons. First, it demonstrates how mutually beneficial relationships between academic institutions and private industries can drive the growth of an entire employment sector. Second, it provides empirical evidence of the relationship between investment in research and development, growth in human capital, and overall employment and GDP growth. The Pitt SOM's research endeavors, such as organ transplantation, have attracted visitors to utilize these specialized services. For example, the UPMC Presbyterian Shadyside Hospital ranks seventh in

the nation in gastrointestinal surgery by U.S. World News and Health, attracting visitors across the nation. This creates employment opportunities for specialized physicians, which thereby promotes the growth of human capital. Our second case study of CMU demonstrates how investment in research and development can also incentivize existing and start-up firms to locate in the area to utilize the stock of human capital. In addition, CMU's focus on advancing the engineering and technology sectors have allowed the city of Pittsburgh to specialize in more than just education and health care, thus creating a healthy industry mix. The prominence of a strong overall knowledge and service-based sector in the city should make it much more resistant to economic downturns, as predicted by the Portfolio Theory and the industry mix and city growth model.

CMU was founded by Andrew Carnegie, an entrepreneur and philanthropist that transformed Pittsburgh's economy into one centered on steel production. The presidents of this institution have focused the university's attention on research in the applied sciences as well as engineering. The departments of electrical engineering, industrial administration, psychology, and mathematics collaborated to pioneer early work in computational science in the 1950's, culminating in the school offering the first programming course within the U.S. that was accessible to freshmen students. Such efforts have contributed to their computer science program being ranked amongst reputable institutions including the Massachusetts Institute of Technology and Stanford University. The Department of Computer Science was officially established in 1965 with donations from the Richard King Mellon Foundation. Richard M. Cyert served as President of the institution during Pittsburgh's period of deindustrialization from 1972-1990. As an economist, he strived to center the institution's focus on fields which would grant the university a comparative advantage, which at the time appeared to be in computer science.

Further, he helped make CMU the first university in the nation to have a wired campus network, aiding in connecting faculty, staff, and students across the entire campus. A well-defined identity helped the university become a top-ranked research university in the United States, particularly in computer science (Carnegie Mellon Office of Institutional Research and Analysis, pp. 10-12).

CMU helped create a stock of human capital that was proficient in engineering and computing, a skill in very high demand by Silicon Valley companies and other rising technology firms. In 2005, CMU opened the Robert Mehrabian Collaborative Innovation Center (RMCIC), a 136,000 square-foot facility which “integrates corporate, university, and governmental research tenants with a focus on mobile computing, software, security, and robotics” (Carnegie Mellon University Corporate and Institutional Partnerships, n.d.). Ultimately, it serves as an accessible place for existing technology firms to locate and utilize the skills and talents within the university in addition to serving as a business incubator for start-up firms. One of the most well-known tenants was Google, which today has moved from the CIC to the former Nabisco factory in Pittsburgh. Andrew Moore, currently the dean of the School of Computer Science at CMU, stated that “Carnegie Mellon had spent decades fostering some of the most brilliant computer scientists and software engineers in the world, so it only makes sense that companies would be drawn here to harness that brainpower for commerce” (Carpenter and Todd, 2014). Apple, Disney, and Intel have also been incentivized to locate in the CIC, and remain tenants to this day. In 2007, the Pittsburgh Technology Council reported that research and technology companies within the region have generated \$10.8 billion in income and employed 213,000 people. This has been aided by the number of start-up firms launched from research at Carnegie Mellon, averaging around 25 companies each year (Carnegie Mellon University, 2007).

The fact that Pittsburgh's prominent institutions have established well-defined roles has allowed the economy of Pittsburgh to have a well-diversified industry mix, which ties back to the city growth and industry mix model. Since each university contributed to the growth of multiple industrial sectors, the city no longer overly relies upon one industry and therefore is more resistant to economic downturns and the corresponding decreases in employment and population. This well-balanced industry mix was accomplished through increasing the stock of human capital through investment in research and development within the city's college institutions. For Pitt, this aided the growth of the UPMC which increased employment opportunities in the education and health care sector. For CMU, investment in research and development has drawn in existing firms into the region to utilize the talents of university students, which in turn has brought more human capital into the region. The sharing of ideas between the university and private industries has also promoted the launching of start-up firms in the growing high-tech industry sector. Ultimately, investment in research and development has brought in more human capital to the region and has created new employment opportunities in diversified industrial sectors that have resulted in sustained economic growth in the city.

Using the Pittsburgh experience of investing in research and development to spur economic growth, we will now apply these principles back to the city of Detroit. If Wayne State University has a Carnegie classification of very high research activity, then why do we not see the same amounts of employment growth in the city? Three observations could potentially explain this contrast between the cities. First, Wayne State University is not as well-funded in its research endeavors compared to Pitt and CMU. It should also be noted that Pitt and CMU are both ranked as having very high research activity, whereas WSU is the only institution in Detroit with this classification. Second, the city of Detroit- even with the massive population loss since the 1950s-

still has over twice the amount of people compared to the city of Pittsburgh. According to the U.S. Census Bureau, the percentage of citizens under the age of 65 without health insurance is 21.4%, far above the value for Pittsburgh at 11.1% and the U.S. average at 12.0%. The city of Detroit also has a poverty rate that is 25 percentage points above the national poverty rate. This has undoubtedly placed a tremendous financial burden on the city's primary medical care providers- The Detroit Medical Center (DMC) and Henry Ford Health Center (HFHS). As explained earlier, faculty physicians at Wayne State University medical school provide around \$60 million of uncompensated medical care a year. Therefore, even if both Pitt and WSU received the same amount of funding, the WSU medical school would still have the disadvantage due to its obligation to serve a much more economically disadvantaged population. Lastly, the six-year graduation rate for WSU lies far below Pitt and CMU, which has in effect led to a lesser stock of human capital in Detroit compared to Pittsburgh.

To best compare the colleges and universities in Detroit and Pittsburgh, the focus of research expenditures will be on medical research, as both WSU and Pitt are arguably best known for their medical schools and medical research. A major source of funding for medical research comes from the National Institutes of Health (NIH) grants, and both universities have been recipients. The amount of funding organizations receive annually is available on the NIH website starting in the year 1992. The total amount of grant money given to Pitt and WSU is illustrated in figure 10. Pitt has witnessed near exponential growth in funding from 1992-2003, though did suffer a 7.74% decrease in funding from 2012-2013. WSU has received far less grant money for all the years observed, peaking in 2003 and showing a linear downward trend since then. The largest differential in funds was in 2015, with Pitt receiving \$372.3 million more dollars in medical research than WSU.

The differences between the two universities in the degree of funding and thereby research activity are reflected in the subsequent changes to the employment levels in the education and health services sector. Figure 8 demonstrates this finding, illustrating employment levels in the education and health services sector for both Allegheny County and Wayne County. For all the years in which data is available (2001-2014), Allegheny County has outnumbered Wayne County in the number of employees in this sector. This differential was at its highest in 2011 with Allegheny County having 32,411 more employees. It must also be noted that as of 2015 U.S. Census Bureau estimates, Wayne County had 528,876 more residents than Allegheny County. Thus, the differential between the employment numbers is more significant taking into consideration that the lesser amount of health care employees in Wayne County serves a greater number of citizens compared to Allegheny County. Pitt's School of Medicine, in collaboration with UPMC, has helped shift the regional economy of Pittsburgh from one focused on steel production to one specialized in health care services. Due to the demographic challenges the city of Detroit possesses- in addition to a lesser amount of funds from sources such as the NIH- we have not seen as substantial of changes to its regional economy.

The previous comparison between the health care sectors in Detroit and Pittsburgh was used to show how Detroit has lagged behind Pittsburgh in realizing the gains of investment in medical research. However, that is not to say that investment in medical research has been unsuccessful in Detroit. Moreover, the education and health services sector has been consistently growing in the region and has made substantial contributions to the well-being of the city. Figure 9 shows that the level of employment in the education and health services sector as a percentage of total employment in all private industries in Wayne County has increased from 15.35% in 2001 to 20.52% in 2014. Thus, this sector has played a more predominant role in the industry structure of

the region. In summary, while the research endeavors of WSU and its connections to the Detroit Medical Center have shown positive results for the region, these efforts have not been sufficient to fully revitalize the entire economy of the city of Detroit. Further, the city requires expansion in other service-based industry sectors to achieve greater employment numbers, a greater stock of human capital, a diversified industry mix, and thereby economic growth.

Abel and Deiz (2011) describe an additional way universities can generate human capital besides investing in research and development: granting degrees. Colleges and universities granting degrees is a direct way of building human capital through educating students to become fit for careers. As a measure of comparing how well the universities are at granting degrees, data from The Education Trust- a non-profit focused on increasing accessibility to education- is used to compare the six-year graduation rate for students at the University of Pittsburgh, Carnegie Mellon University, and Wayne State University as of the year 2013. For CMU, the six-year graduation rate was 88%, and the corresponding figure for Pitt was 80.4%. In sharp contrast, the six-year graduation rate for WSU was 32.3%. Even on a ten-year level, the graduation rate is only 43 percent (French, 2012). To get an idea of how low of a percentage this is, I compiled all universities in the U.S. that have a Carnegie classification of “very high research activity” that have an undergraduate enrollment level of 14,000 students and above. Of the 68 colleges and universities which met these criteria, Wayne State University ranks last on the list. The second lowest ranking, the University of Houston, has a six-year graduation rate of 47.5%, 15.2 percentage points greater than WSU. This observation is 3.28 standard deviations below the mean of 73%, making this value a clear outlier in the distribution of all observations. Meanwhile, the University of Pittsburgh ranks twenty-sixth on this list and their rate is 7.4 percentage points above the mean.

The significantly low six-year graduation rate for Wayne State University is largely the product of socioeconomic challenges faced by a large share of its student body. In the fall 2014 semester, the university undergraduate enrollment level was 18,347 students, 43% of which originated from Wayne County. Further, 36% of the undergraduate student body consisted of minority groups. In 2013, only 11.1% of African American students attending the university graduated within six years, while the corresponding rate for white undergraduate students was 45.2%. In 2010, The Education Trust cited Wayne State as having the largest achievement gap by race of all public universities in the nation (French, 2012).

In a city where its racial composition is predominantly African American, the low graduation rates at Wayne State University are arguably a reflection of the economic disadvantages these Detroit citizens have faced. Further, French (2012) compared the student demographics of two of Michigan's predominant institutions- the University of Michigan and Michigan State University- with that of WSU. He found that there were around five times the number of part-time students and eight times the number of students over the age of 25 at WSU compared to the other universities. It is clear that many of these students are trying to attend school with other work obligations or children to care for that threaten the possibility of eventually receiving a diploma. The low rates may also be a reflection of the notoriously poor quality of the Detroit public schooling system, receiving consistently lower performance ratings by the National Assessment for Education Progress relative to nearby urban areas including Chicago and Cleveland (Lake et al., 2015). The poor quality of education services, coupled with the low admission standards at Wayne State University, has made many students face challenges in a much more rigorous academic environment. In summary, the socioeconomic disadvantages of a large share of the Wayne State University student body may explain a large part of the very low six-year graduation rates at this

institution. Since the proportion of the working-age population holding a college degree- a measure of a city's stock of human capital- is lower than the national average, the low graduation rate may also explain at least part of the low human capital stock. Further, the strong differential in the human capital stock between Detroit and Pittsburgh may explain at least part of why Detroit has not been as successful in its economic resurgence.

One of the overarching strategies policymakers in Pittsburgh used to promote economic growth involved investment in research and development. For Pitt, medical research translated to the growth of the education and health services sector. For CMU, their investment in the fields of engineering and computer science research helped build a stock of human capital that was attractive to existing firms and start-up firms, thereby promoting growth of firm activity in the city and a diversified industry structure. Unfortunately, it is impractical to substantially increase investment in Detroit's institutions to attract firms and human capital to the area, as it is already under severe fiscal pressure. Further, the issue of low college graduation rates is a function of the city's damaged public schooling system, which will require reinvestment and restructuring at the K-12 level to fully improve educational outcomes. However, the Pittsburgh experience suggests an avenue Detroit can take to reach similar outcomes that do not involve unrealistically large additional amounts of investment. This avenue involves attracting outside human capital into the region through creating a culture and environment that is welcoming to entrepreneurship. As was seen with the CMU Collaborative Innovation Center, an environment that nurtures the growth of start-up firms can eventually lead to a diversified industry structure within the entire city. This diversified industry structure feeds back in the city growth and industry mix model, as promoting a diversified industry structure using a greater stock of human capital will solve the root issue of Detroit's problems- the overreliance on one industry. Fortunately, we have seen these strategies

being implemented in recent years in the city. Combined with the continued growth of the education and health care sector, this research provides suggestive evidence that Detroit is following in the footsteps of the city of Pittsburgh. Moreover, ongoing strategies may lead to the eventual economic resurgence of the city and fiscal stability.

John Gallagher's work *Revolution Detroit: Strategies for Urban Reinvention* (2013) advocates for the growth of entrepreneurship as way the city of Detroit can move forward from its over-reliance on the automobile industry. Much like the Collaborative Innovation Center at CMU, Gallagher discusses the idea of "business incubators" or "business accelerators," which are inexpensive office areas that serve as a gathering point for prospective entrepreneurs. These entrepreneurs can network amongst one another and receive mentorship from successful "business coaches." There are more than 1,400 business incubators in North America, and fortunately the city of Detroit is adding to those numbers (p. 99). One of the leaders of the business incubator model in Detroit is TechTown Detroit, a business accelerator located in a former General Motors plant, the Albert Kahn Building. It was initially funded with the help of WSU, General Motors, and the Henry Ford Health System. The non-profit organization has worked with 1,026 companies and has helped raise \$107.26 million in start-up capital and created 1,190 local jobs between the years 2007-2014. The website of the organization describes how the activity within the building "catalyzes entire communities of startups across the retail, wholesale and technology sectors, continuously hosting business acceleration, incubation, co-working and events." (TechTown Detroit, n.d.)

Detroit's economic decline has led the city to fall far behind other cities such as Boston and San Francisco in the development of the growing high-tech industry. Moreover, these high-tech cities have grown to the point where excess housing demand has driven housing prices and

general costs of living to levels much higher than most other American cities. The dramatic population losses since the 1950's have led to an oversupply of housing in Detroit, which has dropped housing prices to very low levels. To put things into perspective, the median home price in Detroit is \$38,000 compared to the median home price in San Francisco, which is about \$1 million. Jerry Davis, an entrepreneur living out of San Francisco, expressed interest in establishing his fifth start-up company in Detroit because infrastructure already exists in the city, but at very low prices. He has also embraced the idea of the city having a technology industry that is "still sort of getting up and off the ground" (Margolis, 2015). Detroit is such a unique city because these low real estate values offer the opportunity for firms to start-up at low costs, something not at all possible in Silicon Valley.

The entrepreneurial contributions of Dan Gilbert, founder and owner of Quicken Loans, is perhaps the best case study which exemplifies that successful entrepreneurship is possible within the city of Detroit. Quicken Loans is the nation's largest online real estate mortgage lender. In 2010, Gilbert relocated the headquarters of Quicken Loans from Livonia to downtown Detroit. In addition, he has purchased and/or taken ownership of a total of 78 downtown properties, which in total composes 12.5 million square feet of land (Aguilar and Abel-Razzaq, 2015). In an interview with the Detroit Free Press, Gilbert stated "we're just starting" and plans to begin the process of selling pieces of property he purchased to prospective businesses (Gallagher, 2016). One of Gilbert's first real estate expenditures was on the purchase of the First National Building, a historic skyscraper located alongside the city's Campus Martius Park. At the time of purchase, the building was in the process of foreclosure, and the final purchase price of \$8.3 million was arguably rather low considering its size and location. Upon renovation, the building has appreciated in value and as of 2016 is valued at more than thirteen times the original

purchase price (Aguilar, 2016). Meanwhile, the level of employment for Quicken Loans has grown from 1,700 in 2010 to over 12,500 in 2015, many of which are composed of young people who reside in the downtown area. Gilbert stated his motivation for owning so many pieces of property in Detroit was to bring new life into the downtown core that used to be nearly empty in the wake of the Great Recession.

The philanthropy and entrepreneurship of Dan Gilbert is helping Detroit reach many of the same outcomes that occurred when Pittsburgh's invested in its college institutions. Young and talented people are being drawn into the area, supplying an increased stock of human capital that is necessary to help Detroit grow in the service-based industrial sector which is predominant in the modern economy. This also has positive implications for Michigan, as the entire state has been suffering a brain drain for over the past ten years, where recent college graduates have a strong tendency to leave the state in pursuit of job opportunities. A 2013 study by the University of Michigan-Dearborn surveyed over 7,000 recent college graduates who received their degree from any of the fifteen public universities in the state in 2012. Of those surveyed, 37 percent had already left the state in pursuit of job opportunities primarily in Illinois, California, and New York (Anders, 2013). Beginning in 2005, census data revealed that more people of the 22-34 year-old age group moved out of the state than moved into the state, creating a net loss of human capital (Vasilogambros, 2014). While job opportunities are essential to keep graduates within the state, policymakers have also found that these young workers are attracted to a vibrant urban community. Dan Gilbert's entrepreneurship has created a downtown core that is oriented to attract recent college graduates. To highlight the job opportunities that are available in Detroit, an initiative called Live.Work.Detroit was established in 2011 by the Michigan Economic Development Corporation (MEDC). This program holds an annual conference where Detroit's

prominent business leaders- such as those from Quicken Loans and General Motors- highlight opportunities available to prospective graduates. Participants also receive a tour of city attractions, small businesses, and potential living areas. Such a program is essential for changing perceptions of Detroit as a lifeless city to one that offers opportunity and desirable amenities such as entertainment venues, restaurants, and museums (Daily Detroit Staff, 2015; Detroit Experience Factory, 2015). Initiatives like these may help reverse the brain drain in both Detroit and the state of Michigan as a whole.

In addition to low rental prices in a city filled with historical architecture, there are other unique aspects to Detroit which can make the city an asset to investors and incentivize skilled workers to locate within the region. In the entrepreneurial community, minority entrepreneurs account for 15 percent of firms within Detroit (Lewan, 2015). In a city that is composed mostly of African American citizens, Detroit may serve as a city that is welcoming to minority entrepreneurs compared to other cities with less minority representation. Detroit is also historically a city that was largely built upon the work of immigrants. Governor Rick Snyder of Michigan has encouraged finding ways to keep foreign exchange students to remain in Michigan as a way to increase human capital and prevent further brain drain (Gallagher, 2013, p. 107). In 2010, a nonprofit called Global Detroit was established, whose members work to promote increased immigration into the southeast Michigan area. In 2014, the organization raised over \$7 million in pursuit of creating a welcoming community for prospective immigrants and also working with international firms to locate and invest within the region (Global Detroit, 2016).

In recent years, Detroit has also been recognized as a city that is conducive to the success of women entrepreneurs. This is particularly important considering the fact that women are generally underrepresented in the entrepreneurial community and often do not receive

comparable wages. One of the most prominent examples is in the U.S. technological industry, where women hold less than 26% of technological jobs and earn about 85% of the wages in which men of the same job positions receive (Fisher, 2016). A 2015 study by the financial company SmartAsset used U.S. Census data to rank cities based on four criteria, including the percentage of women in the technology industry and wage gaps. Based on this study, Detroit ranked third overall in the nation, with Kansas City and Washington, D.C. topping the list. On the basis of percentage of women in the technology industry, the city ranked first at 44.5% (Wallace, 2016). In an overall entrepreneurial climate that may often disfavor women and minorities, Detroit is working to create a culture that can promote equal opportunity and success for these groups, bringing many positive impacts for the city including increased amounts of human capital and job opportunities through the start-up firms of these entrepreneurs.

Conclusion

The objective of this study was to create a comprehensive overview of Detroit's economic decline and persisting challenges the city still faces today. This was accomplished through applying the city growth and industry mix model to explain the period of deindustrialization for the cities of Detroit and Pittsburgh, two "Rust Belt" cities which faced large amounts of losses in employment and population upon the declining U.S. market share of the automobile and steel industries. The model attributes the root cause of the decline of both of these cities to an over-reliance on their primary industry and lack of incentive to diversify their industry mix through entrepreneurship. This paper argues that through a strategic tax policy and efforts to create a better skilled workforce, a city can fix its problems of population loss and lack of a well-diversified regional economy. Under this view, the city of Pittsburgh effectively made changes in these areas which promoted a diversified industry mix and thereby economic growth.

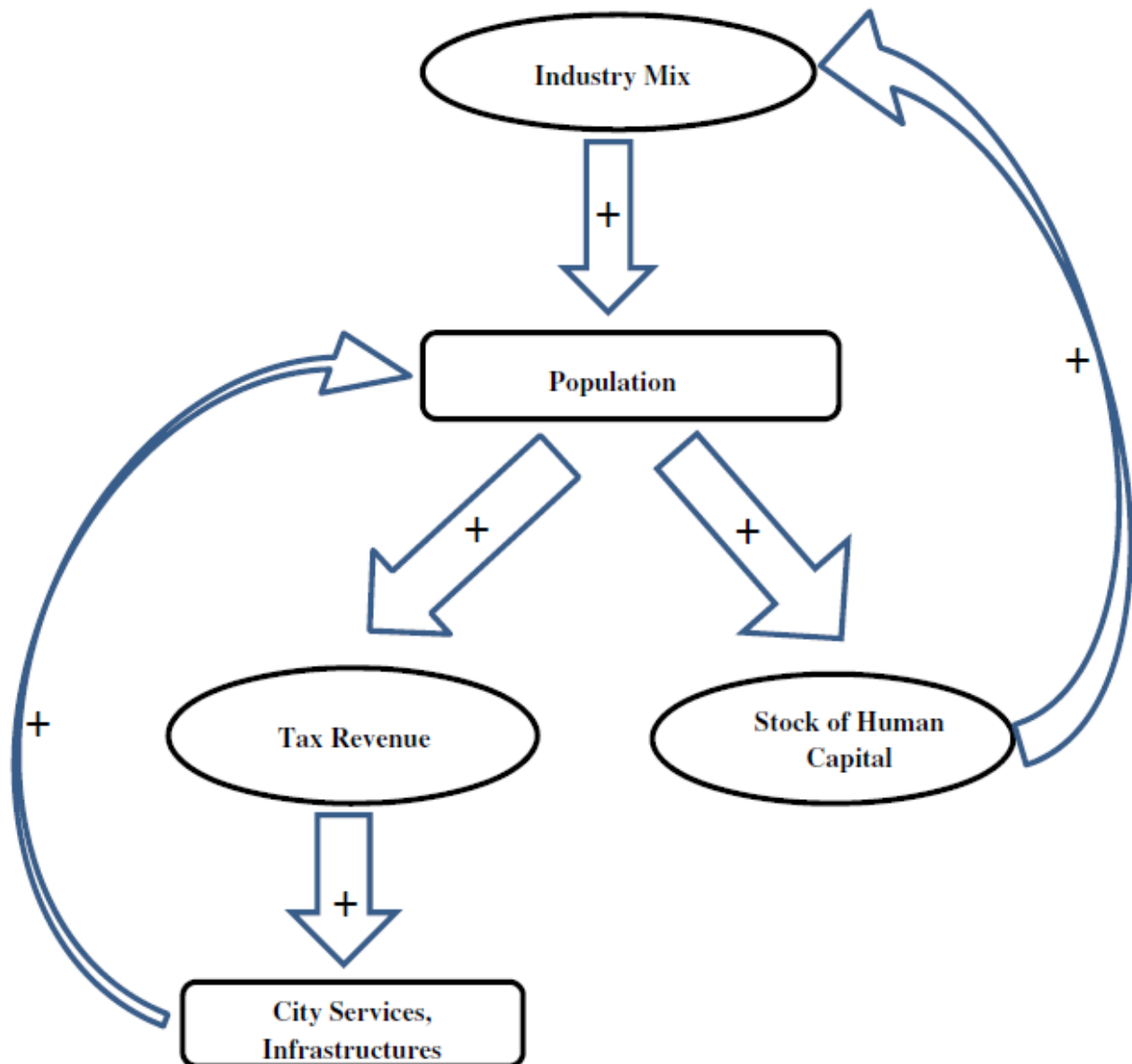
However, the city of Detroit altered its tax structure to accelerate population losses and was not as successful as Pittsburgh in the investment of human capital at the university level to create a regional transformation of the economy. In summary, Pittsburgh was used as a model for how a city can promote economic growth to explain Detroit's past and current issues in the context of the city growth and industry mix model.

While this paper highlights the more successful efforts of Pittsburgh after the period of deindustrialization, Detroit in recent years has been following in the path of Pittsburgh in promoting a diversified industry structure and overall economic growth. The formation of the Great Lakes Water Authority is one way that Detroit could ease its budgetary burdens and allow for more revenue to be dedicated to improved city services to deter further population losses. Other tax policy changes, such as the implementation of a land value tax and methods to decrease tax delinquency rates, could also help dedicate more funds to city services and infrastructure without creating adverse economic incentives.

Detroit is also following in the path of Pittsburgh in the growth of the education and health services sector as well as promoting entrepreneurial activity. In particular, Dan Gilbert's real estate investments in Midtown Detroit have attracted young and educated workers into the city that has provided growth in the city's human capital stock and a powerful force against the "brain drain" that has characterized Michigan within the past decade. Through nonprofit efforts such as TechTown Detroit and Global Detroit, the city is working to become a culture that is welcoming to aspiring entrepreneurs, especially to women and minority groups. Much like the successful entrepreneurship created from the research efforts of the University of Pittsburgh and Carnegie Mellon University, the city of Detroit is moving forward in reaching the outcome of an increased stock of human capital, which in turn promotes industrial diversification. Consistent

with the industry growth and city mix model, addressing the root cause of an undiversified industry mix is essential to creating long-term economic growth within a region.

There is still plenty of work left for the recovery of Detroit, especially in the improvement of the city's struggling public education system, high rates of poverty and crime, and deteriorating infrastructure in patches of largely vacant land. However, we can expect these problems to be largely alleviated as the city addresses the systemic problems which have led to the issues they face today. Therefore, there is still reason to hold hope for the recovery of the city of Detroit as it follows the path of former Rust Belt cities such as Pittsburgh in shifting its industrial structure to promote long-run increases in population and employment, which in turn raises tax revenues to improve public services and makes the city a more desirable place to live.

Appendix- Figures Referenced**Figure 1: The city growth and industry mix model**

Source: Lin, Y.P. (2015). Don't Put All Your Eggs On One Basket: The Lesson from Detroit's Bankruptcy. *World Scientific*, 10(1), 1-20.

Figure 2: Population figures for the cities of Detroit, MI and Pittsburgh, PA from 1950-2014

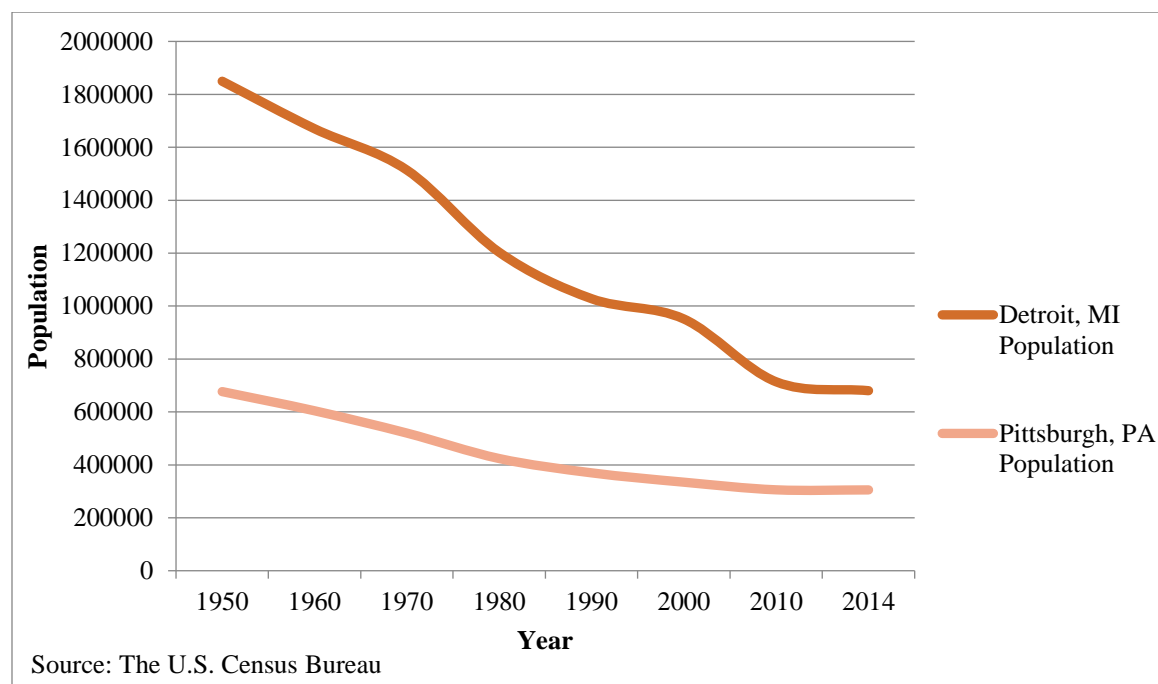


Figure 3: Percentage change in population for the cities of Detroit, MI and Pittsburgh, PA from 1950-2014

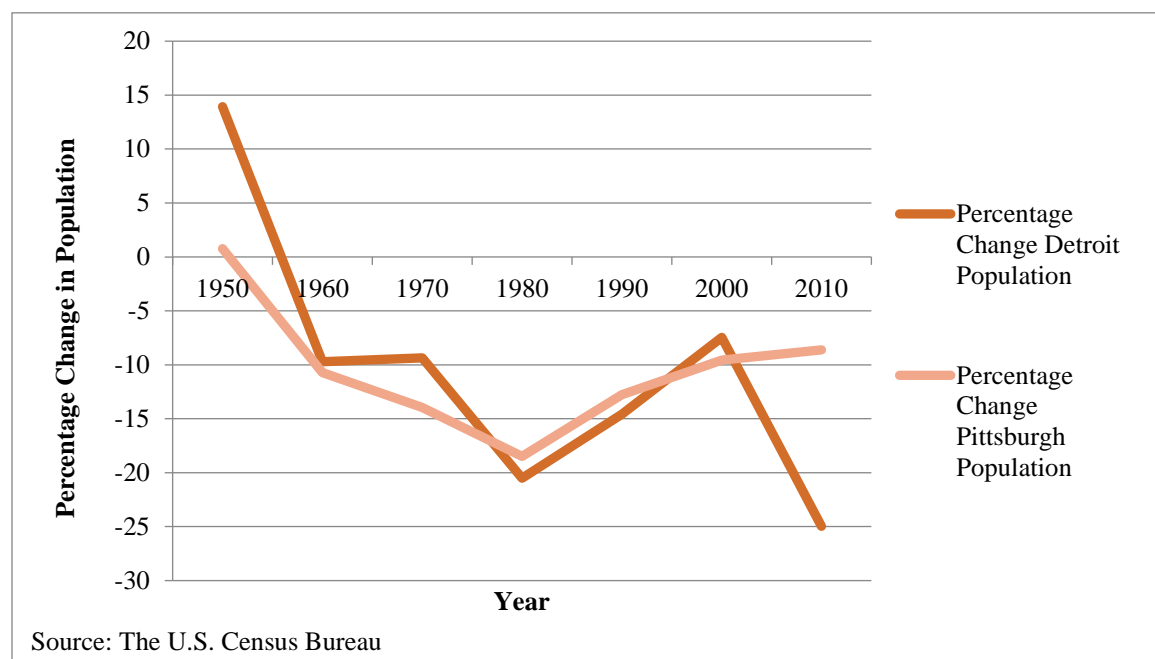


Figure 4: Unofficial seasonally unadjusted county-level unemployment rates and official seasonally unadjusted national unemployment rate from 1976-1989



Figure 5: Official seasonally unadjusted county-level unemployment rates and official seasonally unadjusted national unemployment rate from 1990-2014

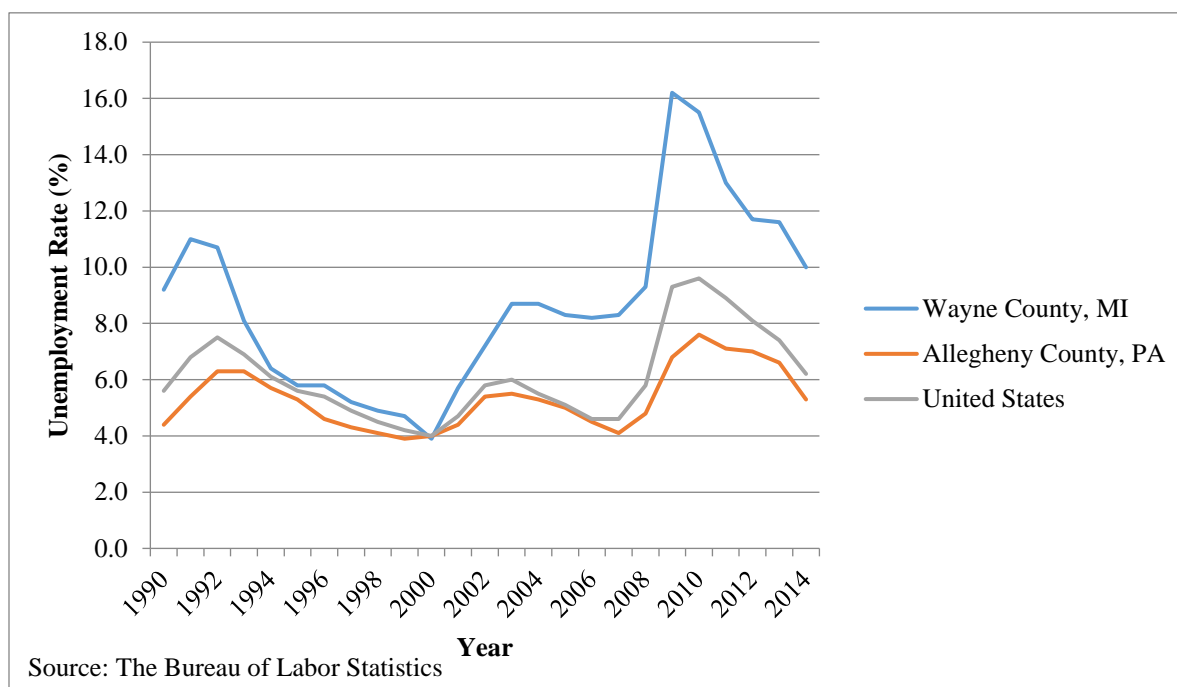


Figure 6: Real per capita personal incomes for Wayne and Allegheny Counties and the metropolitan portion of the United States from 1969-2014

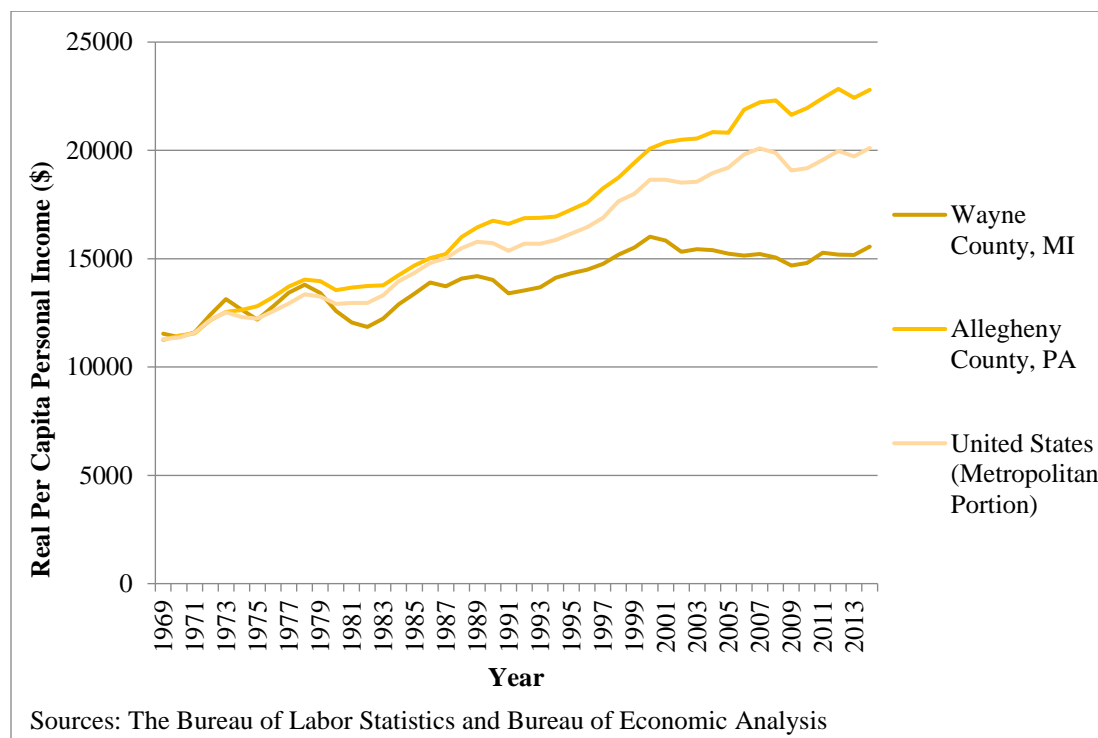


Figure 7: Survey estimates of the proportion of the population 25 years and older possessing a bachelor's degree or higher in Detroit, Pittsburgh, and the United States from 2009-2014

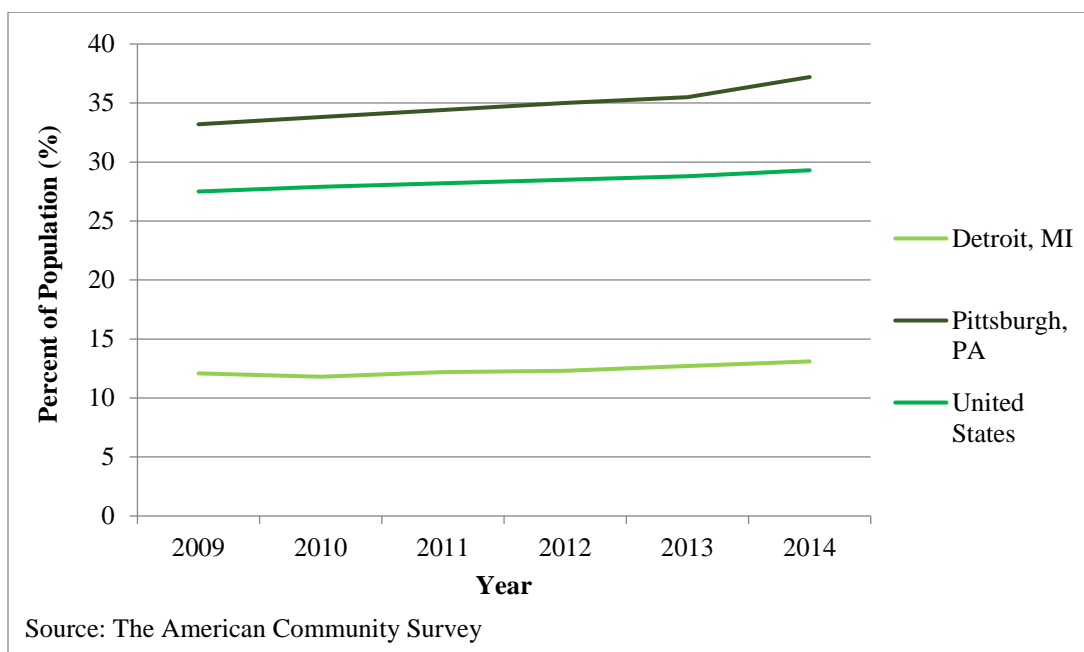
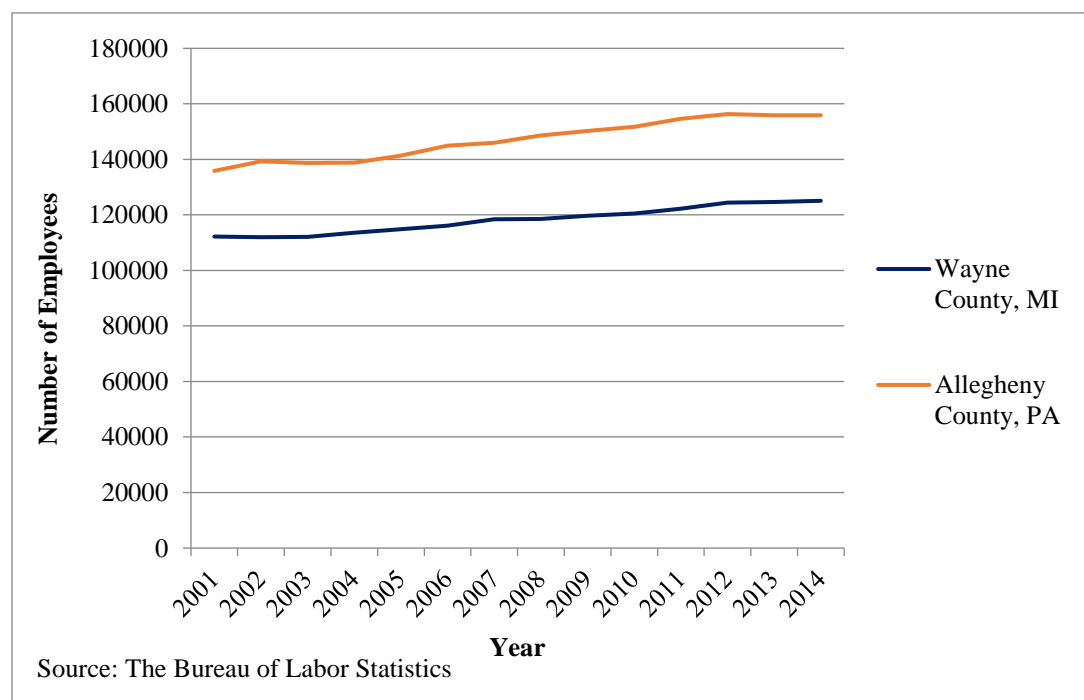


Figure 8: Total employment in the education and health services sector in Wayne County and Allegheny County from 2001-2014*



*The data provided only reflect employment in privately owned industries

Figure 9: Employment in the education and health services sector as a percentage of total private industrial employment in Wayne County and Allegheny County from 2001-2014

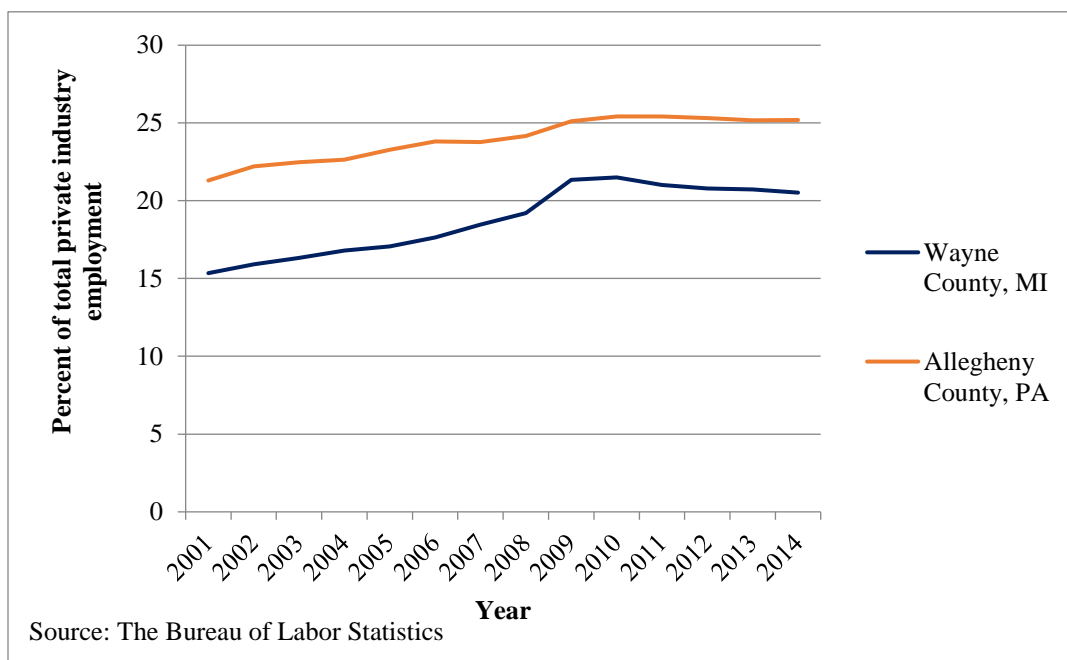
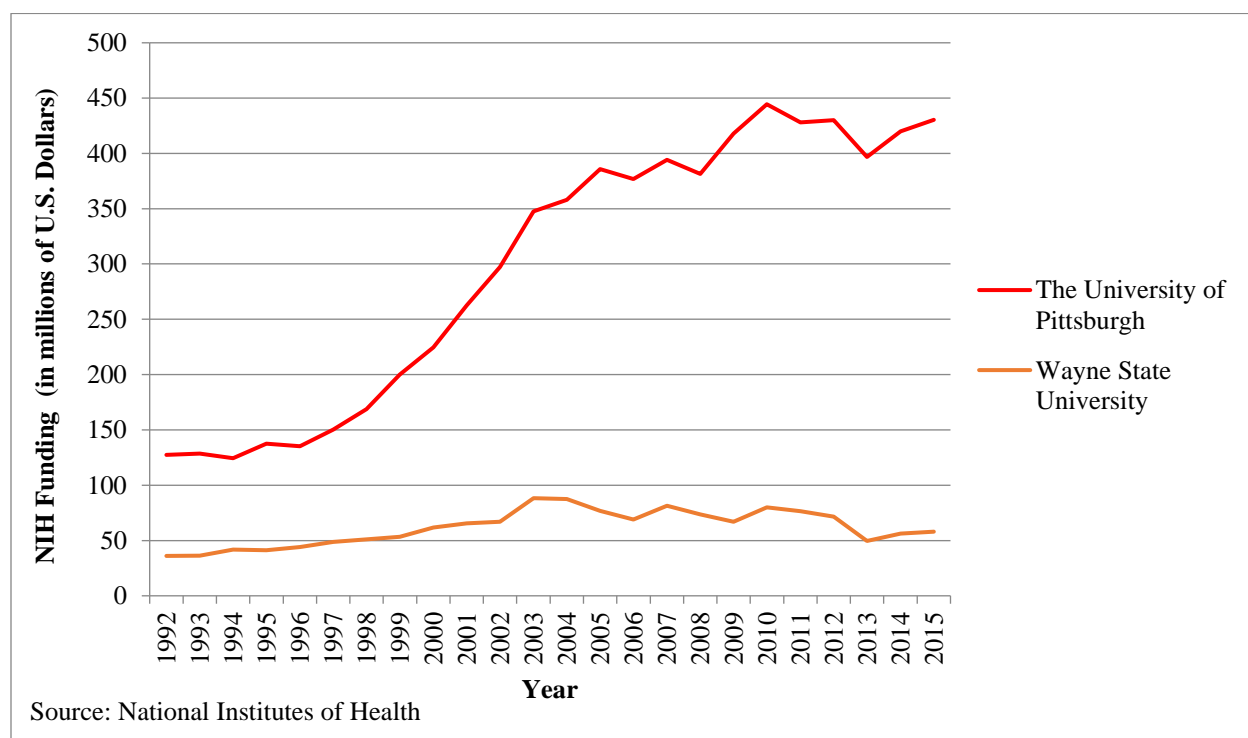


Figure 10: Total amount of funds (in millions of U.S. dollars) received by The University of Pittsburgh and Wayne State University from the National Institutes of Health from 1992-2015*



*Note: These funds have not been adjusted for inflation

Works Cited

- Abel, J.R., & Deitz, R. (2011). The Role of Colleges and Universities in Building Local Human Capital. *Current Issues in Economics and Finance*, 17(6), 1-7.
- Abel-Razzaq, L., & Aguilar, L. (2015, Aug. 17). What we've learned about Dan Gilbert in five years. *The Detroit News*. Retrieved from <http://www.detroitnews.com/story/business/2015/08/17/dan-gilbert-detroit-five-years/31851517/>.
- Aguilar, L. (2016, Jan. 8). Gilbert's First National Building Soars in Value. *The Detroit News*. Retrieved from <http://www.detroitnews.com/story/business/real-estate/2016/01/07/dan-gilbert-downtown-detroit-first-national-building/78451492/>
- Anders, M. (2013, May 13). Brain drain: See what percentage of recent graduates leave Michigan, and why they relocate. *MLive Media Group*. Retrieved from http://www.mlive.com/business/index.ssf/2013/05/brain_drain_report_michigan_re.html.

- Carnegie Mellon University (2007). *High-Tech Home: Companies Keep Jobs, Talent in Pittsburgh*. Retrieved from <http://www.cmu.edu/homepage/beyond/2007/winter/high-tech-home.shtml>.
- Carnegie Mellon University Office of Corporate & Institutional Partners (n.d.). *Industry Partners in the Robert Mehrabian Collaborative Innovation Center*. Retrieved from <https://www.cmu.edu/corporate/partnerships/cic/tenants.html>.
- Carnegie Mellon University Office of Institutional Research and Analysis (2015). *Factbook 2015-2016, Volume 30*. Retrieved from <https://www.cmu.edu/ira/factbook/pdf/facts2016/history-and-organization.pdf>.
- Carpenter, M., & Todd, D.M. (2014, Dec. 7). The Google Effect: How has the tech giant changed Pittsburgh's commerce and culture? *Pittsburgh Post-Gazette*. Retrieved from <http://www.post-gazette.com/business/tech-news/2014/12/07/Google-effect-How-has-tech-giant-changed-Pittsburgh-s-commerce-and-culture/stories/201412040291>.
- Center for the Study of Economics (2013). *Pennsylvania Jurisdictions that employ Land Value Taxation (LVT)*. Retrieved from <http://www.urbantoolsconsult.org/upload/LVT%20Jurisdictions%202013.pdf>.
- Citizens Research Council of Michigan (2013). *Detroit City Government Revenues* (Report 382). Retrieved from http://www.crcmich.org/PUBLICAT/2010s/2013/detroit_city_government_revenues-2013.pdf.
- Cohen, J.P., & Coughlin, C.C. (2005). An Introduction to Two-Rate Taxation of Land and Buildings. *The Federal Reserve Bank of St. Louis Review*, 87(3), 359-374.

- Daily Detroit Staff (2015, Feb. 20). Live.Work.Detroit Looks to Showcase Detroit to College Grads; Slow Roll Co-Founder Jason Hall to Speak. *Daily Detroit*. Retrieved from <http://www.dailydetroit.com/2015/02/20/live-work-detroit-looks-to-showcase-detroit-to-college-grads-slow-roll-co-founder-jason-hall-to-speak/>.
- Detroit Experience Factory (2015). *Live.Work.Detroit*. Retrieved from <http://detroitexperiencefactory.org/lwd/>.
- Eisinger, P. (2014). Is Detroit Dead? *Journal of Urban Affairs*, 36(1), 1-11.
- Fisher, A. (2016, Feb. 25). 10 Best American Cities for Women in Tech Jobs. *Fortune*. Retrieved from <http://fortune.com/2016/02/25/best-american-cities-tech-jobs-women/>.
- French, R. (2012, Feb. 28). Wayne State University: In a black-majority city, but one of the worst at graduating African-Americans. *MLive Media Group*. Retrieved from http://www.mlive.com/news/detroit/index.ssf/2012/02/at_wayne_st_easy_to_get_in_dif.html.
- Gallagher, J. (2013). *Revolution Detroit: Strategies for Urban Reinvention*. Wayne State University Press: Detroit.
- Gallagher, J. (2015, Aug. 8). Five years in, and Dan Gilbert's just beginning. *Detroit Free Press*. Retrieved from <http://www.freep.com/story/money/business/2015/08/15/quicken-bedrock-dan-gilbert-cavsdan-detroit-downtown-buildings-hudsons-apple-store-retail/31742621/>.
- Galster, G. (2012). *Driving Detroit: The quest for respect in the Motor City*. Philadelphia: University of Pennsylvania Press.

Global Detroit (2016). *About Global Detroit*. Retrieved from

<http://www.globaldetroit.com/about/>.

Hartzok, A. (1997). Pennsylvania's Success with Local Property Tax Reform: The Split Rate Tax. *The American Journal of Economics and Sociology*, 56(2), 205-213.

Helms, M., Guillen, J., Gallagher, J., & Reindl, J. (2014). 9 ways Detroit is changing after bankruptcy. *Detroit Free Press*. Retrieved from <http://www.freep.com/story/news/local/detroit-bankruptcy/2014/11/09/detroit-city-services-bankruptcy/18716557/>.

Hodge, T.R., Skidmore, M., Sands, G., & McMillen, D. (2015). Tax Base Erosion and Inequity from Michigan's Assessment Growth Limit: The Case of Detroit. *Public Finance Review*, 43(5), 636-660.

Kampe, P. (2016). Great Lakes Water Authority takes over regional operations. *The Oakland Press*. Retrieved from <http://www.theoaklandpress.com/article/OP/20160104/NEWS/160109869>.

Kotkin, J., & Schill, M. (2014, Nov. 17). America's Smartest Cities. *Forbes*. Retrieved from <http://www.forbes.com/sites/joelkotkin/2014/11/17/americas-smartest-cities/#5b0b91fe2ae4>.

Lake, R.J., Jochim, A., & DeArmond, M. (2015). Fixing Detroit's Broken School System. *Education Next*, 15(1), 20-27.

Levine, A.S., Detre, T.P., McDonald, M.C., Roth, L.H., Huber, G.A., Brignano, M.G., Danoff, S.N., Farner, D.M., Masnick, J.L. & Romoff, J.A. (2008). The Relationship between the

- University of Pittsburgh School of Medicine and the University of Pittsburgh Medical Center- A Profile in Synergy. *Academic Medicine*, 83(9), 816-826.
- Lewan, A. (2015, July 31). Detroit is Cultivating Local Entrepreneurship to Secure Its Future. *Entrepreneur Media*. Retrieved from <https://www.entrepreneur.com/article/248844>.
- Lin, Y.P. (2014). The Fall of Detroit: A Financial Economist's Point of View. *International Journal of Economics and Finance*, 6(7), 43-52.
- Lin, Y.P. (2015). Don't Put All Your Eggs On One Basket: The Lesson from Detroit's Bankruptcy. *World Scientific*, 10(1), 1-20.
- Margolis, J. (2015, June 3). Detroit Hopes to Drive Tech Startups away from Silicon Valley. *NPR All Tech Considered*. Retrieved from <http://www.npr.org/sections/alltechconsidered/2015/06/03/411765237/detroit-hopes-to-drive-tech-startups-away-from-silicon-valley>.
- MacDonald, C. (2016, Jan. 12). Hundreds seek to avoid foreclosure in Detroit. *The Detroit News*. Retrieved from <http://www.detroitnews.com/story/news/local/wayne-county/2016/01/12/hundreds-seek-avoid-foreclosure-detroit/78701880/>.
- McDonald, J.F. (2014). What Happened to and In Detroit? *Urban Studies Journal Limited*, 51(16), 1-21.
- National Institutes of Health. (2016). *Research Portfolio Online Reporting Tools*. Retrieved from <https://report.nih.gov/award/index.cfm>.
- Oates, W.E., & Schwab, R.M. (1996). The Impact of Urban Land Taxation: The Pittsburgh Experience. *National Tax Journal*, 1(1). Retrieved from

- https://www.lincolnst.edu/subcenters/property-valuation-and-taxation-library/dl/oates_schwab.pdf.
- Ohanian, L.E. (2014). Competition and the Decline of the Rust Belt. *Federal Reserve Bank of Minneapolis Economic Policy Papers*, 14-6. Retrieved from https://www.minneapolisfed.org/~media/files/pubs/eppapers/14-6/epp_14-6_rev.pdf.
- Sands, G., & Skidmore, M. (2015). Detroit and the Property Tax: Strategies to Improve Equity and Enhance Revenue. *Lincoln Institute of Land Policy*. Retrieved from https://www.lincolnst.edu/pubs/3590_Detroit-and-the-Property-Tax.
- Skidmore, M., Ballard, C.L., & Hodge, T.R. (2010). Property Value Assessment Growth Limits and Redistribution of Property Tax Payments: Evidence from Michigan. *National Tax Journal*, 63(3), 509-538.
- TechTown Detroit (n.d.). *History: Catalyzing Communities*. Retrieved from <http://techtowndetroit.org/about-us/history/>.
- The Education Trust. (2013). *College Results Online Data Tool*. Retrieved from <http://www.collegeresults.org/search2a.aspx>.
- Toland, B. (2012, Dec. 23). In desperate 1983, there was nowhere for Pittsburgh's economy to go but up: A tide of change. *Pittsburgh Post-Gazette*. Retrieved from <http://www.post-gazette.com/business/businessnews/2012/12/23/In-desperate-1983-there-was-nowhere-for-Pittsburgh-s-economy-to-go-but-up/stories/201212230258>.
- Tripp Umbach (2014). *An Engine for Moving Pennsylvania Forward: The 2014 Economic and Community Impact Report of the University of Pittsburgh*. Retrieved from <https://www.pitt.edu/sites/default/files/2014-Econ-Impact-Report.pdf>.

U.S. News & World Report (2016). *U.S. News College Rankings*. Retrieved from <http://colleges.usnews.rankingsandreviews.com/best-colleges>.

Vasilogambros, M. (2014, Nov. 24). Why the Millennials Who Left Michigan During a Brain Drain Are Moving Back. *The Atlantic*. Retrieved from <http://www.theatlantic.com/politics/archive/2014/11/why-the-millennials-who-left-michigan-during-a-brain-drain-are-moving-back/431736/>

Wallace, N. (2016, Feb. 25). The Best Cities for Women in Tech in 2015. *SmartAsset*. Retrieved from <https://smartasset.com/career/best-cities-women-tech>.

Wayne State University (2016). *Schools and Colleges*. Retrieved from <https://wayne.edu/about/schools/>.

Wisely, J., & Lawrence, E.D. (2015, March 21). Wayne County legacy costs face \$2-billion shortfall. *Detroit Free Press*. Retrieved from <http://www.freep.com/story/news/local/2015/03/21/wayne-county-finances-time-line/25153009/>