A CONTRAST: MODELING THE MACROECONOMIC IMPACT OF "MEDICAID EXPANSION" IN NORTH CAROLINA

PREPARED BY REGIONAL ECONOMIC MODELS, INC. (REMI)

FOR THE NORTH CAROLINA DEPARTMENT OF HEALTH AND HUMAN SERVICES (NC DHHS)

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EXECUTIVE SUMMARY

Using a 1-region, 70-sector PI[+] model of the North Carolina economy, the North Carolina Department of Health and Human Services contracted Regional Economic Models, Inc. to perform an impact study of the potential economic implications of expanding Medicaid under the provisions of the Patient Protection and Affordable Care Act. This study used data from the state on the net increase in healthcare consumption from the expansion and the needed redirection of state funds from other priorities to pay for the state's share against federal matching funds. With this data and assumptions, the Medicaid expansion had potential to be a positive for North Carolina and its economy from 2014 to 2021. Total employment increased by around 23,000 jobs, private employment increased by a similar number, annual GDP was about $1.4 billion higher, and annual real disposable personal income was around $1.0 billion higher. Spending by the state does fall, but the anticipated influx of federal dollars was enough to generate a positive impact. These benefits were concentrated in the industries related to healthcare, professional services like research or operations, and for workers able to work in the occupations demanded by health services firms, either as a provider or in administration. We did not seek to advocate a certain course of action for North Carolina but only to provide better information on this issue.

POLICY HISTORY AND BACKGROUND

The economic implications of policy decisions are always at the front of the mind with policymakers and the public, and this is most definitely true in the case of Medicaid expansion. This "expansion" followed from a series of events beginning with the passage of the Patient Protection and Affordable Care Act in 2010 (typically abbreviated at the "ACA" or "Obamacare" in the political lexicon). This law represented the most significant reform and overhaul of the United States' public healthcare system since the beginning of Medicare and Medicaid in the 1960s,[1] and it sought to expand health insurance coverage in the United States through a series of mandates, premium subsidies, and taxes. One of the chief mechanisms of the ACA was an expansion of the federal/state Medicaid program, which encountered complications at the legal bench when the ACA went before the Supreme Court through the summer and to a final ruling on June 28, 2012.

While surviving the overall legal challenge, the case of *National Federation of Independent Business (NFIB) v. Sebelius* made the situation for states regarding the expansion complicated. The court ruled the general provisions of the law constitutional under Congress' power to tax, though it held that forcing states to expand Medicaid coverage (and thereby their costs in matching federal funds) an unconstitutional appropriation of their sovereign powers.[2] Hence, the original "deal" of the 1965 law remained in force—states would have the choice to expand Medicaid under the provisions of the ACA or not, just as they did under the original Social Security amendment during the Great Society. The Arizona program, Arizona Health Care Cost Containment System (AHCCCS or "Access"), for example, did not start until 1982.[3] While all fifty states did eventually join Medicaid, the reaction to potential expansion under the ACA has been mixed.

Some states eagerly embraced the potential expansion, while others have taken a "wait and see" approach to the details and financing of the state/federal program. Governor Terry Branstad of Iowa, for instance, said Iowa will not participate. Citing worries of changing federal matching rates down the line, he said, "We don't believe the federal government when they say they're going to pay the whole cost of this for the next three years."[4] At the close of 2012, eight states have firmly declared their nonparticipation, and six leaned that way (including Iowa). Reasons changed, but most outlined concerns about paying for the expansion or defects in the ACA.[5] The policy opinion within states between the legislatures and governors and their relationships vary, as well. Thirteen states have announced their intentions to opt-in to the program, either to supplement or complement current state-level programs, to replace states money with federal funding, or to further the original goals of the ACA to expand coverage to lower income households.

Federal funding for states to expand may be substantial. To quote from *The Heritage Foundation*, "States may chose to expand their Medicaid populations to include individuals below 138% of the federal poverty level, with the federal government picking up 100% of payment for the first three years and then rolling back federal payments." They continued, "This structure is designed to be attractive to states, since it appears to increase

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[1] James Vicini and Jonathon Stempel, "US top court upholds healthcare law," *Reuters*, June 2012, <www.reuters.com/article/2012/06/28/usa-healthcare-court-idUSL2E8HS4WG20120628>

[2] "A Guide to the Supreme Court's Decision on the ACA's Medicaid Expansion," *The Henry K. Kaiser Family Foundation*, August 2012, <www.kff.org/healthreform/upload/8347.pdf>

[3] "Managed Medicaid: Arizona's AHCCCS Experience," *National Health Policy Forum*, January 2000, <www.nhpf.org/library/site-visits/SV_AZ00.pdf>

[4] Jon Ward, "Terry Branstad, Iowa Governor, Won't Expand Medicaid in Light of Supreme Court Ruling," *Huffington Post*, July 2012, <www.huffingtonpost.com/2012/07/02/terry-branstad-iowa-medicaid_n_1643428.html>

[5] "Where each state stands on ACA's Medicaid expansion," *The Advisory Board Company*, December 2012, <www.advisory.com/Daily-Briefing/2012/11/09/MedicaidMap#lightbox/1/>

health coverage at little or no state-level costs."[6] While Branstad and others have expressed this initial "no cost" situation to states is temporary and may change with future federal legislation, there is a lot of money on the table from federal coffers to aid states with the expansion. The Congressional Budget Office (CBO) estimated Washington will spend $930 billion on the expansion from 2014 to 2022, paying for the entire share the first three years and gradually declining to 90% federal and 10% state portions by 2020.[7] At current, $930 billion is about 6.2% of the United States' annual gross domestic product (GDP). One could not ignore the potential effect of this money on a single state's economy, which was where this analysis began.

STUDY INTRODUCTION AND PERSPECTIVE

This paper seeks to illustrate the economic impact of the federal dollars on the state of North Carolina from the Medicaid expansion provisions of the ACA. **It does not advocate for expansion or non-expansion in either direction**. There are factors about Medicaid and healthcare policy in the United States that are difficult or impossible to know—most notably, the nature of future legislative action by Congress and the various states. This study looked at the current law, and it did not attempt to prognosticate what policymakers in 2017, 2021, or any other year might do with healthcare. Regional Economic Models, Inc. (REMI) used data provided by the North Carolina Department of Health and Human Services (NC DHHS or just DHHS) to model the impact of the expansion in our model, PI$^+$. The results here came from the data inputs and assumptions.

REMI is strictly nonpartisan, nonpolitical, and involved only in the economic modeling and reporting from the data provided by NC DHHS. We sought to provide robust information for policymakers and the public on the economic implications of certain decisions—in this case, Medicaid expansion in North Carolina. The rest of the study included an introduction to REMI as a firm, the PI$^+$ model used for this study, the data and assumptions from DHHS, and the economic impact results. Some of these assumptions included considerations of how other states respond to the ACA, how migration patterns and household decision-making may change, dealing with the offset of federal money and taxes, and how state-level spending in North Carolina changed to make this into a "net" analysis. The exact numbers in the input data were confidential—one should turn to the NC DHHS to inquire as to exact figures.[8] The $930 billion potential outflow from Medicaid expansion over the next ten years is a stupendous amount of money, and this study inquired into its impact in this one region.

REGIONAL ECONOMIC MODELS, INC. (REMI)

Regional Economic Models, Inc. is a Massachusetts- and Washington, DC-based firm specializing in services related to economic modeling. It began as a project by a professor, Dr. George Treyz, at the University of Massachusetts-Amherst in the 1970s looking into the long-term impact of investments in the I-90 corridor (from Boston to Albany to Buffalo). From there, Dr. Treyz founded a company around his research, which has grown over the past thirty years into the present firm. REMI currently provides software, support services, and issue expertise in forty-seven of the fifty states, the District of Columbia, and several nations abroad. Our model users include state government agencies, local authorities, regional planners, federal departments, consulting firms, private corporations, and academia. In North Carolina, for example, REMI currently works with the General Assembly's Fiscal Research

[6] Drew Gonshorowski, "Medicaid Expansion Will Become More Costly," *The Heritage Foundation*, August 2012, <www.heritage.org/research/reports/2012/08/medicaid-expansion-will-become-more-costly-to-states>

[7] Robert Pear, "Uncertainty Over States and Medicaid Expansion," *New York Times*, June 2012, <www.nytimes.com/2012/06/29/us/uncertainty-over-whether-states-will-choose-to-expand-medicaid.html?_r=0>

[8] "North Carolina Medicaid," *North Carolina Department of Health and Human Services*, December 2012, <www.ncdhhs.gov/dma/medicaid/>

Division and Winston-Salem State University (WSSU). Other relevant users include the Georgia Department of Transportation (GDOT), Atlanta Regional Commission (ARC), the state legislatures in Kentucky and Florida, the comptroller's office in Texas, and the Departments of Revenue in Louisiana, Mississippi, Kansas, and Iowa. REMI's relationship with these organizations consists of providing them a model of their region (in the form of a software package) as well as working with them on the interface, vetting data, selecting variables, interpreting the results, and—in cases like these—running the simulation and reporting the findings.

THE PI[+] REGIONAL MODEL

For this study, REMI used a 1-region, 70-sector build of the counties of North Carolina agglomerated to create a state-level model. The PI[+] model is the "core" of REMI capabilities. The research behind it included four different quantitative methodologies from regional science and economics, which compensated for their individual weaknesses and highlighted their strengths. They included input-output (IO) tabulation, which captured the effects of inter-industry transactions, technological relationships, and multipliers. PI[+] also included a computable general equilibrium (CGE) component, which accounted for the "long-term" impact of policies once all related markets in products, housing, labor, and others have had a chance to return to an equilibrium or "clear." These two types of models only allowed for a "before" and an "after" simulation, however, which was why PI[+] included an econometric component. The econometrics gave a time component, including speed of adjustment, behavioral responses, elasticities, and statistical parameters. The last methodology was New Economic Geography (NEG), which took account of labor pooling, the clustering of industry supply chains, and the spatial elements of a regional economy and its tendency to organize into localized production units.

The research behind the REMI PI[+] model appeared in peer-reviewed journals, and REMI used the federal statistical agencies as data sources when building the software. Data came from the Bureau of Economic Analysis (BEA), Bureau of Labor Statistics (BLS), the U.S. Census Bureau, and the Energy Information Administration (EIA).[9] A macroeconomic forecast came from the Research Seminar in Quantitative Economics (RSQE) at the University of Michigan,[10] which drove many of the county-level or state-level trends in the short-term of the model through the forthcoming business cycle. After that, the REMI model used the BLS' long-term forecast of national growth by industry and in the labor force. The county-level data from these sources allowed for PI[+] to have a customized geography at the sub-national or sub-state basis, but the model here included the discreet state of North Carolina in the inputs and results. The journals included the *Journal of Regional Science*, the *American Economic Review*, and the *Review of Economics and Statistics*.[11]

The model existed in a block structure (see *Figure 1*, next page). Block 1, at the top, represented the economy of the region with final demand and production. These included the various components of GDP, including the spending by governments, investment, net exports, and consumption. Block 2 represented the firm perspective on the economy, where demand turned into sales orders and firms made decisions about the most efficient way to produce. The model optimized their choices with a Cobb-Douglas production function amid labor, capital, and fuel as factors of production. Block 3 represented households in the economy. This included their demographics, their participation in the labor market, their location decisions, non-pecuniary amenity, and their consumption of food,

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[9] For a full listing of data sources and types, see "Data Sources and Estimation Procedures," *REMI*, November 2012, <www.remi.com/download/documentation/pi+/pi+_version_1.4/Data_Sources_and_Estimation_Procedures.pdf>

[10] George Fulton, "RSQE specializes in economic forecasting of the U.S. and Michigan economies," *University of Michigan*, <http://rsqe.econ.lsa.umich.edu/>

[11] For journal citations, please see p. 46 of the PDF online, "PI[+] v. 1.4 Model Equations," *REMI*, November 2012, <www.remi.com/download/documentation/pi+/pi+_version_1.4/PI+_v1.4_Model_Equations(2).pdf>

housing, healthcare, and everything else to fulfill their wants and needs. Block 4 was where households and businesses came together in the marketplace, and it included labor market concepts like employment opportunity and compensation rates, cost of living factors such as real estate and housing prices, and the cost of doing business for an industry in any given region. These then flowed into Block 5, which measured competitiveness against other regions (domestic and international), the ability to export, and the aptitude to keep imports from competitors away from a geographic arena.
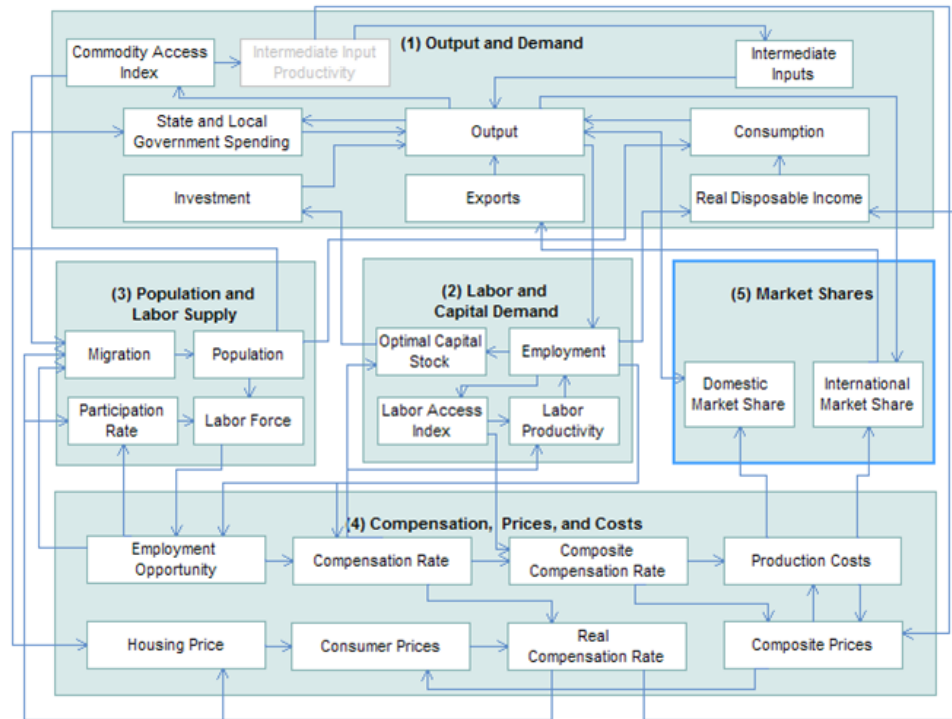
FIGURE 1 – THIS WAS THE BLOCK STRUCTURE OF THE REMI PI[+] MODEL, INCLUDING OUTPUT LEADING INTO LABOR AND CAPITAL, HOUSEHOLDS IN BLOCK 3, MARKETS IN BLOCK 4, AND MARKET SHARES. THE "RECTANGLES" REPRESENTED SOME METRIC, WHILE THE ARROWS SHOW THEIR INTERRELATIONSHIPS IN THE FORM OF EQUATIONS TO ILLUSTRATE THE INTERACTIONS BETWEEN AREAS.[12] THE MODEL WAS A CONSISTENT SYSTEM TO SHOW HOW ALL OF THESE WORK TOGETHER TO GENERATE IMPACTS AND FORECASTS ON A REGIONAL BASIS.

The PI[+] model had two purposes: forecasting and analysis via simulations. The forecasting works by building the government's data into the structure and allowing it to run until the sunset in 2060. REMI builds this "base case" so users can have a forecast of their regional economy, the chance to analyze the internal trends of the model, and to have something to compare against when performing their simulations. The simulations allow the user to make exogenous—"coming from outside"—changes through the above structure in what PI[+] calls "policy variables."[13] These changes represented the effect of their policy and can include production, price changes, and other factors. For example, a Boeing 737 line moving to an area will produce a large amount of output. The model represents it above, and then it hires the workers, pays them their wages, has them spend it, and redirects the capital portion of production into investment and intermediate demand to other industries (such as aluminum providers, design and engineering firms, or accounting services). From there, the model generates a new simulation and compares it

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[12] Please see n. 9 on p. 5
[13] "Exogenous," *EconModel*, December 2012, <www.econmodel.com/classic/terms/exogenous.htm>

against the old case to give an "impact" to the forecast for the regional economy. This impact, or difference, is the estimated implication of the policy in question.
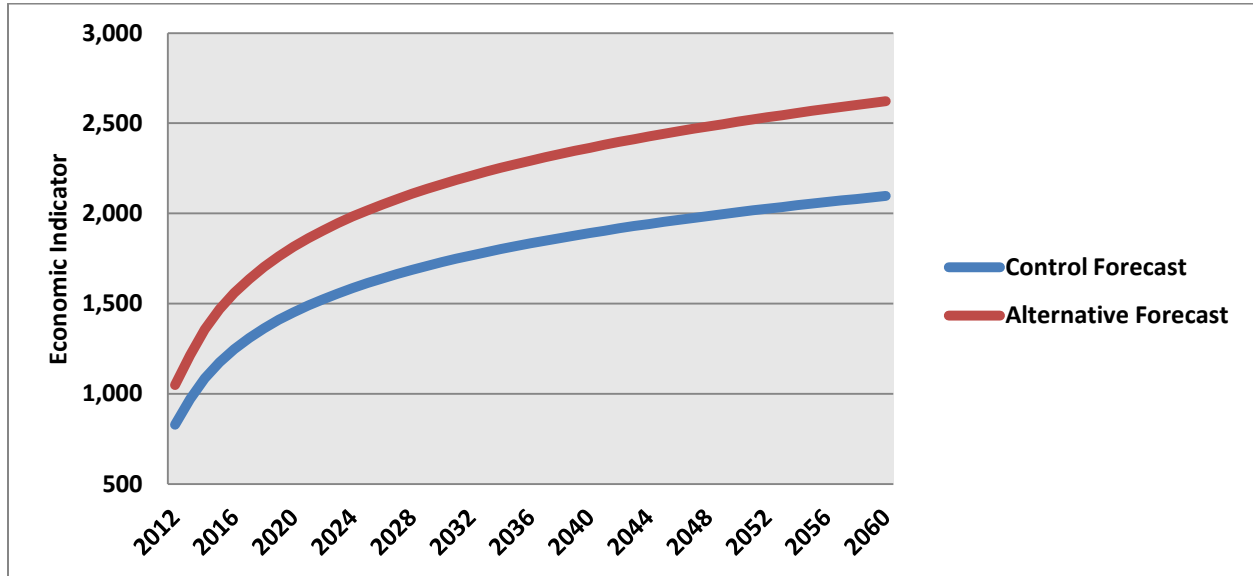
FIGURE 2 – THIS GRAPH REPRESENTS THE BASIC PRINCIPLES OF ANALYSIS WITH PI$^+$. THE BLUE LINE WAS THE BASELINE, BASE CASE, OR "NULL" WITH NO EXTERNAL SHOCKS TO THE ECONOMY. THE RED LINE WAS THE SIMULATION DUE TO CHANGES IN THE POLICY VARIABLES. ONE CAN EITHER LOOK AT THE FORECAST OUT OF THE MODEL FOR THE FUTURE OR THE VERTICAL DIFFERENCE BETWEEN RED AND BLUE TO DETERMINE THE "IMPACT" OF A CERTAIN POLICY. HERE, FOR INSTANCE, THE RED LINE WAS A REGION'S DEVELOPMENT WITH A TRANSPORTATION INVESTMENT, WHILE THE BLUE LINE IS ABSENT THE BUILD. THE Y-AXIS WILL BE SOME ECONOMIC MEASUREMENT OR DATA, INCLUDING MAIN INDICATORS LIKE EMPLOYMENT, GDP, BUSINESS SALES/OUTPUT, OR INCOME.

SIMULATING MEDICAID EXPANSION IN NORTH CAROLINA

In this case, illustrating the impact of the expansion of Medicaid under the ACA's provisions required two major sets of assumptions. One involved the direct application of the federal spending for the expansion, and the other was accounting for the cost to the state for paying for its portion. Modeling this required a "micro-simulation" of the nature of the demand and supply for healthcare in the region when new policies and incentives come into play. This micro-simulation data from DHHS went into the PI$^+$ model to sort healthcare spending by industry and year. On the other hand, even with the generous federal match, the ACA expansion is not entirely free of cost to the government in Raleigh. The state will still shoulder some burden of paying for the expansion, which one can model as a mixture of spending reductions or tax increases, which represents the state's fiscal constraints in the face of expanding Medicaid and more people participating in the market.

NC DHHS provided REMI with an estimation of how the expansion would impact healthcare spending in North Carolina as well as data on how to sort that into individual NAICS industries. NAICS stands for North American Industrial Classification System, and it is the official way the government keeps data and defines a series of firms

into individual "industries" that provide similar services and compete against each other.[14] The direct industries impacted by the expansion include hospitals, offices of physicians, prescription drug manufacturers and retailers, diagnostic and treatment equipment manufacturers and practitioners, dentists' offices, and other providers of healthcare specialties. A number of factors lead to a net increase in healthcare spending: the "woodwork effect" from the individual mandate,[15] moving SCHIP beneficiaries over to Medicaid, and the availability of Medicaid for households between 100% and 138% of the federal poverty threshold.[16] REMI could not answer to the veracity of these micro-simulations, though other groups throughout the literature have made their own estimations of what Medicaid expansion might cost the federal and state governments.[17]

Even without expanding, the ACA will change the nature of the North Carolina economy. There are two reasons for this: the woodwork effect and the decisions other states make about Medicaid. An article in the *New England Journal of Medicine* stated, "the participation rates [for Medicaid have] a national average of 61.7% eligible individuals."[18] However, now facing a financial penalty for not enrolling from the individual mandate, people are more likely to enroll in plans. This will happen without regard to what the state does with Medicaid expansion. Decisions by other states will also impact North Carolina's economy; healthcare is a labor-intensive, localized industry, and North Carolina is one of the United States' leaders in providing care and in R&D. The decision of a large state, even far away ones like Texas and California, will impact the flow of dollars coming into North Carolina. The same is true of the smaller state economies in the neighboring South. We needed to make a few assumptions and clarifications about these factors before proceeding with a Medicaid simulation.

REMI produced multiple simulations to take account of these issues. First, REMI updated the base case simulation of the North Carolina economy to include the woodwork effect regardless of what the state decided to do with expansion. This increased demand for healthcare in the state while reducing government spending (as the federal match for the preexisting Medicaid program was much less than 90% or 100%). The alternative simulation then became a case where only eligibility expansion is included as an exogenous factor. Secondly, PI$^+$ automatically moves money and people between states in any simulations. However, given this study is about North Carolina, **we did not model the impact of federal dollars in other states and their potential to make their way to North Carolina**. That interstate trade of capital, sales orders, and employment will happen no matter what Raleigh does about its Medicaid program; hence, we did not include it in the simulations.

Another factor to consider is migration. The PI$^+$ model moves households from place-to-place due to changes in relative job availability, wages, and cost of living. The ACA will have a profound effect on each of these in every state, and modeling as if North Carolina was the only state to expand—and therefore the only state to undergo these changes—is not complete. However, one should expect there to be some change in how people locate themselves due to the ACA and expansion. The North Carolina economy has a high concentration of healthcare firms, which attracts the young or footloose looking for employment and high wages. North Carolina would be on something of an "island" in the South if it were to participate in the Medicaid expansion because many nearby states (Virginia, South Carolina, Georgia, Alabama, Mississippi, and Texas) intend to opt-out of the expansion

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[14] "North American Industrial Classification System," *Department of Commerce – U.S. Census*, December 2012, <www.census.gov/eos/www/naics/index.html>

[15] Joseph Ahern, "Medicaid and the 'Woodwork Effect,'" *The Center for Community Solutions*, December 2012, <tinyurl.com/cjlut2z>

[16] "Medicaid Expansion: A Short Explanation," *American Public Health Association*, December 2012, <www.apha.org/advocacy/Health+Reform/ACAbasics/medicaid.htm>

[17] Please see n. 6 on p. 4

[18] Benjamin Sommers and Arnold Epstein, "Medicaid Expansion – The Soft Underbelly of Health Care Reform," *New England Journal of Medicine*, 2010, <www.nejm.org/doi/full/10.1056/NEJMp1010866>

altogether.[19] This would give North Carolina an advantage in attracting households in light of the other states turning down the federal dollars and associated spending in the healthcare sector. Hence, one would want a migratory effect, but not one as strong as a "regular" simulation. More migration means more people, more spending, and therefore more impact. We ran cases with the migration effect turned on and off, and we reported both of them to give sensitivity towards other states' decisions.

The federal match of 90% by 2020 in the current ACA law still left 10% (or so, depending on the year) of the fiscal cost for the expansion to the state. To model this, PI$^+$ had variables to either decrease state government spending or raise taxes in various areas, such as on income or consumption. Raising taxes generally requires some legislative act; therefore, this study intentionally cut spending in order to make Medicaid expansion consistent with North Carolina's need to balance its budget. State agencies can, on the whole, reprioritize spending on the margin in the face of fiscal constraints more easily than a legislature can enact wholesale changes to taxes. If in 2019 (to pick a random year) for example, Medicaid expansion were costing the state $112, then $112 would come out of state spending elsewhere. We chose to cut the spending "across-the-board," as well, given that it is the most likely assumption to make without information on the future priorities of elected leaders.

The last big assumption involved federal taxes, because the ACA included a number of new revenue provisions. These involved capital gains, payroll taxes, a tax on medical devices, excise taxes on high-value insurance plans for individuals and families, and a number of other measures.[20] For this study, these taxes and their impact were beyond the purview of any decision Raleigh might make in the future about Medicaid. The federal government enacted these changes, and only it can unmake them in its legislation. The taxes are still going to take place in a state whether it chose to expand Medicaid or not. Hence, the federal money coming into the state was exogenous in the simulation, or "without opportunity cost," and the lack of an offset will make these results look positive. It was important to remember, however, this money came from somewhere, and it would contribute negatively to the impact of the ACA in North Carolina and the rest of the United States if included. Nevertheless, the decision about Medicaid expansion in North Carolina would not change this.

ECONOMIC IMPACT RESULTS

This section describes the results of the simulation. It included major economic indicators for the state of North Carolina in cases between non-expansion (which included the woodwork effect) and expansion under the ACA. To return to *Figure 2*, the blue line was the former situation while the red line was the latter. From the PI$^+$ model, this was the expected impact or difference from adding the Medicaid expansion to North Carolina. We subtracted state government spending to cover any anticipated need for state funds to make up for the ~10% not covered by federal money in later years. Each result had three lines: a baseline "zero" (which was the model's forecast of the state after the woodwork effect alone), one including economic migration, and one that did not include economic migration. The total scale and effect of migratory effects would depend on the decisions of other states throughout the South and the whole United States. If more states opted-in to the program, then the impact would trend closer to the non-migration situation. If fewer states chose to participate in the ACA, then North Carolina (and other states undergoing expansion) would have a larger migratory effect. These results were predictions, and they were not intended to be absolutely accurate. **They were meant to give a sense of scale towards the impact of the federal dollars for Medicaid expansion in the state**.

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[19] Please see n. 5 on p. 3

[20] "Affordable Care Act Tax Provisions," *Internal Revenue Service*, December 2012, <www.irs.gov/uac/Affordable-Care-Act-Tax-Provisions>

TOTAL EMPLOYMENT

	2014	2015	2016	2017	2018	2019	2020	2021
Migration Allowed	5,792	24,623	25,684	23,782	22,729	22,106	20,491	20,095
No Migration	5,692	24,129	24,846	22,639	21,279	20,344	18,426	17,742
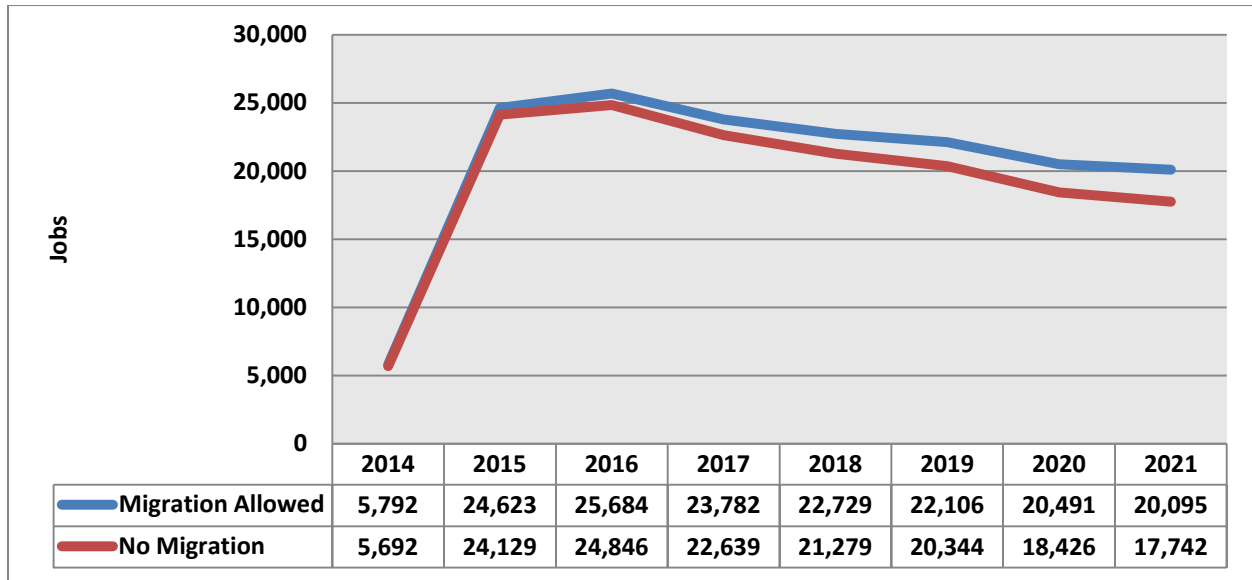
FIGURE 3 – THIS SHOWS THE TOTAL EMPLOYMENT IMPACT TO NORTH CAROLINA BETWEEN EXPANSION AND NON-EXPANSION WITH THE MIGRATION EQUATION EITHER ON OR OFF. THE ZERO LINE HERE IS A BASE CASE OF THE STATE ECONOMY, INCLUDING THE WOODWORK EFFECT BUT WITHOUT EXPANSION. THE FLOW OF FEDERAL DOLLARS INTO THE HEALTHCARE SECTOR GENERATED A POSITIVE IMPACT IN THE STATE, THOUGH GRADUALLY-IMPROVING LABOR PRODUCTIVITY AND THE NEED FOR THE STATE TO REDIRECT ITS INTERNAL FUNDS TO ITS PORTION CAUSED THE SLIGHTLY-DOWNWARD TREND STARTING IN 2016 AND TOWARDS 2021.

PRIVATE NON-FARM EMPLOYMENT

	2014	2015	2016	2017	2018	2019	2020	2021
Migration Allowed	5,546	23,047	23,979	23,511	23,237	23,010	22,408	22,305
No Migration	5,470	22,674	23,344	22,636	22,115	21,626	20,767	20,418
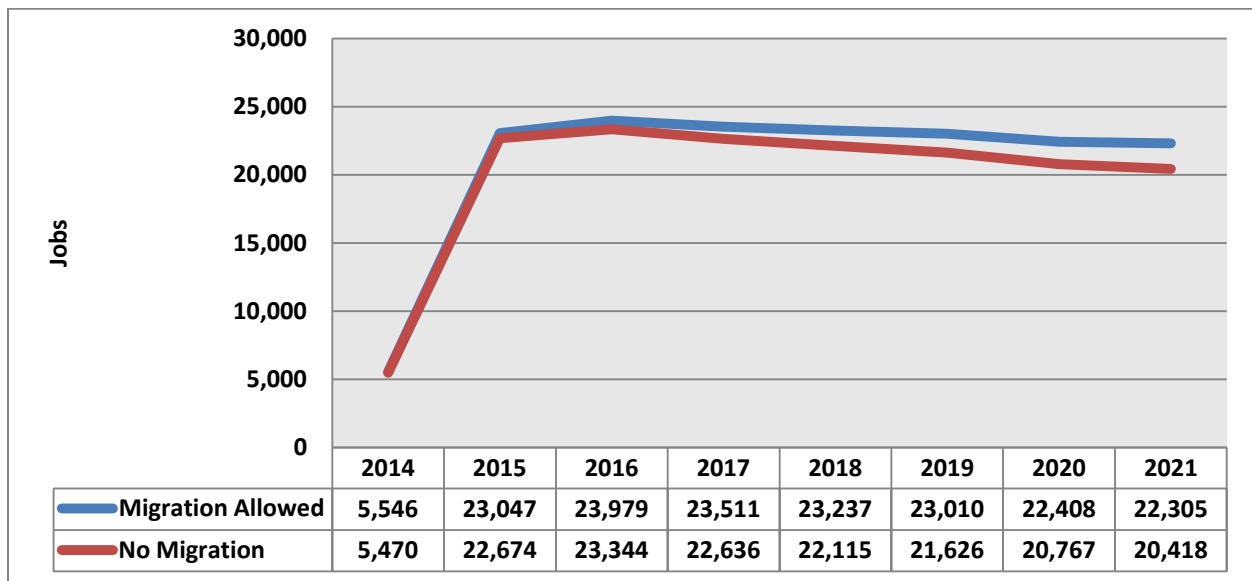
FIGURE 4 – THIS SHOWS THE SAME GRAPH INCLUDING ONLY PRIVATE NON-FARM EMPLOYMENT IN THE NAICS INDUSTRIES. THEREFORE, THE GRAPH WAS FLATTER IN THE LATER YEARS OF THE IMPACT.

The difference between total employment and private non-farm employment was naturally public employment. This includes employment at the state-, local-, and federal-levels. Since state spending decreased in other areas relative to the baseline to pay for the ACA expansion, public employment was actually slightly lower in the alternative cases. For instance, in 2019, total employment rose 22,106 (when allowing migration) and private non-farm employment rose 23,010, which means public employment must have fell by 904 in the simulation. This subtractive exercise would lead the same results between different years and settings.

One should note that these numbers represented "job-years," rather than a rolling total of job creation.[21] The PI[+] model used the BEA's definition of employment, which is a "labor demanded" concept rather than an idea of "how many people have a job" at a moment. That headcount methodology came from the BLS, and they feature it in the monthly job and unemployment figures. The numbers above represented the number of "roster slots" available from business or government at the prevailing wage conditions during a time period. To read it, for example, one could say that total employment in 2019 is 22,106 jobs greater, which means that there are 22,106 more jobs available and occupied than in the baseline. It did not mean that 22,106 new jobs began that year or 22,106 more people have a job (when accounting for people who work multiple jobs or commute in or out of North Carolina for work), but it did mean there was more work in the state to such degree.

GROSS DOMESTIC PRODUCT (GDP)

	2014	2015	2016	2017	2018	2019	2020	2021
Migration Allowed	$386	$1,651	$1,742	$1,632	$1,577	$1,548	$1,449	$1,436
No Migration	$379	$1,614	$1,679	$1,547	$1,469	$1,418	$1,296	$1,260
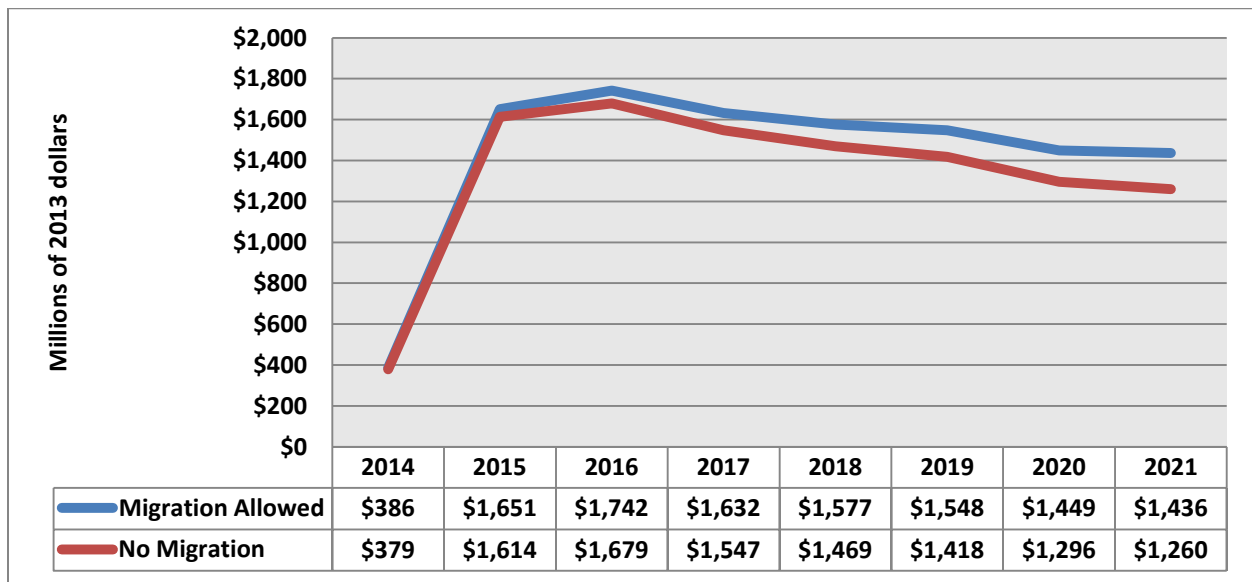
FIGURE 5 – THIS SHOWS THE GDP IMPACT IN NORTH CAROLINA FROM THE EXPANSION. MUCH OF THE PATTERN IS THE SAME AS EMPLOYMENT CONCEPTS, BECAUSE THE EXPANSION BRINGS MORE DIRECT MEDICAL SPENDING AND SPINOFFS TO THE STATE BEFORE A REDUCTION IN GOVERNMENT SPENDING DRIVES THE LINES DOWN SLIGHTLY AFTER 2016. DO NOTE THAT THIS IS IN AN INFLATION-ADJUSTED DOLLAR; THEREFORE, THESE NUMBERS ARE COMPARABLE ACROSS THE TIMEFRAME FROM 2014 TO 2021 IN THEIR VALUES.

GDP reproduces annually, and hence it is sensible to sum it across years. From 2014 to 2021, from the above results, the state gained $11.042 billion in GDP when averaging the impact amid the migration and non-migration

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[21] Tim Fernholz, "What the Heck is a Job-Year," *The American Prospect*, May 2009, <http://prospect.org/article/what-heck-job-year>

scenarios. This gave an average impact on an annual basis of $1.380 billion for the six years of the expansion above. One could do the same exercise with job-years on *Figure 3* and *Figure 4*.

BUSINESS SALES/OUTPUT

	2014	2015	2016	2017	2018	2019	2020	2021
Migration Allowed	$621	$2,659	$2,809	$2,630	$2,536	$2,483	$2,315	$2,286
No Migration	$609	$2,598	$2,708	$2,494	$2,363	$2,272	$2,068	$2,002
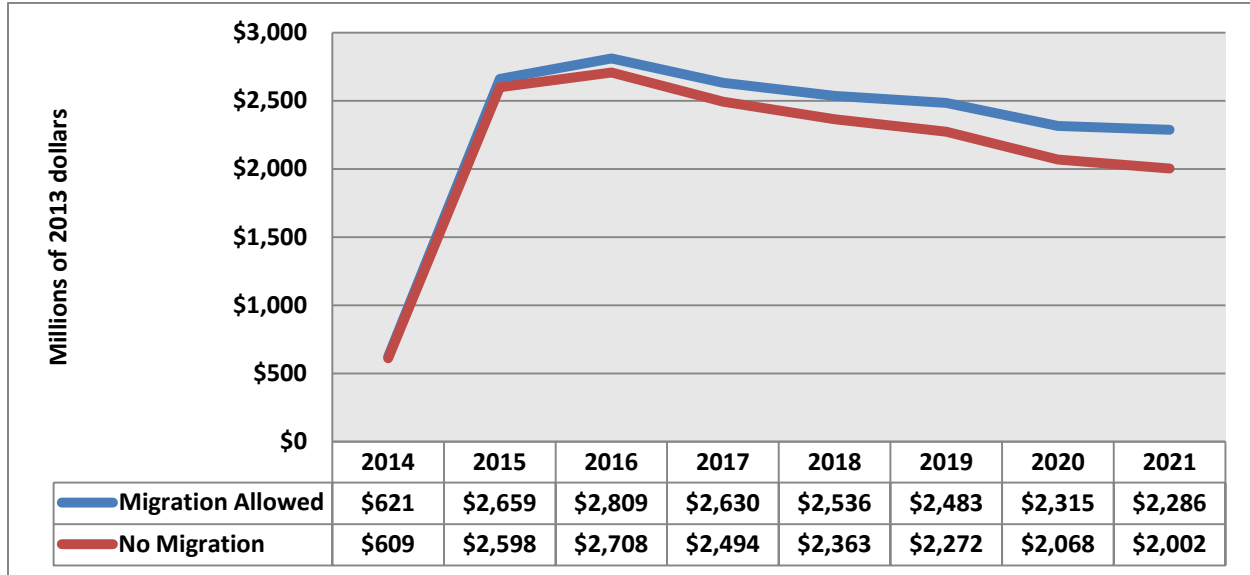
FIGURE 6 – THE ABOVE REPORTS WHAT THE PI⁺ MODEL CALLS "OUTPUT," WHICH IS AN EQUIVALENT CONCEPT TO TOTAL PRODUCTION OR SALES ORDERS. IN THE LONG-RUN, BUSINESSES ONLY PRODUCE IF THEY ARE ABLE TO SELL WARES, SO THESE NUMBERS REPRESENT EITHER CONCEPTION. MUCH OF THE PATTERN IN THE LINES WAS THE SAME. ONE SHOULD READ IT AS, FOR EXAMPLE IN 2016, THE MODEL FOR MEDICAID EXPANSION (IN THE NON-MIGRATION SCENARIO) PREDICTED BUSINESS SALES IN NORTH CAROLINA WOULD INCREASE BY $2.809 BILLION OVER A BASELINE SIMULATION WITHOUT THE EXPANSION BUT INCLUDING THE WOODWORK EFFECT.

REAL DISPOSABLE PERSONAL INCOME

	2014	2015	2016	2017	2018	2019	2020	2021
Migration Allowed	$237	$1,025	$1,129	$1,111	$1,115	$1,127	$1,093	$1,116
No Migration	$223	$957	$1,019	$968	$942	$924	$863	$860
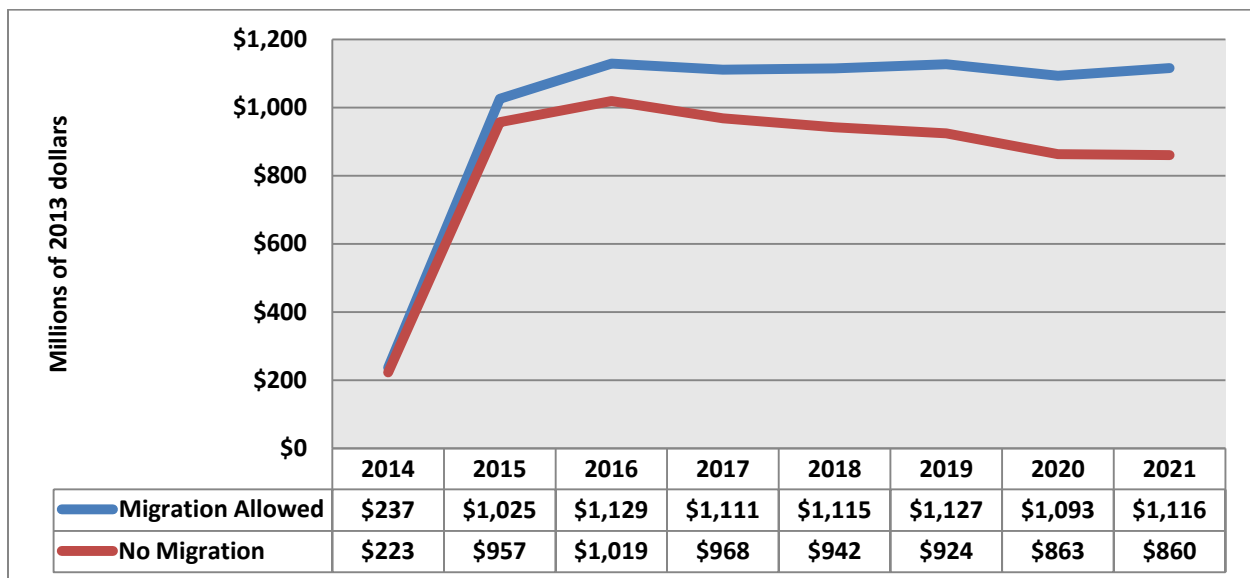
FIGURE 7 – THIS SHOWS THE TOTAL AMOUNT OF AFTER-TAX PERSONAL INCOME ASSOCIATED WITH THE MEDICAID EXPANSION IN NORTH CAROLINA. THE REMI MODEL ADJUSTS FOR PRICES AND THE COST OF LIVING, AND THEREFORE THE ABOVE TOOK ACCOUNT OF ANY CHANGES TO THE COST OF HOUSING OR CONSUMER GOODS. THE TREND IS MUCH THE SAME AS OTHER GRAPHS, THOUGH THE BLUE LINE DOES SOMETHING NOVEL. ADDITIONAL ECONOMIC MIGRATION MEANS MORE PEOPLE IN NORTH CAROLINA THAN OTHERWISE, AND THOSE ADDITIONAL PEOPLE BRING MORE CONSUMPTION, DEMAND FOR HOUSING STOCK, AND NEED FOR GOVERNMENT SERVICES (SUCH AS EDUCATION OR POLICE AND FIRE PROTECTION). THIS DRIVES THE TOTAL AMOUNT OF JOBS, GDP, AND PERSONAL INCOME UPWARDS, WHILE THE RED LINE DOES NOT DISPLAY A SIMILAR PATTERN UPWARDS.

PERCENTAGE CHANGES

The next section detailed the impact to these major indicators in proportional terms. In 2012, the North Carolina economy produced approximately $380 billion in GDP and had a total "job stock" of around 5.4 million with around 4.5 million of those in the private sector. The above were sizeable impacts in absolute terms, but they were still important to conceptualize the Medicaid expansion against the rest of the economy. Medicaid and healthcare was an important driver to the state economy, as one can see from *Figure 9* below.

	2014	2015	2016	2017	2018	2019	2020	2021
Total Employment	0.10%	0.43%	0.43%	0.39%	0.36%	0.34%	0.30%	0.29%
Private Non-Farm Employment	0.12%	0.48%	0.49%	0.46%	0.45%	0.43%	0.41%	0.39%
Gross Domestic Product (GDP)	0.08%	0.32%	0.33%	0.29%	0.27%	0.25%	0.22%	0.21%
Business Sales/Output	0.07%	0.29%	0.30%	0.27%	0.24%	0.23%	0.20%	0.19%
Real Disposable PI	0.06%	0.26%	0.26%	0.24%	0.23%	0.22%	0.20%	0.19%
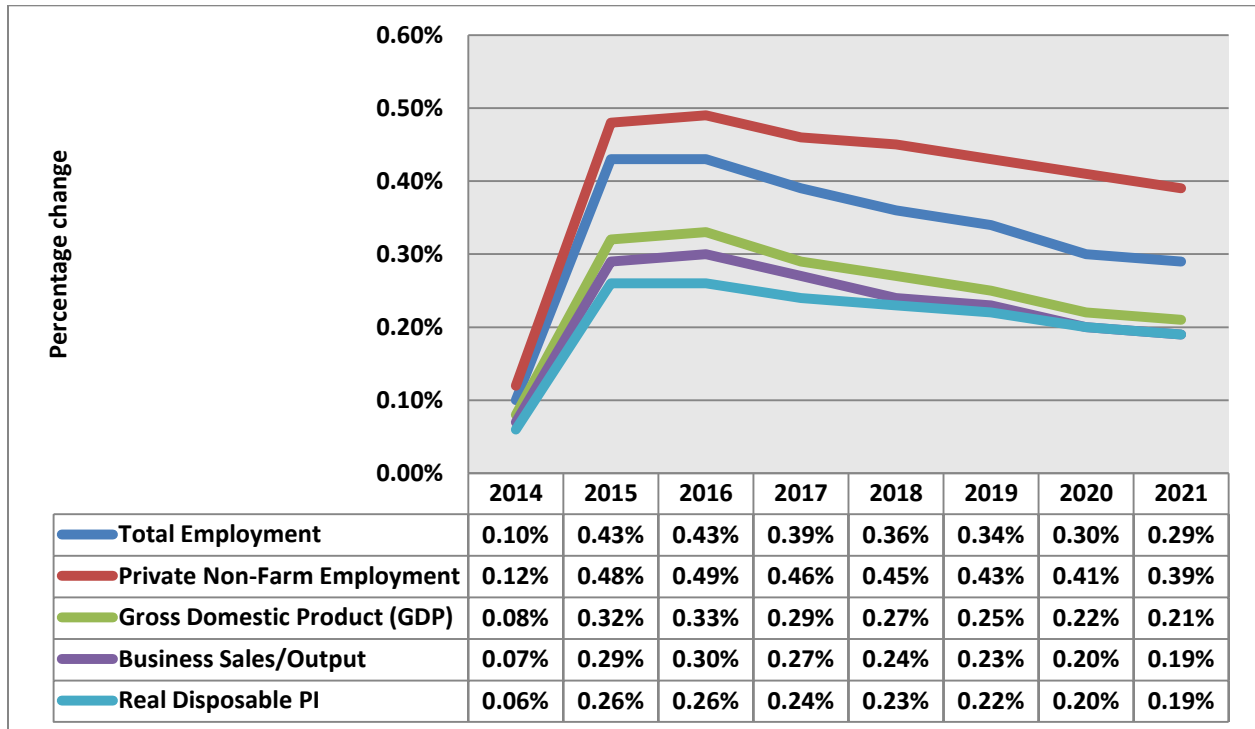
FIGURE 8 – THIS SHOWS THE PERCENTAGE IMPACT ON INDICATORS FROM THE PROGRAM. FOR THIS CHART, WE AVERAGED THE IMPACT BETWEEN THE CASES OF NON-MIGRATION AND MIGRATION. EMPLOYMENT CONCEPTS ROSE FASTER THAN MACROECONOMIC MEASURES. THIS WAS BECAUSE HEALTHCARE AND ITS SUPPLY CHAIN WERE RELATIVELY LABOR-INTENSIVE INDUSTRIES WHEN COMPARED TO THINGS LIKE THE NATURAL RESOURCES, SHIPPING, AGRICULTURE, OR MANUFACTURING. THIS LEADS TO A HIGH RATIO OF "JOBS TO GDP." PRIVATE NON-FARM EMPLOYMENT NUMBERS ROSE MORE THAN TOTAL EMPLOYMENT, WHICH REFLECTED THE CUTBACKS FROM THE EXPANSION IN STATE SPENDING IN OTHER ARENAS. OVERALL, THE EXPANSION REPRESENTED ABOUT 0.33% OF THE STATE'S ECONOMY, WHICH MEANS IT WAS A FACTOR OF SOME SIGNIFICANCE.

FISCAL IMPACT

Directly modeling the fiscal impact of Medicaid expansion to North Carolina was not an object of this study. To do this, we would require another model, REMI Tax-PI,[22] and additional data and assumptions about the state's budget and planning in the future. Tax-PI includes a customized budget module on top of a 1-region PI$^+$ model of the state. This involves revenue categories (income taxes, sales taxes, corporate taxes, fees, federal transfers, and more), expenditures (education, healthcare, transportation, corrections, and others), and how they change in response to forecasts and simulations of the state's economy and demography. It also includes assumptions about how the state balances its budget in the future, as well as how taxes and spending respond to policy changes at the state- or federal-level. This additional work would have required additional cost for NC DHHS and data from the revenue agencies—**given time and financial constraints, we did not use Tax-PI, but rather concentrated on PI$^+$ and the economic impacts of Medicaid expansion.**

One can still estimate fiscal impacts based on the previous results. This was not as exact or detailed as Tax-PI and its breakdown of the state budget categories, but high-level indicators like GDP correlated closely with the total revenue collections of the state in the past. Researchers tracked revenue-to-GDP ratios at the federal-level,[23] and the same idea applied with the states. Using historical data from the North Carolina Office of State Budget and Management, we looked at revenues and how they compared to GDP over time:

Fiscal Year	North Carolina state tax revenues (Millions of nominal dollars)[24]	North Carolina GDP (Millions of nominal dollars)	Revenue-to-GDP Ratio
FY2010	$17,745.0	$377,811.2	4.70%
FY2011	$18,092.2	$396,735.5	4.56%
FY2012	$18,871.4	$414,531.4	4.55%

FIGURE 9 – THIS SHOWED THAT, HISTORICALLY SINCE THE LAST RECESSION IN 2008, NORTH CAROLINA TENDED TO BRING IN JUST ABOVE 4.5% OF ITS GDP IN TAX REVENUES. GDP IS MEANT AS A MEASUREMENT OF THE TOTAL AMOUNT OF ECONOMIC ACTIVITY OCCURRING IN AN AREA. THEREFORE, IT WAS EASY TO IMAGINE THE ADDITIONAL JOBS, PRODUCTION, AND PERSONAL INCOME BEHIND THAT GDP LEADING TO STATE TAX REVENUES IN THE FORM OF INCOME TAXES, SALES TAXES, AND VARIOUS FEES IN THE STATE'S JURISDICTION.

Applying the 4.5% ratio of revenue-to-GDP generated an estimate of additional revenue for the state. There were several cautions behind this methodology. Households and firm's decision-making is a complicated process, and state budgets are complex things with many idiosyncrasies. REMI designed Tax-PI to capture much of this, but that model was not available. Conversely, revenue was never the whole story. Modifying Medicaid on a state-level changed household cost of living, the condition of the labor market, and the incentives for people to move in or out of the state. These changes in demography might change expenditure requirements for North Carolina—additional people requiring more roads, schools, police officers, and other services. It may change Medicaid spending, too, but more states undergoing this expansion would weaken this effect. While leaving these on the table was an assumption, $1.4 billion in additional annual GDP would generate substantial state tax revenues, and it would have the potential to overcome any needs for "carrying cost" expenditures.

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[22] "Tax-PI," *REMI*, December 2012, <www.remi.com/products/tax-pi>
[23] "Historical Source of Revenue as Share of GDP," *Tax Policy Center*, April 2012,
<www.taxpolicycenter.org/taxfacts/displayafact.cfm?Docid=205>
[24] "Governor's Recommended Budget, 2011-2013," *North Carolina Office of State Budget and Management*,
December 2012, <www.osbm.state.nc.us/new_content/historical_budget_data.pdf>

	2014	2015	2016	2017	2018	2019	2020	2021
Migration Allowed	$17.377	$74.312	$78.407	$73.443	$70.948	$69.666	$65.208	$64.623
No Migration	$17.041	$72.616	$75.559	$69.621	$66.119	$63.788	$58.312	$56.711
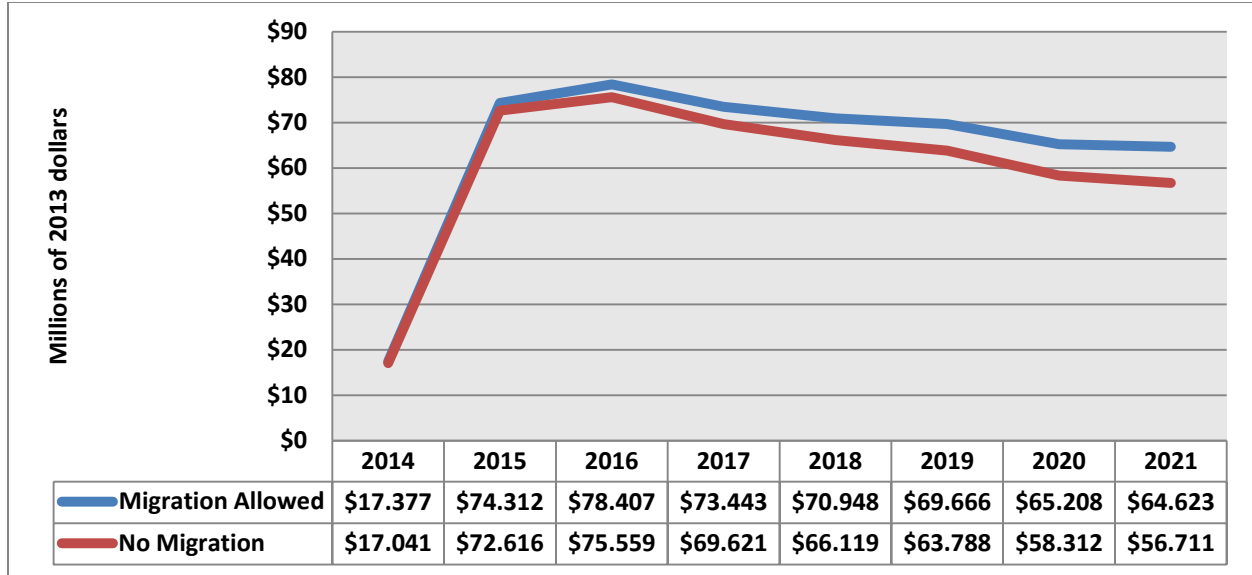
FIGURE 10 – THIS SHOWED THE ANTICIPATED REVENUE IMPACT OF MEDICAID EXPANSION IN NORTH CAROLINA, BASED ON THE ASSUMPTIONS AND METHODOLOGY ON P. 14 AND IN *FIGURE 9*. DO NOTE THAT THESE ARE CALENDAR AND NOT FISCAL YEARS. THIS REVEALED THE STATE COULD EXPECT AROUND $70 MILLION MORE IN ANNUAL REVENUE FROM THE MEDICAID EXPANSION WHEN COMPARED TO NON-EXPANSION. FROM THERE, THE STATE COULD "RECYCLE" THIS MONEY BACK THROUGH THE BUDGET AND ECONOMY VIA ADDITIONAL SPENDING, INCENTIVES, OR GENERAL TAX RELIEF. THESE WOULD HAVE ECONOMIC IMPACTS, TOO. REMI CALLED THIS "FEEDBACK" IN THE TAX-PI MODEL, BUT THE PI[+] BUILD HERE DID NOT INCLUDE ANY RECYCLING. THIS ADDITIONAL MONEY WOULD HAVE TO BALANCE WITH ANY CHANGE IN EXPENDITURES FROM LABOR MARKET CONDITIONS OR MIGRATION.

DATA TABLES

This section detailed the results in industry-level and occupational-level impacts. The industries followed the NAICS while the occupations follow the BLS' Standard Occupational Classification (SOC) codes.[25] We averaged the impact between the migration and non-migration scenarios (the same as the percentage changes in *Figure 9*). A 70-sector REMI model does not exactly follow the NAICS codes at any particular level; those 70-sectors approximated 3-digit NAICS.[26] Different industries should expect different impacts from the ACA, and those industries either in the healthcare sector or within their supply chain have the strongest impacts. Some other industries (such as retail or construction, which related closely to housing) collected much of the additional wages paid to households in the simulation, which accounted for their positive impacts. Some industries had slightly negative numbers owing to their closeness to state government spending or their high productivity. High productivity industries do not require much labor, so there is not much of an impact to jobs. The occupational distribution gives an impression of the socioeconomics of Medicaid expansion. Industries and governments hire all sorts of workers, which we had in *Table 3*. **Do note, this was not meant as an absolute representation of the expansion's impact, but rather a potential scenario—from given data and assumptions—for an impression of the distribution of the impact across industries and occupations**. The results were in keeping with this caveat.

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[25] "Standard Occupational Classification," *Bureau of Labor Statistics*, December 2013, <www.bls.gov/SOC/>

[26] "NAICS Industries for PI[+] - Hierarchical v. 1.4," *REMI*, November 2012, <www.remi.com/download/documentation/pi+/pi+_version_1.4/NAICS_Industries_for_PI+-Hierarchical_v1.4.pdf>

TABLE 1 - BUSINESS SALES/OUTPUT BY INDUSTRY (MILLIONS OF 2013 DOLLARS)

NAICS Industries	2014	2015	2016	2017	2018	2019	2020	2021
Forestry and logging; Fishing, hunting, and trapping	$0.017	$0.043	-$0.082	-$0.241	-$0.389	-$0.521	-$0.639	-$0.723
Agriculture and forestry support activities	$0.013	$0.063	$0.061	$0.030	$0.009	-$0.005	-$0.029	-$0.038
Oil and gas extraction	$0.022	$0.098	$0.097	$0.070	$0.048	$0.030	$0.006	-$0.008
Mining (except oil and gas)	$0.013	$0.056	$0.047	$0.011	-$0.022	-$0.052	-$0.087	-$0.108
Support activities for mining	$0.010	$0.044	$0.057	$0.058	$0.054	$0.047	$0.038	$0.031
Utilities	$3.469	$15.073	$16.050	$14.725	$13.919	$13.393	$12.084	$11.777
Construction	$29.125	$141.295	$193.440	$195.985	$187.629	$175.036	$149.020	$131.975
Wood product manufacturing	$0.495	$2.260	$2.653	$2.342	$1.966	$1.592	$1.053	$0.717
Nonmetallic mineral product manufacturing	$0.757	$3.360	$3.839	$3.560	$3.240	$2.921	$2.406	$2.103
Primary metal manufacturing	$0.029	$0.072	-$0.140	-$0.413	-$0.667	-$0.887	-$1.077	-$1.190
Fabricated metal product manufacturing	$1.088	$4.819	$5.449	$5.021	$4.593	$4.189	$3.505	$3.165
Machinery manufacturing	$0.220	$0.987	$1.155	$1.100	$1.047	$0.996	$0.885	$0.871
Computer and electronic product manufacturing	$1.002	$4.229	$3.747	$2.421	$1.287	$0.340	-$0.689	-$1.203
Electrical equipment and appliance manufacturing	$0.256	$1.052	$0.814	$0.207	-$0.352	-$0.841	-$1.345	-$1.643
Motor vehicles, bodies and trailers, and parts manufacturing	$1.433	$6.090	$6.527	$6.155	$5.909	$5.713	$5.260	$5.179
Other transportation equipment manufacturing	$0.031	$0.107	$0.025	-$0.088	-$0.191	-$0.281	-$0.361	-$0.410
Furniture and related product manufacturing	$0.354	$1.412	$1.098	$0.514	$0.013	-$0.406	-$0.819	-$1.046
Miscellaneous manufacturing	$0.448	$1.867	$1.882	$1.735	$1.629	$1.548	$1.428	$1.354
Food manufacturing	$0.521	$2.062	$1.518	$0.631	-$0.120	-$0.743	-$1.350	-$1.705
Beverage and tobacco product manufacturing	$0.705	$2.985	$2.949	$2.338	$1.906	$1.590	$1.117	$0.927
Textile mills; Textile product mills	$0.040	$0.120	-$0.062	-$0.274	-$0.457	-$0.605	-$0.727	-$0.792
Apparel manufacturing; Leather and allied product manufacturing	$0.117	$0.494	$0.498	$0.433	$0.383	$0.345	$0.293	$0.272
Paper manufacturing	$0.670	$2.858	$2.918	$2.511	$2.253	$2.073	$1.746	$1.621
Printing and related support activities	$0.851	$3.657	$3.785	$3.339	$3.095	$2.957	$2.619	$2.533
Petroleum and coal products manufacturing	$0.337	$1.523	$1.665	$1.444	$1.287	$1.172	$0.934	$0.845
Chemical manufacturing	$13.653	$55.930	$55.141	$51.918	$49.649	$47.752	$45.496	$44.358
Plastics and rubber product manufacturing	$1.282	$5.412	$5.476	$4.802	$4.254	$3.784	$3.144	$2.806
Wholesale trade	$23.940	$101.707	$106.809	$101.157	$98.244	$96.477	$90.897	$90.213
Retail trade	$40.112	$169.879	$180.287	$176.989	$176.119	$175.840	$170.953	$171.729
Air transportation	$0.189	$0.793	$0.589	$0.191	-$0.158	-$0.452	-$0.755	-$0.988
Rail transportation	$0.013	$0.051	$0.030	-$0.010	-$0.046	-$0.078	-$0.109	-$0.129
Water transportation	$0.005	$0.019	$0.015	$0.007	-$0.001	-$0.007	-$0.014	-$0.017
Truck transportation	$1.013	$4.294	$4.407	$3.927	$3.543	$3.213	$2.720	$2.495
Couriers and messengers	$0.422	$1.749	$1.737	$1.593	$1.488	$1.398	$1.274	$1.225
Transit and ground passenger transportation	$22.551	$92.221	$94.749	$96.700	$99.248	$101.409	$103.353	$105.478
Pipeline transportation	$0.001	$0.004	-$0.002	-$0.009	-$0.016	-$0.021	-$0.026	-$0.029
Scenic transportation; Support activities for transportation	$0.024	$0.056	-$0.126	-$0.359	-$0.581	-$0.788	-$0.983	-$1.129
Warehousing and storage	$0.036	$0.095	-$0.159	-$0.477	-$0.770	-$1.029	-$1.263	-$1.432
Publishing industries, except Internet	$1.348	$5.923	$6.520	$6.219	$6.131	$6.173	$5.933	$6.120
Motion picture and sound recording industries	$0.032	$0.127	$0.119	$0.096	$0.077	$0.062	$0.044	$0.039
Internet publishing and broadcasting; ISPs, search portals, and data	$1.422	$6.314	$6.889	$6.338	$6.096	$6.038	$5.595	$5.672
Broadcasting, except Internet	$0.604	$2.515	$2.427	$2.046	$1.755	$1.521	$1.223	$1.077
Telecommunications	$3.477	$14.929	$15.235	$13.184	$11.711	$10.587	$8.767	$8.102
Credit intermediation; Funds, trusts, & other financial	$12.207	$51.576	$52.399	$46.750	$42.465	$38.893	$33.483	$31.338
Securities, commodity contracts, investments	$1.545	$6.422	$5.533	$3.551	$1.786	$0.202	-$1.556	-$2.581
Insurance carriers and related activities	$5.855	$24.089	$24.741	$24.648	$24.767	$24.879	$24.780	$24.970
Real estate	$37.902	$161.168	$171.032	$162.774	$154.707	$146.750	$134.082	$128.270
Rental and leasing services; Leasers of nonfinancial assets	$3.437	$14.702	$15.541	$14.500	$13.726	$13.074	$11.842	$11.470
Professional, scientific, and technical services	$12.856	$55.250	$56.143	$47.334	$40.770	$35.779	$28.287	$25.504
Management of companies and enterprises	$1.910	$7.324	$5.177	$2.381	-$0.260	-$2.700	-$4.909	-$6.429
Administrative and support services	$15.626	$65.946	$67.359	$62.101	$58.935	$56.746	$52.347	$51.238
Waste management and remediation services	$0.847	$3.941	$4.157	$3.019	$2.344	$1.945	$1.019	$0.710
Educational services	$1.166	$5.093	$5.684	$5.429	$5.292	$5.225	$4.888	$4.893
Ambulatory health care services	$213.856	$877.362	$898.826	$906.454	$921.982	$935.499	$944.233	$959.967
Hospitals	$140.619	$574.920	$589.131	$598.211	$611.004	$621.596	$630.787	$641.891
Nursing and residential care facilities	$2.025	$8.747	$9.073	$8.088	$7.494	$7.123	$6.320	$6.162
Social assistance	$0.314	$1.422	$1.643	$1.596	$1.612	$1.659	$1.602	$1.633
Performing arts and spectator sports	$1.165	$5.003	$5.348	$5.042	$4.858	$4.733	$4.393	$4.320
Museums, historical sites, zoos, and parks	$0.135	$0.582	$0.637	$0.627	$0.626	$0.632	$0.617	$0.631
Amusement, gambling, and recreation	$0.775	$3.291	$3.371	$3.031	$2.789	$2.604	$2.296	$2.198
Accommodation	$1.170	$4.839	$4.424	$3.279	$2.329	$1.537	$0.641	$0.165
Food services and drinking places	$7.667	$32.933	$35.583	$34.092	$33.499	$33.313	$31.673	$31.803
Repair and maintenance	$3.323	$14.399	$15.154	$13.593	$12.635	$12.011	$10.587	$10.221
Personal and laundry services	$3.868	$16.306	$16.464	$14.771	$13.690	$12.909	$11.496	$11.080
Membership associations and organizations	$1.689	$7.145	$7.419	$6.786	$6.269	$5.848	$5.246	$5.085
Private households	$0.310	$1.302	$1.312	$1.172	$1.079	$1.009	$0.893	$0.876

TABLE 2 - INDUSTRY-LEVEL EMPLOYMENT (JOB-YEARS)

NAICS Industries	2014	2015	2016	2017	2018	2019	2020	2021
Forestry and logging; Fishing, hunting, and trapping	0	0	-1	-2	-3	-4	-5	-5
Agriculture and forestry support activities	0	2	2	0	0	-1	-2	-2
Oil and gas extraction	0	0	0	0	0	0	0	0
Mining (except oil and gas)	0	0	0	0	-1	-1	-1	-1
Support activities for mining	0	0	0	0	0	0	0	0
Utilities	4	19	19	17	15	14	12	11
Construction	288	1,379	1,852	1,836	1,717	1,564	1,294	1,115
Wood product manufacturing	2	9	10	8	7	5	2	1
Nonmetallic mineral product manufacturing	3	11	12	11	9	8	6	4
Primary metal manufacturing	0	0	-1	-1	-2	-2	-2	-2
Fabricated metal product manufacturing	4	18	19	17	14	12	9	8
Machinery manufacturing	1	3	3	2	2	1	1	0
Computer and electronic product manufacturing	2	8	6	2	0	-2	-4	-5
Electrical equipment and appliance manufacturing	1	3	2	0	-2	-3	-4	-5
Motor vehicles, bodies and trailers, and parts manufacturing	3	10	10	9	8	7	6	6
Other transportation equipment manufacturing	0	0	0	-1	-1	-1	-2	-2
Furniture and related product manufacturing	2	7	5	1	-2	-4	-7	-8
Miscellaneous manufacturing	2	8	7	6	5	4	4	3
Food manufacturing	1	4	2	-1	-4	-6	-8	-10
Beverage and tobacco product manufacturing	1	2	2	1	1	0	-1	-1
Textile mills; Textile product mills	0	0	-1	-3	-4	-5	-5	-6
Apparel manufacturing; Leather and allied product manufacturing	1	4	4	3	3	2	2	1
Paper manufacturing	1	6	6	4	3	3	2	1
Printing and related support activities	5	19	19	16	14	13	11	10
Petroleum and coal products manufacturing	0	1	1	1	1	1	0	0
Chemical manufacturing	16	61	58	52	47	43	39	36
Plastics and rubber product manufacturing	4	16	15	12	10	8	5	4
Wholesale trade	110	457	465	425	398	378	342	328
Retail trade	536	2,213	2,273	2,158	2,077	2,010	1,892	1,842
Air transportation	1	2	1	0	-2	-3	-4	-5
Rail transportation	0	0	0	0	0	0	0	0
Water transportation	0	0	0	0	0	0	0	0
Truck transportation	6	24	21	14	9	3	-2	-6
Couriers and messengers	4	14	13	11	9	8	6	5
Transit and ground passenger transportation	371	1,510	1,537	1,556	1,582	1,604	1,621	1,638
Pipeline transportation	0	0	0	0	0	0	0	0
Scenic transportation; Support activities for transportation	0	0	-2	-4	-6	-8	-10	-11
Warehousing and storage	0	0	-3	-7	-11	-14	-16	-18
Publishing industries, except Internet	4	15	15	12	11	10	8	8
Motion picture and sound recording industries	0	1	0	0	-1	-1	-1	-1
Internet publishing and broadcasting; ISPs, search portals, and data	3	14	14	12	11	10	8	8
Broadcasting, except Internet	2	8	7	6	4	4	3	2
Telecommunications	6	26	25	20	17	14	11	9
Credit intermediation; Funds, trusts, & other financial	28	113	106	85	68	54	38	29
Securities, commodity contracts, investments	12	49	38	20	4	-9	-23	-31
Insurance carriers and related activities	25	101	101	97	95	93	90	89
Real estate	115	482	499	462	426	392	346	320
Rental and leasing services; Leasers of nonfinancial intangible assets	8	34	34	30	27	24	20	18
Professional, scientific, and technical services	90	382	376	302	246	203	145	120
Management of companies and enterprises	9	33	19	5	-8	-19	-28	-34
Administrative and support services	254	1,054	1,049	940	867	812	727	693
Waste management and remediation services	4	19	20	14	11	8	4	2
Educational services	16	70	76	71	68	66	61	60
Ambulatory health care services	2,199	9,051	9,253	9,332	9,483	9,618	9,708	9,855
Hospitals	1,004	4,085	4,137	4,159	4,209	4,249	4,280	4,322
Nursing and residential care facilities	27	117	113	91	76	65	49	42
Social assistance	5	23	23	19	16	14	11	9
Performing arts and spectator sports	16	67	69	63	59	56	50	48
Museums, historical sites, zoos, and parks	1	4	5	4	4	4	4	4
Amusement, gambling, and recreation	15	63	64	55	50	45	38	35
Accommodation	10	42	37	25	16	9	1	-4
Food services and drinking places	125	528	557	519	498	484	448	441
Repair and maintenance	33	142	146	128	116	107	92	86
Personal and laundry services	60	248	245	214	193	178	154	144
Membership associations and organizations	23	95	96	84	75	67	58	54
Private households	44	184	180	157	141	129	111	107

TABLE 3 - OCCUPATIONAL-LEVEL EMPLOYMENT (JOBS-YEARS)

SOC Occupations	2014	2015	2016	2017	2018	2019	2020	2021
Top executives	62	270	281	236	208	188	151	137
Advertising, marketing, promotions, public relations, and sales managers	11	47	47	42	38	35	31	29
Operations specialties managers	35	151	153	127	111	101	81	74
Other management occupations	87	374	393	361	340	325	293	281
Business operations specialists	85	379	397	321	274	243	180	157
Financial specialists	47	205	206	153	119	95	54	38
Computer occupations	60	259	261	214	184	165	129	117
Mathematical science occupations	2	9	9	7	6	5	3	3
Architects, surveyors, and cartographers	2	11	12	8	6	4	1	0
Engineers	15	71	74	50	35	25	6	-1
Drafters, engineering technicians, and mapping technicians	8	39	41	26	16	10	-2	-7
Life scientists	8	36	37	31	27	25	21	19
Physical scientists	4	21	21	12	6	3	-3	-5
Social scientists and related workers	12	54	55	46	41	39	33	31
Life, physical, and social science technicians	6	27	28	19	14	11	4	2
Counselors and Social workers	83	359	368	321	298	288	256	249
Miscellaneous community and social service specialists	30	139	143	100	77	65	34	25
Religious workers	6	25	26	24	23	22	21	21
Lawyers, judges, and related workers	10	49	50	20	2	-7	-29	-36
Legal support workers	5	26	26	15	8	3	-6	-8
Postsecondary teachers	5	22	23	21	21	20	19	19
Preschool, primary, secondary, and special education school teachers	8	37	39	34	31	29	25	24
Other teachers and instructors	5	22	22	17	14	12	8	7
Librarians, curators, and archivists	4	24	25	5	-6	-11	-25	-29
Other education, training, and library occupations	5	23	25	17	13	10	5	3
Art and design workers	8	34	35	30	27	25	21	20
Entertainers and performers, sports and related workers	6	27	28	22	18	16	12	10
Media and communication workers	10	45	46	38	34	31	26	24
Media and communication equipment workers	2	10	10	8	7	6	4	4
Health diagnosing and treating practitioners	874	3,591	3,661	3,662	3,702	3,741	3,755	3,799
Health technologists and technicians	491	2,021	2,056	2,033	2,037	2,046	2,033	2,049
Other healthcare practitioners and technical occupations	14	57	58	54	53	52	50	50
Nursing, psychiatric, and home health aides	278	1,167	1,207	1,206	1,226	1,250	1,260	1,280
Occupational therapy and physical therapist assistants and aides	38	160	165	167	172	176	179	182
Other healthcare support occupations	338	1,380	1,398	1,392	1,399	1,404	1,400	1,413
Supervisors of protective service workers	7	40	42	7	-13	-23	-48	-56
Fire fighting and prevention workers	9	58	61	6	-25	-41	-80	-92
Law enforcement workers	35	223	236	25	-91	-152	-301	-346
Other protective service workers	45	199	202	157	130	115	81	70
Supervisors of food preparation and serving workers	14	58	60	54	50	48	43	41
Cooks and food preparation workers	50	210	216	195	183	175	157	152
Food and beverage serving workers	94	396	412	381	362	350	322	315
Other food preparation and serving related workers	18	75	78	70	65	62	55	53
Supervisors of building and grounds cleaning and maintenance workers	8	34	34	27	23	21	16	14
Building cleaning and pest control workers	105	437	439	393	364	343	308	295
Grounds maintenance workers	29	128	132	103	86	75	53	45
Supervisors of personal care and service workers	4	19	20	13	9	7	2	1
Animal care and service workers	5	20	21	18	16	15	13	12
Entertainment attendants and related workers	10	47	49	29	18	11	-4	-9
Funeral service workers	3	13	13	11	10	9	8	8
Personal appearance workers	23	97	97	87	81	76	67	64
Baggage porters, bellhops, and concierges; Tour and travel guides	2	8	8	7	6	5	4	4
Other personal care and service workers	129	553	577	556	555	562	552	558
Supervisors of sales workers	46	192	197	185	177	170	158	154
Retail sales workers	283	1,175	1,207	1,134	1,084	1,043	971	942
Sales representatives, services	27	111	112	100	91	83	72	67
Sales representatives, wholesale and manufacturing	33	141	147	135	126	118	106	100
Other sales and related workers	31	130	135	124	114	106	94	88
Supervisors of office and administrative support workers	81	340	347	321	305	296	275	269
Communications equipment operators	11	43	42	38	36	33	30	29

Financial clerks	172	719	736	686	654	631	588	574
Information and record clerks	288	1,210	1,229	1,123	1,064	1,029	950	930
Material recording, scheduling, dispatching, and distributing workers	108	454	461	411	379	357	316	301
Secretaries and administrative assistants	280	1,177	1,208	1,139	1,103	1,082	1,028	1,018
Other office and administrative support workers	174	745	767	672	615	580	503	479
Supervisors of farming, fishing, and forestry workers	0	1	1	0	0	0	-1	-1
Agricultural workers	2	11	11	8	6	5	3	2
Fishing and hunting workers	0	0	0	0	0	-1	-1	-1
Forest, conservation, and logging workers	0	2	1	0	-1	-2	-3	-3
Supervisors of construction and extraction workers	20	99	129	120	108	95	72	59
Construction trades workers	168	803	1,050	1,002	918	826	658	556
Helpers, construction trades	13	61	82	81	76	69	57	49
Other construction and related workers	11	63	71	31	8	-6	-37	-48
Extraction workers	1	5	6	6	6	5	4	3
Supervisors of installation, maintenance, and repair workers	12	55	60	50	44	39	30	27
Electrical and electronic equipment mechanics, installers, and repairers	11	50	55	49	43	39	32	28
Vehicle and mobile equipment mechanics, installers, and repairers	49	211	219	195	181	171	151	144
Other installation, maintenance, and repair occupations	81	361	398	345	306	275	216	190
Supervisors of production workers	6	24	25	19	15	12	7	6
Assemblers and fabricators	15	63	63	55	49	44	37	33
Food processing workers	9	37	38	34	32	30	28	26
Metal workers and plastic workers	11	48	51	45	40	35	28	24
Printing workers	3	13	12	10	9	8	6	6
Textile, apparel, and furnishings workers	13	53	52	44	39	35	30	28
Woodworkers	2	8	8	7	5	4	2	1
Plant and system operators	6	32	33	13	2	-4	-18	-22
Other production occupations	31	130	130	115	104	95	83	77
Supervisors of transportation and material moving workers	13	53	55	49	46	43	39	37
Air transportation workers	2	10	9	8	8	7	6	6
Motor vehicle operators	328	1,353	1,386	1,347	1,334	1,328	1,296	1,292
Rail transportation workers	1	4	4	2	1	1	-1	-1
Water transportation workers	0	1	1	0	0	0	-1	-1
Other transportation workers	17	70	71	63	59	56	50	49
Material moving workers	81	345	354	304	270	245	202	184