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Sustainable Economic Growth
& Quality of Place

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November 21, 2020

Hon. Sabina Matos
President, Providence City Council
Providence City Hall
25 Dorrance Street, Room 303
Providence RI 02903

Re: Population Study

Dear Madam President,

It was exactly one year ago today that the Providence City Council unanimously passed this [City Council Resolution](#) in support of a population growth study that Grow Smart RI commissioned with two Bryant University professors.

Although the conducting of the study was somewhat delayed due to Covid-19, I'm pleased to report that the study is now complete. It provides an important analysis of how significant population growth in Providence over the next several decades would enhance the economic performance of the city, the economic well-being of the city's residents and the City's impact on the State's economic well-being.

Linked here for City Council review is a 4-page [Executive Summary](#) as well as the 47-page [full analysis](#).

If there is a consensus in Rhode Island that population growth is desirable to strengthen our communities, expand economic opportunity and avoid the risk of losing a Congressional seat – and if Providence is poised to be the center of that growth - then it's clear that achieving such growth will require a new city-state partnership.

As a first step, we would be pleased, with the assistance of the Study's authors, Bryant professors Edinaldo Tebaldi and Aziz Berdiev, to present a summary of the study's major findings to the full City Council at its December 3, 2020 meeting.

We hope this data can inform future policy discussions about ways to strengthen Providence and Rhode Island's economic vibrancy, fiscal stability and access to economic opportunity for more residents.

We look forward to confirmation about a City Council briefing at your convenience.

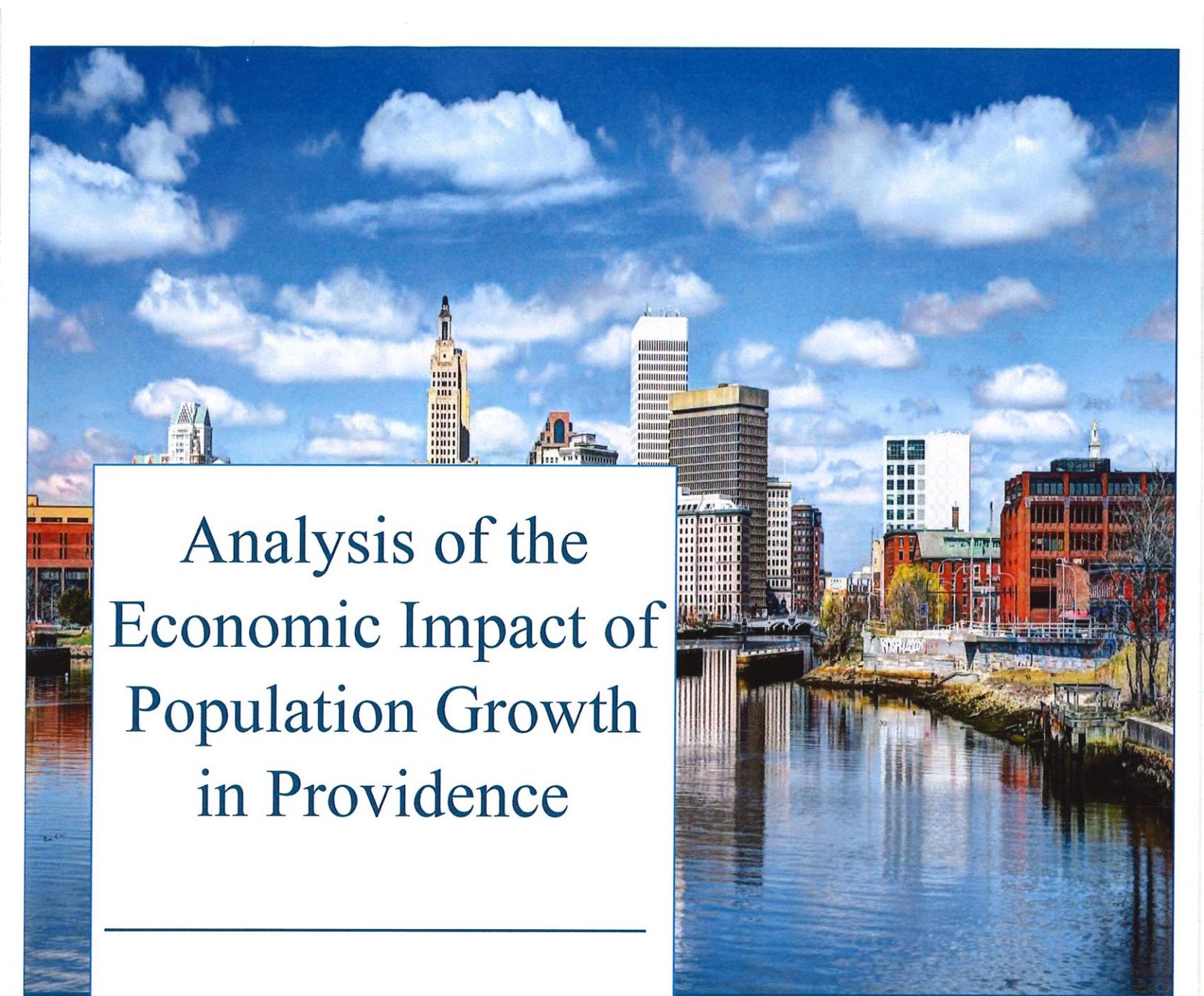
Sincerely,

Scott Wolf
Executive Director

IN CITY COUNCIL

DEC 03 2020

READ
WHEREUPON IT IS ORDERED THAT
THE SAME BE RECEIVED.



Analysis of the Economic Impact of Population Growth in Providence

Authored by:

Edinaldo Tebaldi, Ph.D., Bryant University

Aziz Berdiev, Ph.D., Bryant University

October 2020



GrowSmartRI
Sustainable Economic Growth
& Quality of Place

Executive Summary

Background

The city of Providence has been through three main development phases.

- Phase I was marked by fast economic growth and population expansion, reaching more than 250,000 people in the 1930s and in 1940.
- Phase II, which covers the early 1940s to the early 1980s, was a period of decline in both wealth creation and population, falling to 156,804 people.
- Phase III, which started in the 1980s and continues to the current time, has been marked by a relatively modest upswing in population and economic activity within the city along with significant socio-economic and demographic changes.

Providence is facing worrying demographic headwinds:

- The population of the city of Providence was 179,883 people in 2019, which was approximately the population of the 1970s (179,116 people).
- The Rhode Island Department of Administration projects that the population of Providence will grow at an average rate of 0.3 percent per year, reaching 190,601 people in 2040. The growth of population will take place in the 65-years-and-older cohorts while the working-age population is expected to decrease.
- These major demographic changes pose significant socio-economic and public finance challenges to the City government.

Purpose of the Report

Would it be economically beneficial to promote inward migration to tackle the potential decline in the working-age population of the city of Providence? What would be the impact of migration-driven population growth on the City's public finances? Understanding how a growing population influences overall economic activity and public finances is essential to designing policies that promote population growth.

This report provides an empirical analysis of how population growth would affect the economy and public finances of the City of Providence. In particular, the report:

- Presents data showing the trajectory of population growth and provides an overview of the economic base, public services and finances, and housing supply in Providence;
- Reviews studies that discuss the potential benefits and costs of population growth;
- Provides relevant insights on the determinants of migration and population growth; and
- Presents the results of simulations of the economic (e.g., employment, income, total economic activity, and revenues from personal income taxes, real estate property taxes, corporate profit taxes, sales taxes, and motor vehicle fees) and fiscal (e.g., spending on

public services including education, public safety and other services) impacts of two alternative population growth scenarios in the city:

- Scenario A assumes that the city's population would grow at an average rate of 0.5 percent per year from 2020 to 2050, thereby increasing the population from 179,883 in 2019 to 208,500 in 2050.
- Scenario B allows for much faster population growth and assumes that the population of Providence would increase at an average rate of 1.1 percent per year from 2020 to 2050, which would increase the population from 179,883 in 2019 to 250,000 in 2050.
- Population density in Providence will increase to 11,332 (13,587) people per square mile if population grows as simulated in Scenario A (B). These figures would likely move Providence up to be among the top 20 densest cities in the country by 2050, but population density would still be lower than current population density levels observed in cities such as Boston, MA (13,943), Cambridge, MA (17,316), Peterson, NJ (17,438), Jersey City, NJ (17,860), San Francisco, CA (18,581), and New York City, NY (28,211).

Lessons from Other Studies

The impact of population growth on economic growth is a multifaceted issue that depends on local socio-economic conditions and is mediated by many complex factors.

- The benefits of population change include higher entrepreneurial activity, innovation, knowledge diffusion, and job growth,
- A growing population increases public spending to meet demand for public goods and services such as education and public safety.

The presence (or lack) of economies of scale in public service provision is important to consider the fiscal impacts of population growth.

- If economies of scale are present, then per capita spending to provide public services would decrease when population increases.
- The presence of economies of scale in the provision of public services depends on local conditions including the size and composition of the local population.

Data and Methods

This report uses data from various sources including the U.S. Census Bureau, Rhode Island Department of Education, Rhode Island Department of Revenue, Rhode Island Department of Labor and Training, Rhode Island Association of Realtors, and the city of Providence.

The analysis employs two statistical tools namely *REMI (Regional Economic Models, Inc.)* and *IMPLAN (Impact analysis for PLANning)* to conduct the economic impact analysis. These tools allow analysis of inter-industry relationships and assess how economic activities spurred by net-migration would impact the economy and public finances in the City of Providence.

The analysis is complemented by descriptive statistics and econometric analysis to quantify the potential impact of population growth on the demand for public school and public safety services as well as to project additional expenses with other public services.

Findings

The empirical analysis shows that population growth would:

- i) Generate significant job growth and an overall expansion of economic opportunities for current and future residents of the city of Providence and the state of Rhode Island.
- ii) Increase revenues from personal income taxes, real estate property taxes, corporate profit taxes, sales taxes, and motor vehicle fees that will be accrued by the City of Providence and the State of Rhode Island.
- iii) Increase the demand for public services and thus will require increasing spending on public services such as education and public safety.
- iv) Have a neutral-fiscal impact if the City takes advantage of economies of scale and implement measures to increase efficiency in the delivery of public services. Spending to provide additional public services may exceed tax revenues if the City takes no measures to increase efficiency in the delivery of public services.
- v) Require a City-State partnership to develop and promote population growth policies that are socially, economically, and fiscally sustainable. The lack of joint-efforts and partnerships would lead to imbalances in accruing the benefits and sharing the costs of population growth between the City and the state government. In particular,
 - a. Tax revenues are about evenly divided between the City and the state government, but the City would bear most of the additional costs associated with providing public services.
 - b. The state government would be a major beneficiary through increases in revenues from income taxes, corporate profit taxes, and sales taxes.
 - c. The state would benefit by supporting Providence's efforts to grow, including some form of revenue and cost-sharing agreements associated with population growth initiatives.

The analysis and discussion presented in this report also indicate that low housing supply and overall economic conditions are the major barriers to inward migration to the city of Providence.

- a. Employment opportunities and overall "affordability," particularly housing affordability, are the most relevant drivers of recent migration flows across cities and states in the United States.
- b. Cities/regions that are deemed relatively unaffordable and lack employment opportunities experienced the largest slowdown in immigration or the largest increase in out-migration flows.
- c. Housing supply is the most relevant factor to enable Scenarios A and B to materialize; thus, development of new housing units would have to increase considerably to enable inward migration to the city.

Policy Implications

A strategy to foster population growth in Providence must be supported by innovative strategies and policies that enable economically and financially balanced migration flows to the city. There is a need to consider and implement policies in the following strategic areas:

- Enhance inward migration incentives;
- Increase the supply of housing and the number of dwellings including the development of multi-family and well-designed high-density residential structures;
- Increase efficiency in the delivery of public services and take advantage of economies of scale in the provision of public services;
- The state would benefit by supporting Providence's efforts to grow its population and ensure that the benefits (tax revenues) and costs (provision of public services) of population growth are more equitably divided between the City of Providence and the state of Rhode Island;
- Establish City-State partnerships to develop vital infrastructure that promotes and supports population growth policies that are socially, economically, and fiscally sustainable; and
- Create an economic environment that facilitates more entrepreneurial activity and job creation in Providence.

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SPECIAL THANKS

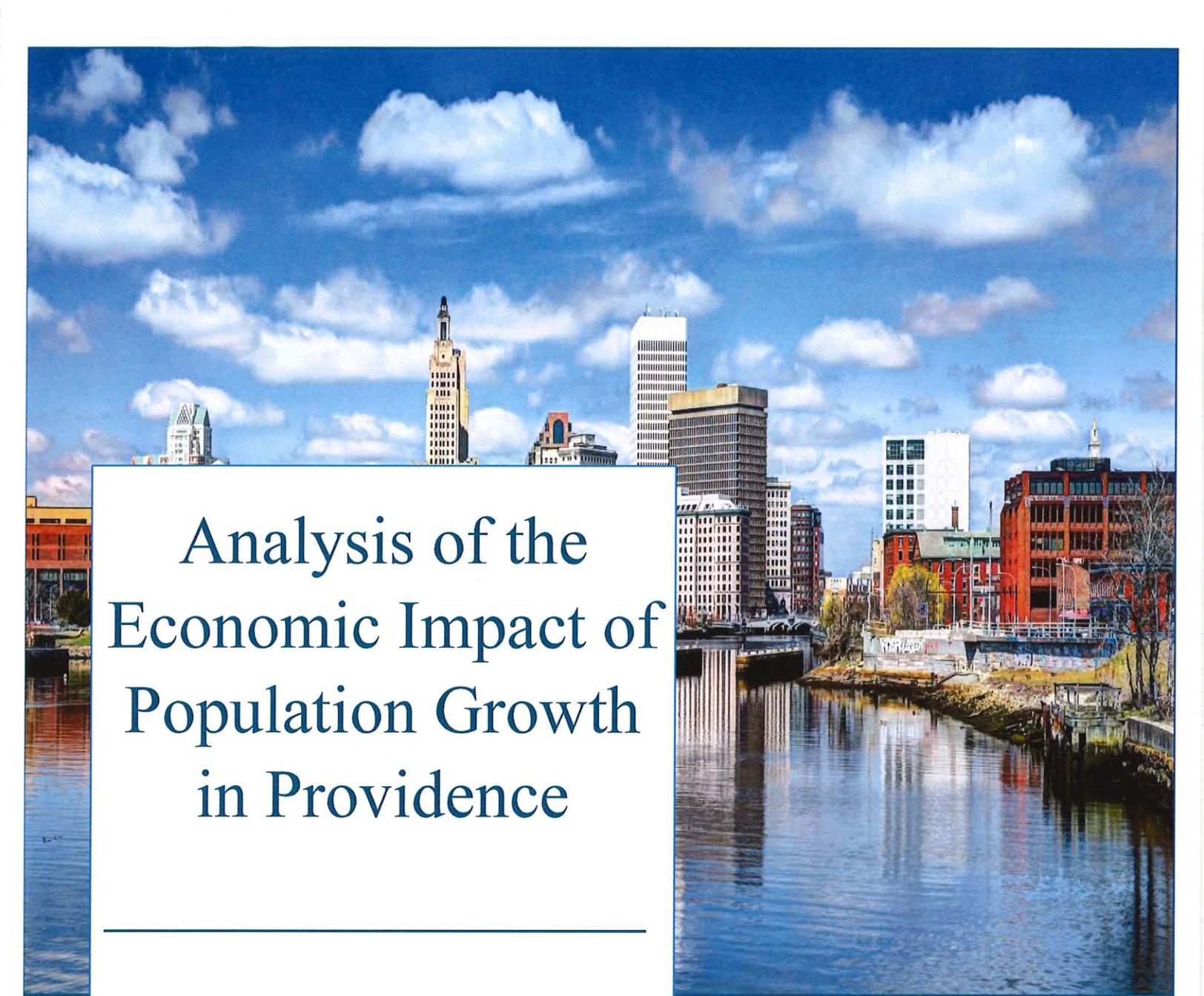
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DISCLAIMERS

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Edinaldo Tebaldi, Ph.D., Professor of Economics at Bryant University, and Aziz Berdiev, Ph.D., Associate Professor of Economics at Bryant University, prepared this report at the request of and for Grow Smart Rhode Island. The views and opinions of the authors expressed herein do not state or reflect those of Bryant University.

The authors have exercised due and customary care in conducting this research and report. Every effort has been made to ensure the quality of the analysis. The authors assume no liability for any loss resulting from errors, omissions, or misrepresentations made by others.



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Policy Implications

A strategy to foster population growth in Providence must be supported by innovative strategies and policies that enable economically and financially balanced migration flows to the city. There is a need to consider and implement policies in the following strategic areas:

- Enhance inward migration incentives;
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- Create an economic environment that facilitates more entrepreneurial activity and job creation in Providence.

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Purpose of the report

The relationship among population growth, economic growth, and public finances is multifaceted and depends on local and regional socio-economic conditions. To better understand the impacts of - and response to - population growth on economic activity and public finances, it is imperative to consider the benefits of population growth including knowledge diffusion, innovation, increased pool of labor, tax revenues among others as well as the costs to provide public services to the population.

The city of Providence, RI, in particular, has been through major cycles in terms of population changes, and recent population projections indicate that during the next two decades the city will only experience growth of population in the 65-years-and-older cohort while the working-age population is projected to decrease. Along with a need to consider policies to boost population growth in the city, there is also a requirement to better understand the impacts of population growth to the City's finances, employment, income, and overall economic activity. Would it be economically beneficial to promote inward migration to tackle the potential decline in the working-age population in Providence? What would be the impact of migration-driven population growth on the City's public finances? This report was prepared to examine these issues and provide an empirical analysis of how population growth would affect the economy and public finances of the City of Providence.

This report has three major sections. The first section presents an overview of the trajectory of population growth, then focuses on the economic base, K-12 school enrollment and school capacity, public finances, and housing supply and demand for the City of Providence. The second section of the report reviews studies that discuss the potential benefits and costs of population growth and provides relevant insights on the determinants of migration and population growth.

The third section of the report presents the results of simulations of the economic (e.g., employment, income, output, and revenues from personal income taxes, real estate property taxes, corporate profit taxes, sales taxes, and motor vehicle fees) and fiscal (e.g., spending on public services including education, public safety and other services) impacts of two alternative population growth scenarios in the city of Providence. Scenario A assumes that the population of the city of Providence will follow the dynamics and growth pattern of Providence County as projected by REMI (Regional Economic Models, Inc.). Under this scenario, the city's population would grow at an average rate of 0.5 percent per year from 2020 to 2050, thereby increasing the population from 179,883 in 2019 to 192,100 in 2030, to 202,900 in 2040, and to 208,500 in 2050. Scenario B allows for much faster population growth and assumes that the population of Providence would increase at an average rate of 1.1 percent per year from 2020 to 2050, which would increase the population from 179,883 in 2019 to 207,100 in 2030, to 229,700 in 2040, and to 250,000 in 2050. The growth of population in Scenario B would cause the population of the city of Providence in 2050 to be about the same as the population observed in the 1930s and 1940s, which was the city's highest level of population.

The growth of population in Scenarios A and B exceeds the projections of growth made by the Rhode Island Department of Administration, which indicates that the population of Providence will grow at an average rate of 0.3 percent per year, reaching 190,601 people in 2040.

The empirical analysis is conducted using data from several sources including the U.S. Census Bureau, Rhode Island Department of Education, Rhode Island Department of Revenue, Rhode Island Department of Labor and Training, Rhode Island Association of Realtors, and the City of Providence. This report uses two statistical approaches to conduct the economic impact analysis: REMI¹ and IMPLAN (IMPact analysis for PLANning).² These tools allow analysis of inter-industry relationships and assess how economic activities spurred by net-migration would impact the economy and public finances in the city of Providence.

There are inherent tensions between developing a realistic simulation model while keeping it simple and robust. Accordingly, the results must be interpreted considering the assumptions and limitations of the present analysis.³

Overview of population, economic base, and public finances

Population

The city of Providence has been through three main development phases (Figure 1). Phase I was marked by fast economic growth and population expansion, reaching more than 250,000 people in the 1930s and in 1940. During this phase Providence thrived and its population increased due to significant immigration flows and the industrialization process (mainly textile and jewelry) that created many jobs and produced significant wealth in the region. On other hand, during Phase II, which covers the early 1940s to the early 1980s, Providence experienced a period of decline in both population and wealth creation. This was mainly caused by the demise of the textile industry, long-lasting effects of the Great Depression of the 1930s, and the floods caused by the 1938 New England Hurricane. The population of Providence declined significantly between 1950 and 1980 as economic activity contracted, and organized crime flourished.

¹ The REMI model is based on input-output multipliers that represent inter-industry relationships and transactions between industries. The REMI model also provides a general equilibrium representation between supply and demand as external/exogenous changes affect the economy. REMI was founded in 1980 and used economic theory and practice to develop software and application that could be used for quantitative economic analysis and guide policy decisions. REMI is widely used by government agencies and the private sector to conduct economic impact analysis.

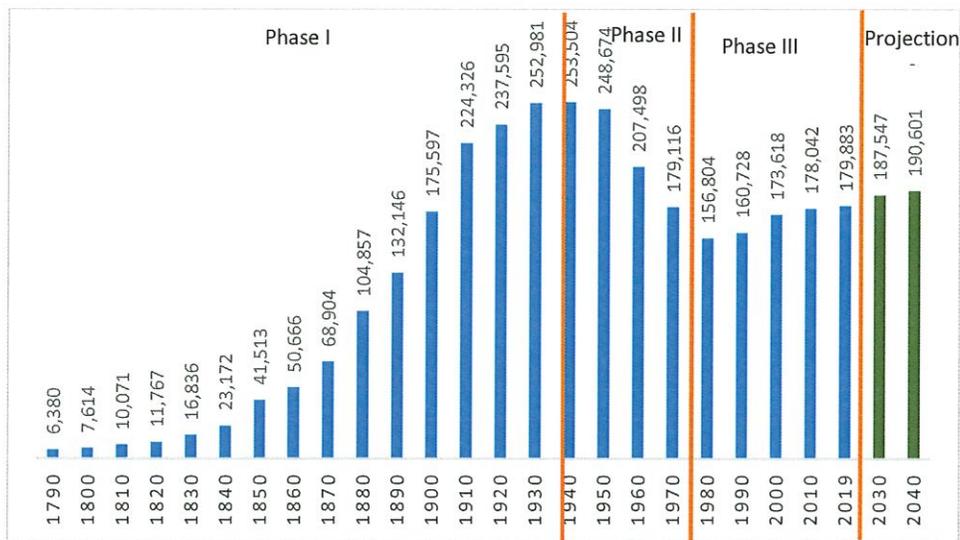
² In 1976, the United States Forest Service (USFS) and the Federal Emergency Management Agency (FEMA) developed two linear programming models: FORPLAN and IMPLAN. FORPLAN (short for “forest planning”) estimated the resource outputs of land management strategies, and IMPLAN (short for “impact analysis for planning”) estimated the economic effects of those resource outputs on local communities. The USFS officially began modeling economic impacts with IMPLAN in 1978 and still does to this day. In 1985, the responsibility for developing IMPLAN data sets shifted to the University of Minnesota. As demand grew for regional models by non-USFS organizations, IMPLAN (then Minnesota IMPLAN Group (MIG, Inc.)) was established as an independent corporation for the purpose of developing and selling all future iterations of the IMPLAN database and software.

³ The methodology section discusses key methods and assumptions utilized in this report.

Phase III, which started in the 1980s and continues through the current time, was marked by a relatively modest upswing in population and economic activity within the city along with significant socio-economic and demographic changes. The improvements were fostered by infrastructure investments and initiatives that revitalized Providence and provided fertile ground for the development of service industries that led to job and wealth creation. Population growth, however, has been relatively slow during this period.

The population of Providence was 179,883 people in 2019, compared to 156,804 people in the 1980s, an increase of 23,079 people. This current figure, however, is significantly lower than the 253,504 people recorded in the 1940s.

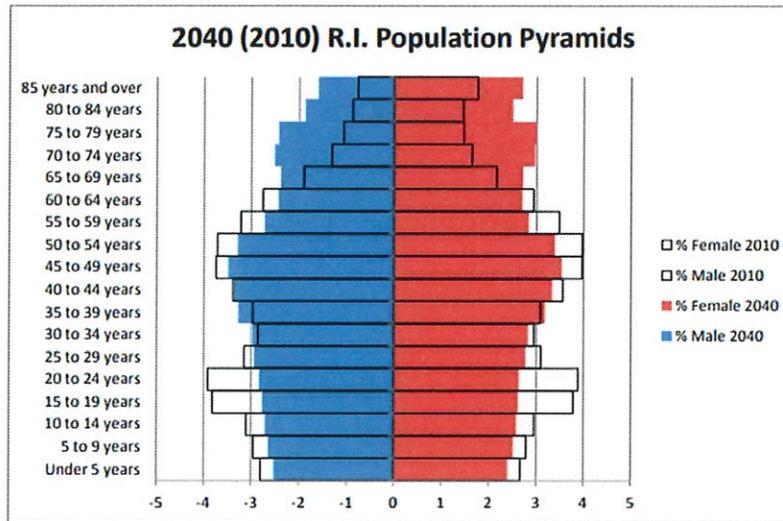
Figure 1: Population, Providence, 1790-2019



Source: Authors' compilation using data from the Rhode Island Department of Administration.

Providence is, however, facing worrying demographic headwinds. According to the Rhode Island Department of Administration, the population of Providence will be 190,601 people in 2040, an increase of only 10,718 individuals compared to the 2019 population. The projections, however, show that the growth of population will take place in the 65-years-and-older cohorts while the working-age population is expected to decrease (Figure 2). This projected shift in the composition of the population is consistent with projections for New England and the nation. These projections pose significant socio-economic and public finance challenges because it indicates a high probability of reduced labor supply while public services may have to be increased to meet the needs of an aging population.

Figure 2: Population pyramids, Rhode Island, 2010 and 2040

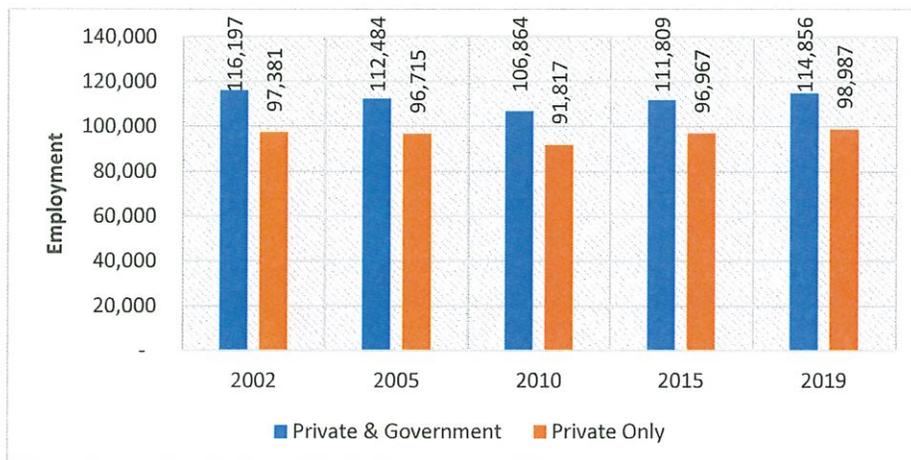


Source: Rhode Island Department of Administration, Division of Statewide Planning.

Economic base

Total employment is a key measure of economic vitality and growth. The total number of workers employed in the private and government sectors combined decreased from 116,197 in 2002 to 106,864 in 2010 and then increased to 114,856 in 2019, which implies a reduction of 1,341 jobs from 2002 to 2019 (see Figure 3).⁴ Employment in the private sector, on the other hand, increased from 97,381 in 2002 to 98,987 in 2019, an increase of 1,606 jobs during this period. Employment in the government sector, however, decreased from 18,816 workers in 2002 to 15,869 workers in 2019, a cut of 15.7 percent in the number of employees in that sector.

Figure 3: Total employment, Providence, 2002-2019



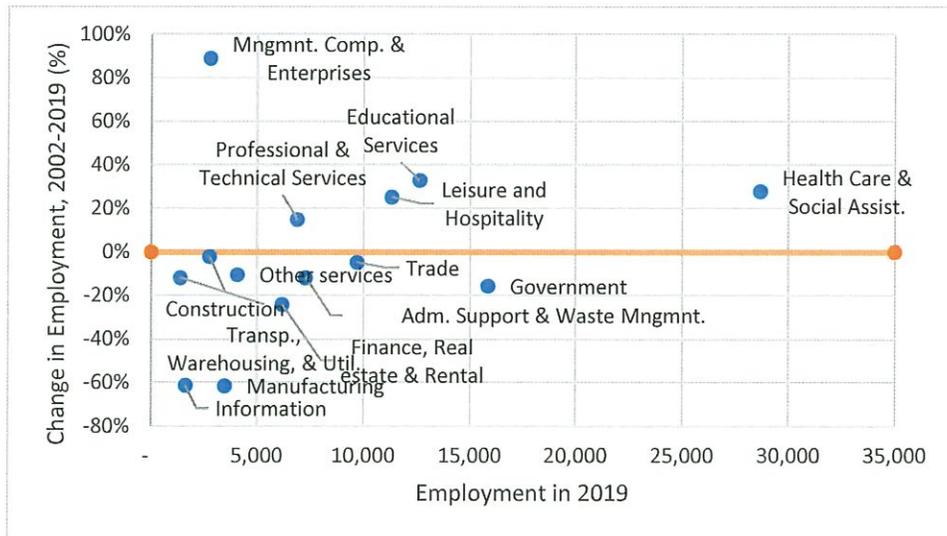
Source: Authors' compilation using data from the Rhode Island Department of Labor and Training.

⁴ These figures refer to the “place of employment,” which represent the worksite where workers perform their work regardless of their place of residence.

Providence’s private economy is currently based on four industries: health care and social assistance, educational services, leisure and hospitality, and trade. Data from the Rhode Island Department of Labor and Training show that in 2019 the health care and social assistance industry employed 28,684 people or 29 percent of total private employment, generating \$1.75 billion in wages in Providence. The second largest industry is educational services, which employed 12,644 workers (12.8%) with wages totaling \$760 million. Leisure and hospitality employed 11,334 workers (11.5 percent) and created \$286.1 million in wages and retail and wholesale trade employed 9,707 workers (9.8 percent) and created \$401.3 million in wages. Despite the reduction in employment, the public sector continues to be a major employer in the city of Providence. In 2019, the government sector employed 15,869 workers and paid \$1.1 billion in wages.

Nevertheless, it is important to note that Providence’s economy has been through major changes over the last two decades. The city has benefited from a strong expansion of employment in health care, educational services, leisure and hospitality, professional and technical services, and management of companies and enterprises⁵ (Figure 4). From 2002 to 2019, the number of jobs increased by 6,252 (27.9 percent) in health care, 3,132 (32.9 percent) in educational services, 2,287 (25.3 percent) in leisure and hospitality, 1,323 (89.1 percent) in management of companies and enterprises, and 899 (15 percent) in professional and technical services. During the same period, however, Providence lost 5,597 manufacturing jobs (-61.4 percent), 2,589 jobs (-61.3 percent) in information services, 1,965 jobs (-24.1 percent) in finance, real estate and rental services, 971 jobs (-11.8 percent) in administrative support and waste management, and 481 jobs (-4.1 percent) in trade. The public sector also shed 2,947 jobs (-15.7 percent) from 2002 to 2019.

Figure 4: Employment base and growth by sector, Providence, 2002-2019



Source: Authors’ compilation using data from the Rhode Island Department of Labor and Training.

⁵ According to the BLS, “establishments in this sector perform essential activities that are often undertaken, in-house, by establishments in many sectors of the economy. By consolidating the performance of these activities of the enterprise at one establishment, economies of scale are achieved.”

Public services and finance

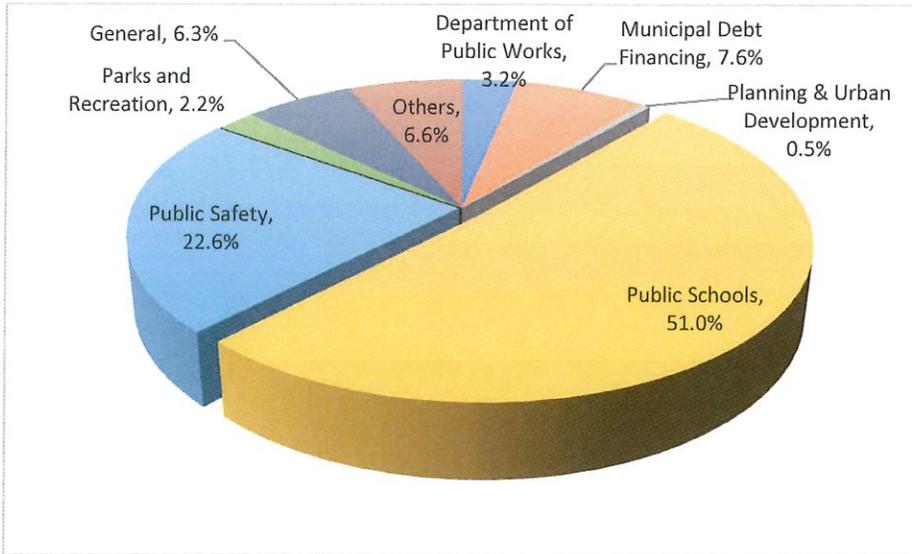
The effective provision of public services is critical to foster economic development, promote well-being, and create a landscape that attracts labor and businesses. Local policy priorities are usually reflected in municipalities' budgets that determine the allocation of scarce resources for the provision of public services including education, public safety, transportation, and infrastructure.

Providence's adopted FY 2020 budget totals \$772.6 million, including \$282.1 million in property tax revenue, \$66.1 million in tangible and excise tax revenue, \$94 million in state revenues and aid, \$66.4 million in local receipts (PILOT payments, licenses, fines, etc.) and \$264.1 million in pass-through school fund revenues. The total city budget has increased at an average of 2.6 percent since 2015.

Figure 5 summarizes the FY 2020 budgeted expenses by department and shows that 73.6 percent of the City's spending is directed to two departments: public schools (51 percent) and public safety (22.6 percent). The service of municipal debt accounted for 7.6 percent of the City's budgeted expenditure in 2020. Expenditure by the department of public works accounted for 3.2 percent, parks and recreation represented 2.2 percent, general spending represented 6.3 percent, and all other spending accounted for 6.6 of total expenditure.

While the composition of the budget of the City of Providence is similar to the average for all other cities and towns in Rhode Island, it differs significantly from what is observed at the national level. According to the U.S. Census Bureau, in 2017 (most recent year) expenditure on K-12 education represented approximately 50 percent of the spending by all local cities and towns in Rhode Island compared to an average of 36.9 percent across all cities and towns in the nation. In addition, expenditure on public safety represented approximately 14.4 percent of the spending by local cities and towns in Rhode Island compared to an average of 9.8 percent across all cities and towns in the nation. Interest on municipal debt accounted for 4 percent of total expenditure, on average, across all cities and towns in the nation.

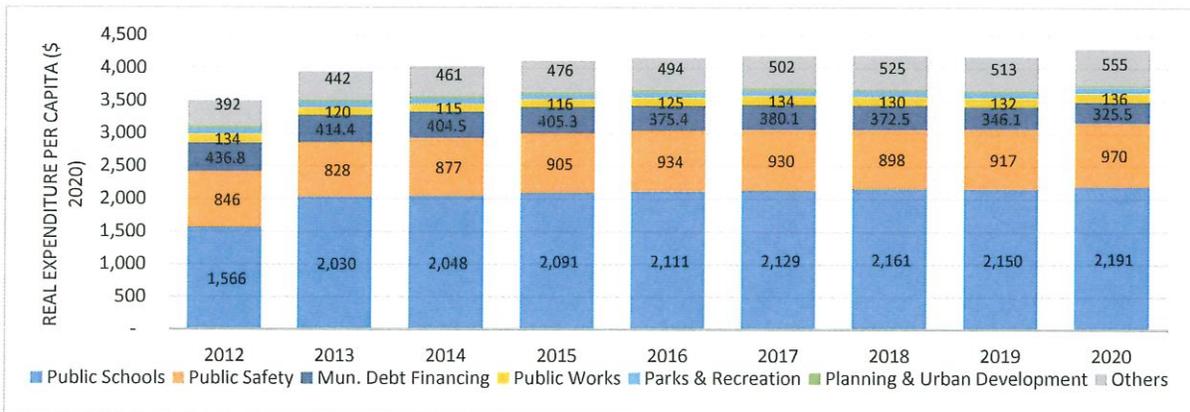
Figure 5: Public expenditure per function (percentage), Providence, 2020



Source: Authors' compilation using data from the Open Data Portal, City of Providence, Rhode Island.

In 2020, expenditure per capita in public schools reached \$2,191, compared to \$2,030 (inflation-adjusted) in 2013, which represents an increase of about 8 percent over this time period (or an average of 1.1 percent per year) (Figure 6). Expenditure per capita on public safety increased 17 percent during the same period, jumping from \$828 in 2013 to \$970 in 2020. Expenditure per capita by the public works department – which is typically responsible for the day-to-day maintenance of the city’s infrastructure services (sewer, sanitation, street maintenance, etc.) – increased from \$120 in 2013 to \$136 in 2020. Expenditure per capita by the planning and urban development declined from \$29.2 in 2013 to \$21.9 in 2020. There was also a significant decline in expenditure per capita to service the municipal debt, which declined from \$414.4 in 2013 to \$325.5 in 2020.

Figure 6: Public expenditure per capita (\$ 2020), Providence, 2012-2020



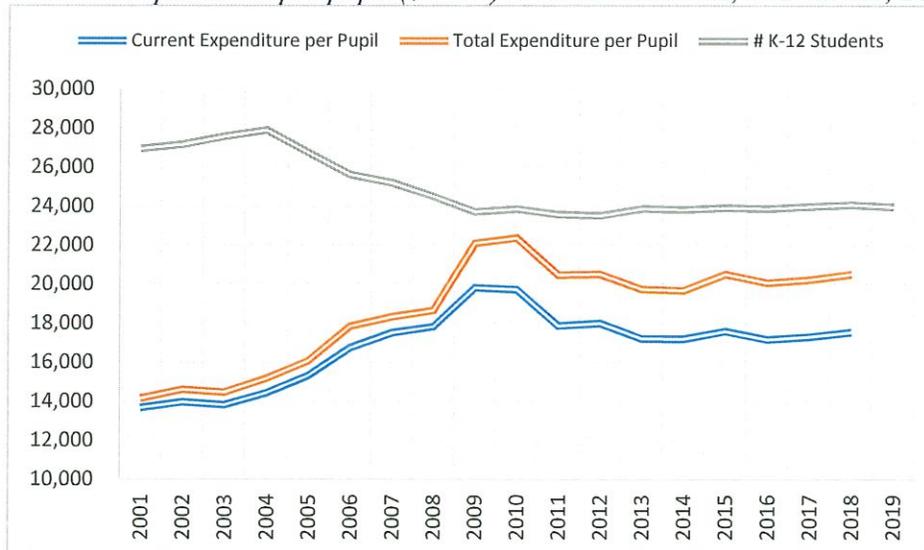
Source: Authors' compilation using data from the Open Data Portal, City of Providence, Rhode Island.

The high concentration of public expenditure on education and public safety is aligned with strong empirical evidence that investments in public education and public safety are fundamental

pillars of economic development and prosperity. Providence, however, is spending significantly more on those two functions compared to the national average, which limits the City’s ability to make investments in other public services that are also important to promote economic development. The demographic structure in the city of Providence, nevertheless, might partially explain this relevant difference in public expenditure priorities.

The number of K-12 students enrolled in public schools experienced a steep decline in the late 2000s, dropping from a peak of 27,580 students in 2003 to 23,699 in 2019, a reduction of about 14 percent in the number of K-12 students in the city. The drop in the K-12 students occurred at the same time that there was a significant increase in inflation-adjusted public expenditure per pupil, which rose from \$14,459 in 2003 to \$20,508 in 2018, an increase of about 42 percent (or an average of 2.8 percent per year) (Figure 7). The socio-economic composition of the student population of Providence changed during this period, which may impact the cost of providing education. Particularly, the proportion of students who are eligible for free or reduced lunch increased from 73 percent in 2002 to 79.4 percent in 2018 (most recent data from the National Center for Education Statistics (NCES)).⁶ However, the strong inverse association between average cost per pupil and the size of the student population could indicate that economies of scale might exist in the provision of public education in Providence, which would explain why a smaller student population led to higher expenditure per pupil. This hypothesis is further considered in the sub-section “Spending on public services” of this report.

Figure 7: Public expenditure per pupil (\$ 2020) and K-12 students, Providence, 2001-2019



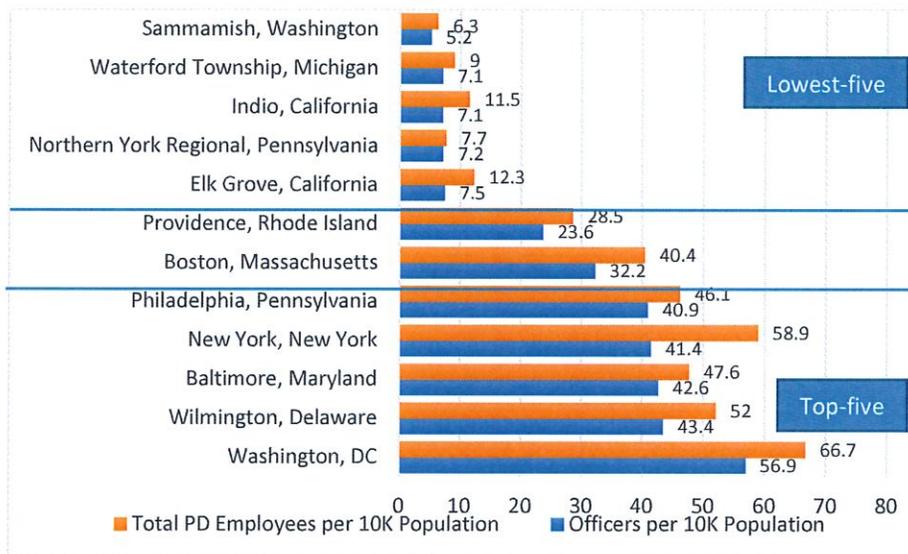
Source: Authors’ compilation using data from the National Center for Education Statistics (NCES). Note: Spending figures were adjusted by inflation using the Consumer Price Index (CPI) and are in 2020 dollars. We follow the NCES terminology, which defines *Current expenditure* as total expenditure minus capital spending.

⁶ In 2019, the Providence school district started offering every student access to free breakfasts and lunches without having to apply for a free or reduced-price lunch program.

The decline in enrollment across many school districts caused a reduction in the number of operational public schools in Rhode Island. The City of Providence also experienced a significant decline in available school seats due to the reduction in the number of operational public school from 58 schools in 2005 to 42 operational public schools in 2019. According to a 2017 report by the Rhode Island Department of Education (RIDE), aspirational capacity⁷, which is based on the Educational Program Space Guidelines in the Rhode Island School Construction Regulations (SCRs), is at 97.1 percent in the City of Providence, compared to a statewide average of 104 percent. In addition, public school facilities in Providence are subject to significant deficiency that would require over \$500 million in investments in the next five years.⁸

Public expenditure on public safety is largely driven by the size of the police department and expenditure on personnel. According to data from the FBI Uniform Crime Reporting program, in terms of police department employment (PD) per 10,000 population, Providence ranked 86th highest among 690 cities in the United States (Figure 8). The City employed 23.6 officers (or a total of 28.5 PD employees) per 10,000 residents, which compares to 32.2 officers per 10,000 people in Boston, MA, and 7.5 officers per 10,000 people in Elk Grove, CA, a city of approximately 172,000 people. The national average for cities with 100,000-200,000 people was 15.9 officers per 10,000 population and a total of 20.9 PD personnel per 10,000 people.

Figure 8: Police department employment (per 10,000 population), select cities



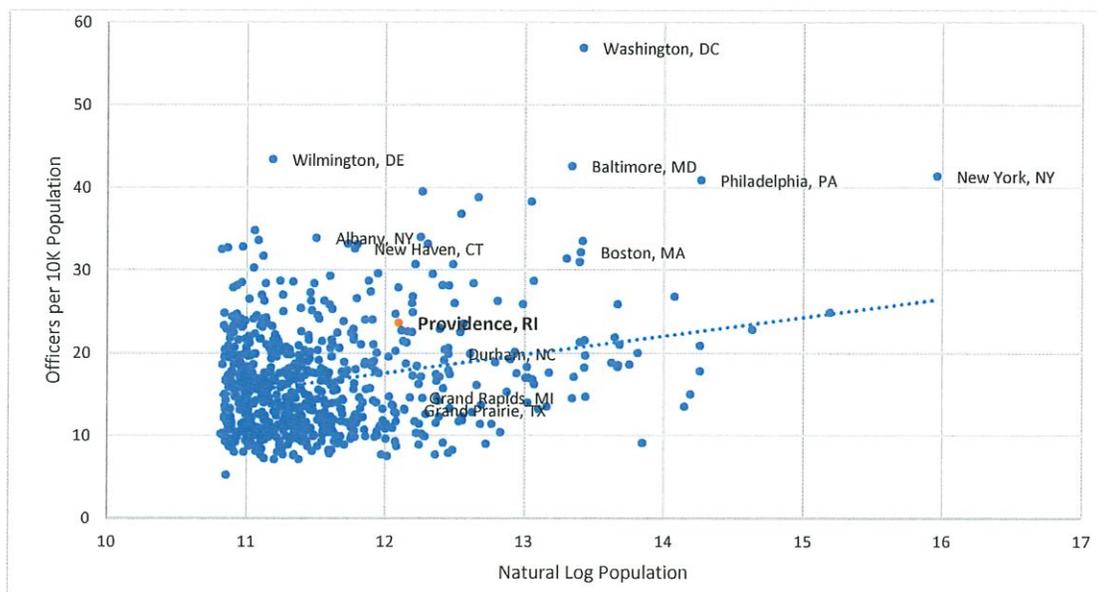
Source: Authors' compilation using data from Governing.com and from the 2016 FBI Uniform Crime Reporting program.

⁷ “The functional capacity attempts to capture how the spaces within a school are being used, whereas the aspirational capacity is based on the square-feet-per-student ratio used when calculating the utilization of a facility. The aspirational capacity is based on the Rhode Island SCRs and is an aspirational goal of space use.” (RIDE, Educational Program Space Guidelines in the Rhode Island School Construction Regulations, p. 2).

⁸ According to the SCRs, “facility deficiencies are divided into industry-standard building systems with multiple subsystems and subsystem types. The systems include: Site, Structural, Electrical, Interior, Fire & Life Safety, Technology, Roofing, Mechanical, Conveyances, Exterior, Plumbing, and Specialties.” (RIDE, Educational Program Space Guidelines in the Rhode Island School Construction Regulations, p. 22).

According to *Governing.com* and Figure 9, the size of the population does not reflect demands placed on law enforcement, which are driven by a myriad of factors including funding to the police department, demographic, economic, among others. Figure 9 also shows that Providence is in the “middle of the pack” in terms of the size of its population and the relative size of its police department. As highlighted above, Providence employed 23.6 officers per 10,000 population, compared to a national average for cities with 100,000-200,000 people of 15.9 officers per 10,000 population, to 32.6 officers per 10,000 population in New Haven, CT, 19.9 officers per 10,000 in Durham, NC, 14.6 officers per 10,000 people in Grand Rapids, MI, and 8.9 officers per 10,000 people in Fontana, CA. Thus, holding other factors constant, demand for public safety is driven by a myriad of local factors that might not be related to the size of a city’s population.

Figure 9: Population and size of police department, United States, 2016



Source: Authors’ compilation using data from *Governing.com* and 2016 FBI UCR data.

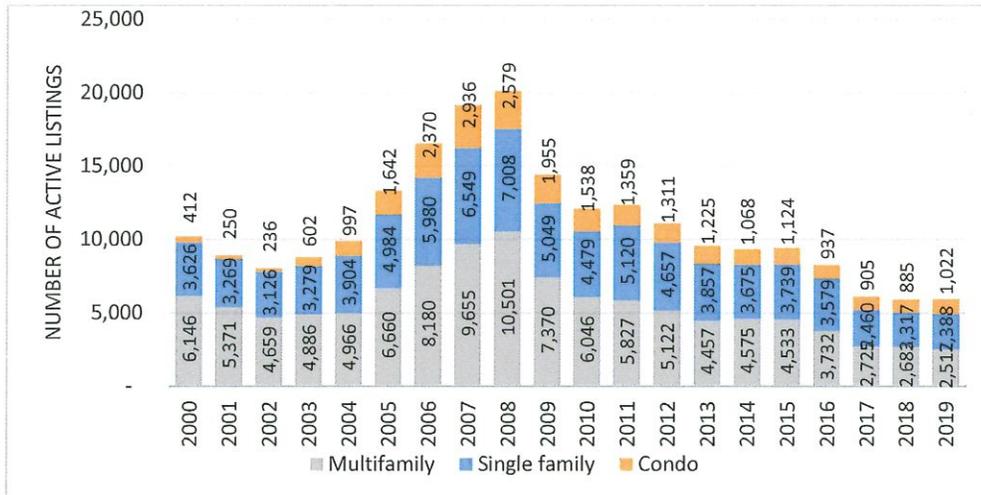
Housing supply

Rhode Island and Providence have experienced both housing shortages and a lack of affordable housing. According to the U.S. Census, there are 74,036 housing units in Providence, of which 82 percent were occupied and 58.8 percent were built before 1940, which makes it particularly costly to maintain and meet the current housing needs. As of November 2018, the vacancy rate was 1.6 percent and home inventory was 3.6-month supply, which are relatively low and indicate a tight housing market in the region.⁹ Construction of new homes has also been at historical low levels since the 2008-09 Great Recession and will likely be insufficient to meet the estimated demand for new homes in the Providence county market (HUD).

⁹ The months’ supply indicates how long the current for-sale inventory would last given the current sales rate if no additional new houses were built.

Active listing figures from the Rhode Island Association of Realtors show that housing supply is particularly low in the city of Providence. In 2019, just under 6,000 properties (single family, multi-family, and condos) were listed for sale in Providence, compared to approximately 20,000 properties in 2007-2008, and a historical average of 11,000 properties (Figure 10).

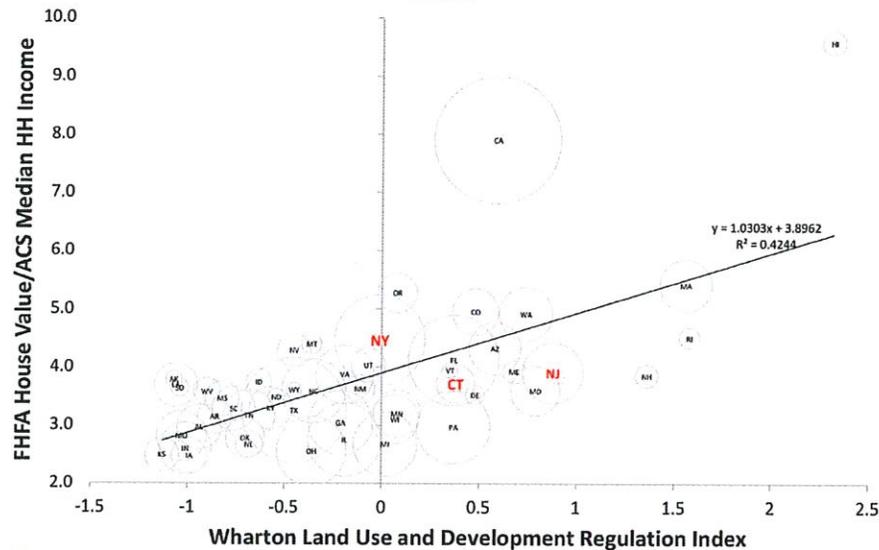
Figure 10: Number of active residential listings, Providence, 2000-2019



Source: Authors' compilation using data from the Rhode Island Association of Realtors.

Overall, high home prices, lack of affordable housing, and low housing supply in Rhode Island as well as in the city of Providence are results of structural problems and regulatory barriers that have caused construction cost to skyrocket in the state. Rhode Island ranks as the second most land-regulated state in the country (Figure 11). The excessive barriers to housing supply including a costly permitting process and outdated land development regulations have reduced construction activity and job creation in the sector and contributed to making housing unaffordable for the majority of the population across the state.

Figure 11: 2015 FHFA house values/median household income and the Wharton regulatory index



Source: <http://rutgersrealestate.com/blog-re/affordable-housing-supply-side-innovation/>

Costs and benefits of population growth

The interrelationship between population growth and economic development and growth has been an active area of research for economists, demographers, political scientists, and sociologists. The influence of population changes on economic growth, however, is a multifaceted issue that depends on local socio-economic conditions. To better understand the impacts of - and response to - population growth, it is imperative to consider the (relative) benefits and costs of a growing population. For instance, while the benefits of population change might include employment/entrepreneurship growth, a growing population could also impact the provision of public goods and services. This report briefly reviews various studies that discuss the potential benefits and costs of population change.

Benefits of population growth

Research indicates that there is a long-run positive relationship between the growth rate of population and the growth rate of employment in the United States (Rappaport 2018). Carlino and Mills (1987) use county data for the US to show that there is a positive link between aggregate employment and population densities. In another study, analyzing the rates of unemployment across the US, Rappaport (2012) reports a positive association between metropolitan areas with positive job gains and the influx of workers during two separate time spans, 1990-2000 and 2000-2007.

Box 1: Policy making requires considering the relative benefits and costs of population growth.



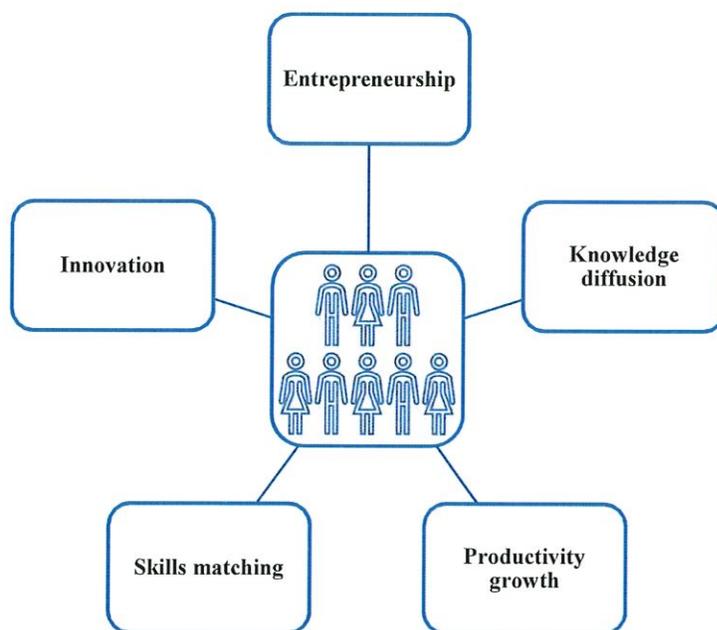
The growth rate of population is associated with creation of new business activity. More specifically, an increase in population might bring in entrepreneurs who supply their talents and

more individuals who demand goods and services (Hathaway and Litan 2014)). Indeed, Brown (2018, p. 6) argues that new firm formation is fundamental to the growth of employment and the overall economy as “they may bring new ideas, products and technologies.” Perhaps not surprisingly, Hathaway and Litan (2014) find that a drop in business creation in the Southeast, Southwest, and West of the US was linked to a drop in population growth.

There is also evidence that firm turnover is considerably lower in cities with a population under 220,000 as compared to locations with higher population during the period 1998-2014 (Brown 2018). Accordingly, Brown (2018) argues that a drop in firm turnover is concerning as it might suggest that a reduction in productivity and innovation is taking place in areas with relatively smaller populations. Since new firm formation is linked to employment growth, a drop in firm turnover might curb economic development and growth. Brown and Tousey (2020) show a positive link between population growth and turnover in population. They argue that it is crucial for regions to experience population turnover because it promotes “better matches between employer and employee” and accelerates “the dissemination of knowledge between people and firms as people come into an area with new ideas or take ideas with them to other locations (Brown and Tousey (2020, p. 16)).”

Broadly speaking, locations that have a larger population experience a diffusion of knowledge in the form of transfer of information and ideas, which, in turn, could lead businesses and entrepreneurs to learn from each other about ways to innovate and promote economic activity in the region (Brown (2018); Rappaport (2018); Brown and Tousey (2020)). Indeed, Brown (2018) documents that innovation, proxied by per capita utility patents during the 2000-2014 period, is notably lower in locations with a population under 220,000 compared with locations with higher populations.

Figure 12: Potential benefits of population growth



In general, studies demonstrate the beneficial effects of population to entrepreneurial activity, innovation, knowledge diffusion, and job growth (Figure 12). Thus, higher growth rate of population might, thereby, contribute to faster economic growth (Jones 1995; Segerstrom 1998). Nevertheless, Romer (1990) argues that what matters for growth is human capital accumulation, opening borders, and becoming more globally integrated. Likewise, Strulik (2005) documents that the growth of economic activity is not necessarily linked to the growth rate of population, but to accumulation of human capital. Strulik (2005, p. 141) explains that “[s]ince people become skillful researchers by education, economic growth is explained by product innovation and quality improvement but is ultimately driven by human capital accumulation.”

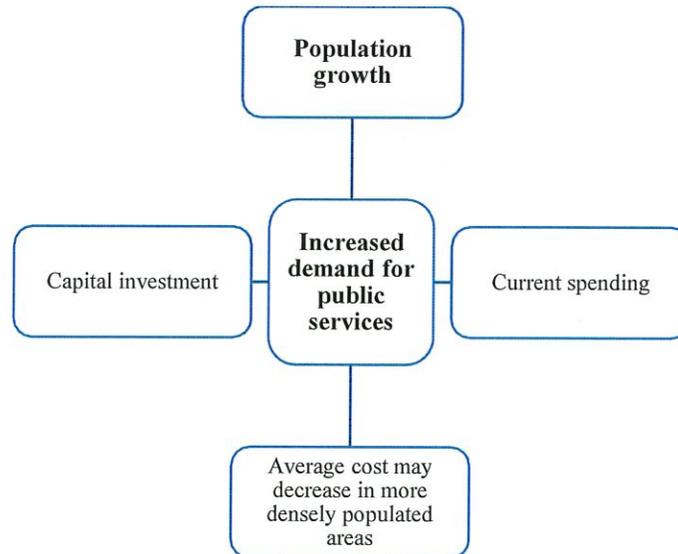
Costs of population growth

The nexus between population growth and economic growth is multifaceted and mediated by many complex factors. For instance, while an increase in population may increase the speed of accumulation of human capital, a growing population might also lower the quantity and quality of public goods allocated to support education and thus impact future accumulation of human capital (see Prettner, 2014; Barro, 2001).

Population growth requires that municipalities accrue additional tax revenue to cover spending associated with the provision of public services to the new population or resort to decreasing the quantity/quality of public resources (Ladd (1992)). Population growth, however, might create economies of scale and allow sharing public sector costs among a larger population, thereby reducing per capita spending (Holcombe and Williams 2009). Put differently, per capita public sector spending might be larger in less densely populated areas due to the lack of scale economies (Carruthers and Úlfarsson 2008).

The presence (or lack) of economies of scale in public service provision is important to consider when weighing the fiscal impact of population growth. If economies of scale are present, then per capita expenditure to provide public services would decrease when population increases. Ladd (1992) uses data for US counties and shows that the response of expenditures per capita to an increase in population is negative. Interestingly, Ladd (1992, p. 285) interprets this finding as locations “respond only sluggishly to a surge in population and in the process presumably allow their services to deteriorate.” However, the author also shows that a growing population is positively linked with capital investment spending. To explain the dissimilar influences of population change, Ladd (1992, p. 288) suggests that “the major stress on local public spending associated with a surge in population occurs in the capital, not the current, account budget.”

Figure 13: Effects of population growth on public finances



In general, research suggests that the impact of population growth on spending is not that clear-cut. Consequently, the presence of economies of scale or diseconomies of scale in the provision of public services is location specific and often depends on local conditions including the size and composition of the local population.

For instance, using data for more than 3,000 US counties, Carruthers and Úlfarsson (2008) show that a growing population is associated with lower aggregate expenditure, and this result holds for various sub-expenditure components including police, housing development and schooling. However, Holcombe and Williams (2008) find that population growth has a statistically insignificant influence on aggregate and operational spending using data for nearly 500 US cities with populations of more than 50,000 people. They also show that the impact of population density on aggregate and operational spending is statistically insignificant for areas with populations under half a million people, but it is positively correlated with aggregate and operational spending for municipalities with populations of more than half a million people.¹⁰

Goodman (2015) also reports that population has a limited impact on per capita spending utilizing data for US counties. However, disaggregating population under (over) the age of 19 (65) shows that population under the age of 19 is positively correlated with per capita spending whereas population over the age of 65 is statistically insignificant. Exploring school expenditures data for Missouri, Edmiston and Spong (2012) reveal that population density and population over the age of 65 are positive associated with school expenditure per student although population under the age of 18 is negatively associated with school expenditure per student.

¹⁰ In another study, Holcombe and Williams (2009) report a statistically insignificant impact of population growth and density on aggregate spending per capita and find no evidence of economies of scale. Moreover, they also find that police expenditure exhibit diseconomies of scale.

Gyimah-Brempong (1987), who employs city data with populations larger than 5,000 people in Florida, finds evidence of diseconomies of scale in police expenditures and this finding is primarily driven by relatively bigger cities with populations higher than 50,000 people. Also, employing data for US cities, Holcombe and Williams (2008) find a positive correlation between population density and police spending in areas with populations higher than half a million people, albeit this relationship is statistically insignificant for population densities with populations lower than half a million people. Another important result in Holcombe and Williams (2008) is that population growth, although negative, has a statistically insignificant influence on police spending.

Implications for the city of Providence

The effects of population growth on local economies is a multifaceted issue that depends on local socio-economic conditions and is mediated by many complex factors. In the case of the City of Providence, it is imperative to investigate the influence of population growth on total employment, real income, real output, and tax revenues to better understand the potential beneficial effects of population growth.

At the same time, it is crucial to examine whether and to what extent the City of Providence is experiencing economies of scale in public service provision such as education services. For instance, if the City of Providence is experiencing economies of scale, a growing population might reduce public service costs on per person basis. On the other hand, if the City is experiencing diseconomies of scale, population growth might increase public per person service costs. Understanding these interrelationships enables policymakers to comprehensively weigh the benefits against the costs of population change.

In summary, there is no such thing as one-size-fits-all and, prior to drawing any strong conclusions about the impacts of population growth, it is vital to evaluate the costs and benefits of population growth.

Drivers of population growth

Population growth is affected by four major factors: fertility rates, mortality rates, age profile of the population, and migration (Pew Research Center 2015). The Rhode Island Department of Administration's (RIDA) population projections for the city of Providence (Figure 1) consider these four main factors in their methodology and concludes that population growth will be slow, averaging 0.2 percent annual growth for the next two decades in Providence. Fertility rates, mortality rates, and the age profile of the population are slow-changing and will not deviate from RIDA's projections unless there is a major change in migration flows to the city. Migration can significantly change the age profile and fertility rates and, thus, trigger significant changes to population growth patterns.

Migration flows may be triggered by interstate movements of population and foreign migration. Foreign migration into the United States is driven by political, economic, and border-enforcement measures that are mostly controlled by the federal government. Thus, foreign migration is not an issue that a City like Providence can effectively impact. However, the City could promote higher inward migration through for example greater job opportunities, which has

been considered a driver of migration and population change by the extant literature in the United States (e.g., Carlinio and Mills (1987)).

In the United States, interstate migration has long been recognized an important phenomenon and a part of the country's social fabric as individuals/families move to locations that offer better job and life opportunities. However, during the 2008-2009 Great Recession, the migration rate in the United States declined to its lowest point since World War II, and this decline was especially observed among people of different demographic and economic attributes including educational attainment, marital status, and labor force status (Brookings, 2009).

The discussion of the trends and determinants of in-state migration in the United States makes up a large body of literature that is rooted in the idea "that individuals and families weigh the costs and benefits of their location options and migrate when the benefits from relocation outweigh the costs" (Molloy, Smith and Wozniak 2011, p. 181). Overall, studies suggest that the key drivers of migration in the United States are: age (-), house ownership (-), college opportunities (+), cost of living (-), housing availability and affordability (-), labor demand (+), and overall economic conditions (+). Among these factors, employment opportunities and overall "affordability," particularly housing affordability, seem to be the most relevant drivers of recent migration flows in the United States. Cities/regions that are deemed relatively unaffordable and lack employment opportunities were the ones that experienced the largest slowdown for immigration or largest increase in out-migration flows (Brookings, 2009).

Consequently, the City of Providence and the State government could play important roles in promoting inward migration, thereby increasing the rate of population growth. Recall that the Providence thrived and experienced one its largest populations in the 1930s due to high immigration flows and the process of rapid industrialization that generated employment and income. Nevertheless, as discussed in the previous section, it is important to analyze the benefits (e.g., income, jobs, output, tax revenues) and costs (spending on public services such as education and public safety) of population change before drawing any conclusions, which is the focus of the next section of this report.

Economic impact of simulated population growth in Providence

The previous sections of this report show that the population of Providence is projected to grow very little over the next two decades. In addition, the population is projected to age, with the 65-years-and-older cohorts expanding while the working-age population is projected to contract. A smaller working-age population impacts business activity, innovation, and productivity and may put additional strain on Providence's public finances by reducing its economic-base at a time of increased demand for public services to meet the needs of an aging population. On the other hand, a growing population can contribute to economic growth, but inherently increases the demand for public services, which also affects public finances. This section of the report explores both the economic contribution (e.g., jobs, income, output, and tax revenues) as well as the impact on public finances (e.g., spending on public services) of two scenarios for population growth in the city of Providence.

Methodology

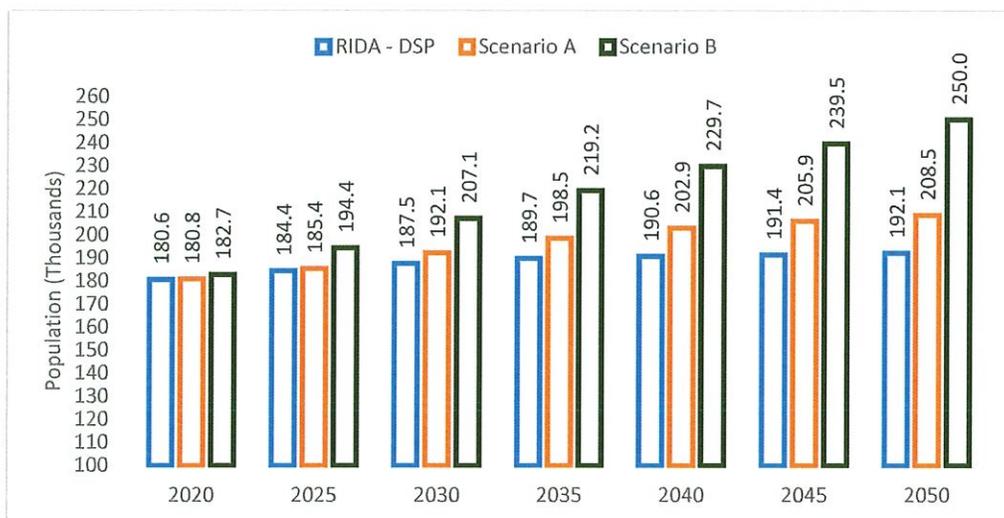
Assumptions

This section simulates the economic impact of two alternative scenarios in which population increases faster than the figures projected by the Rhode Island Department of Administration (RIDA – DSP), which estimates that the population of Providence will grow at an average rate of 0.3 percent per year until 2040.

Scenario A assumes that the population of Providence will follow the same dynamics and growth pattern of Providence County as projected by REMI. Under this scenario, the city’s population would grow at an average rate of 0.5 percent per year, increasing from 179,883 in 2019 to 192,100 in 2030, to 202,900 in 2040 and to 208,500 in 2050.

Scenario B assumes that the population of Providence would increase at an average rate of 1.1 percent per year from 2020 to 2050, which would increase the city’s population from 179,883 in 2019 to 207,100 in 2030, 229,700 in 2040, and to 250,000 people in 2050, which would be about the same the population observed in the 1930s and 1940s.

Figure 14: Population projection and simulation scenarios, Providence, 2020-2050



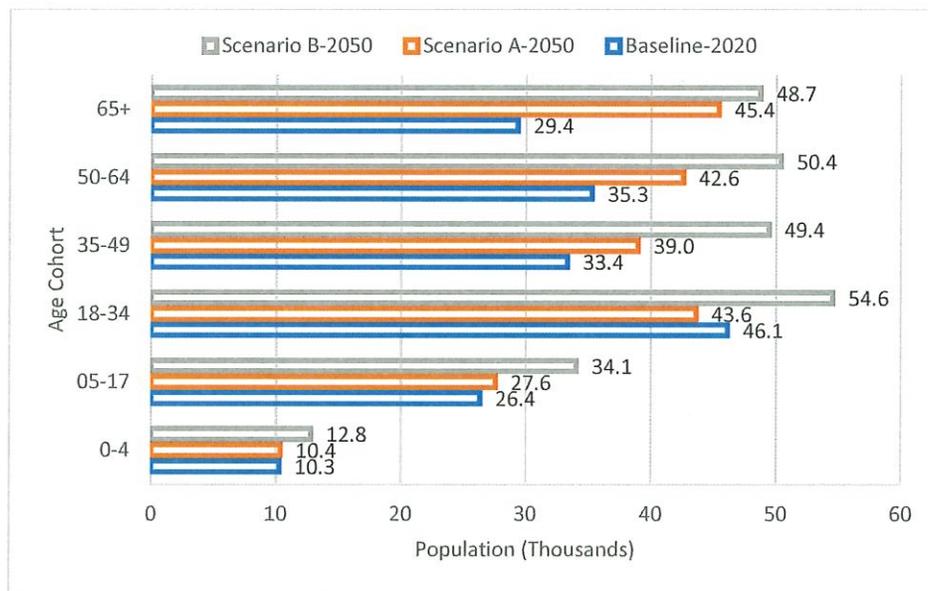
Source: Authors’ compilation using data from RIDA – DSP and REMI. The 2045 and 2050 data in RIDA-DSP columns are author’s projections based on trend in the RIDA-DSP data.

Scenarios A and B are built on the premise that the increase in population will take place through net-migration and no assumptions about the origin of the incoming population is made (people could come from other places in Rhode Island as well as from other states and countries).

Scenario A imposes no constraints on the age structure and assumes that the age distribution of the incoming population would be like that of the current population of Providence. Scenario B not only allows for faster population growth, but also assumes that net-migration would take place due to economic reasons that motivate people 64-years-old or younger to migrate to the city.

These assumptions result in major changes to the age distribution of the population and would avoid a situation in which only the population in the 65+ age cohort would increase (see Figure 2). Figure 15 shows that under positive net-migration as simulated in Scenario B, all sub-cohorts of the working-age population 18 – 64-years-old would increase. The relative size of 65 + age group would still increase, but it would represent a much smaller proportion of the total population compared to current projections. More specifically, extrapolations using projection data from RIDA-DSP indicate that the participation of the 65 + age cohort in the total population would increase from 16.2 percent in 2020 to approximately 24 percent in 2050. Under Scenario B, however, the 65 + age cohort would account for 19.5 percent of the total population of Providence in 2050.

Figure 15: Population simulation by age cohorts, Providence, 2020 and 2050



Source: Authors' compilation using data from REMI.

Population density

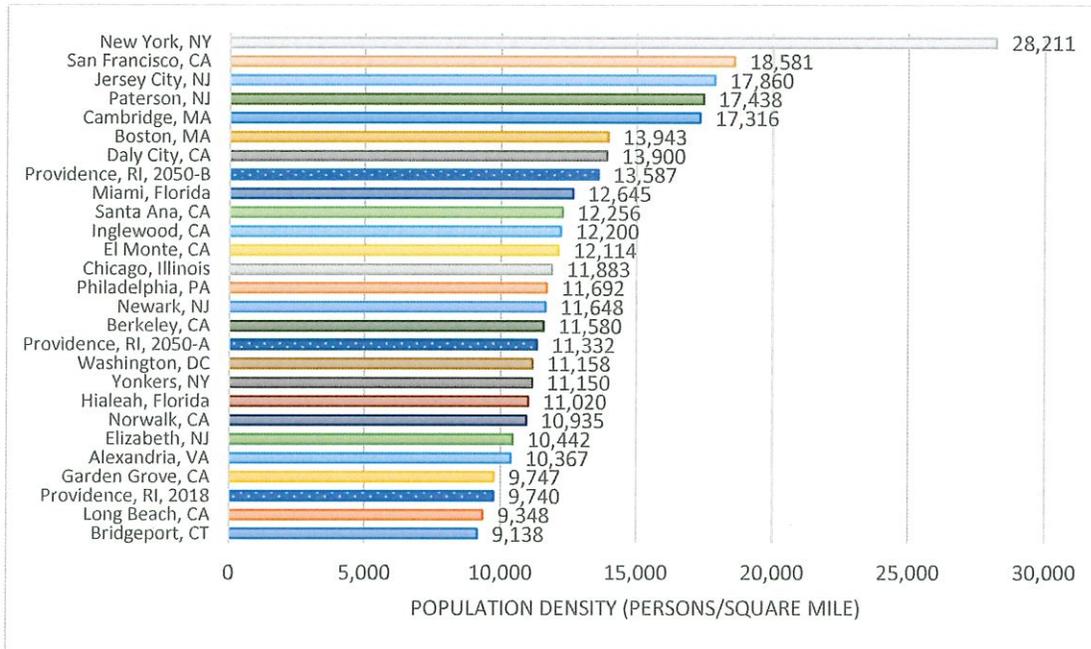
Will the increase in population simulated in Scenarios A and B cause population density¹¹ to reach “congestion” levels in Providence? It is well known that population density varies significantly across cities in the United States. According to the U.S. Census Bureau, in 2016 population density was on average 1,600 people per square mile in incorporated cities, but ranged from 172 people per square mile in Buckeye, AZ to 28,211 people per square mile in New York City, NY, the densest city in the country.

In Providence, population density was 9,740 people per square mile in 2016, the 23rd highest amongst cities with more than 100,000 people. This figure is considerably lower than population density in New York City, NY (28,211), San Francisco, CA (18,581), Cambridge, MA (17,316), or Boston, MA (13,943). Population density in Providence would increase to 11,332 people per square mile if population grows as simulated in Scenario A and increase to 13,587 people per

¹¹ Population density is calculated as population divided by area (square mile).

square mile in Scenario B. These figures would likely move Providence up to be among the top 20 densest cities in the country by 2050, but population density would still be lower than current population density levels observed in Boston, MA (13,943), Cambridge, MA (17,316), Peterson, NJ (17,438), Jersey City, NJ (17,860), San Francisco, CA (18,581), and New York City, NY (28,211). Housing development would have to be focused on multi-family residential structures to accommodate the increase in population density in Providence under these two scenarios.

Figure 16: Population density (persons/square mile) in places of 100,000 or more people, 2016

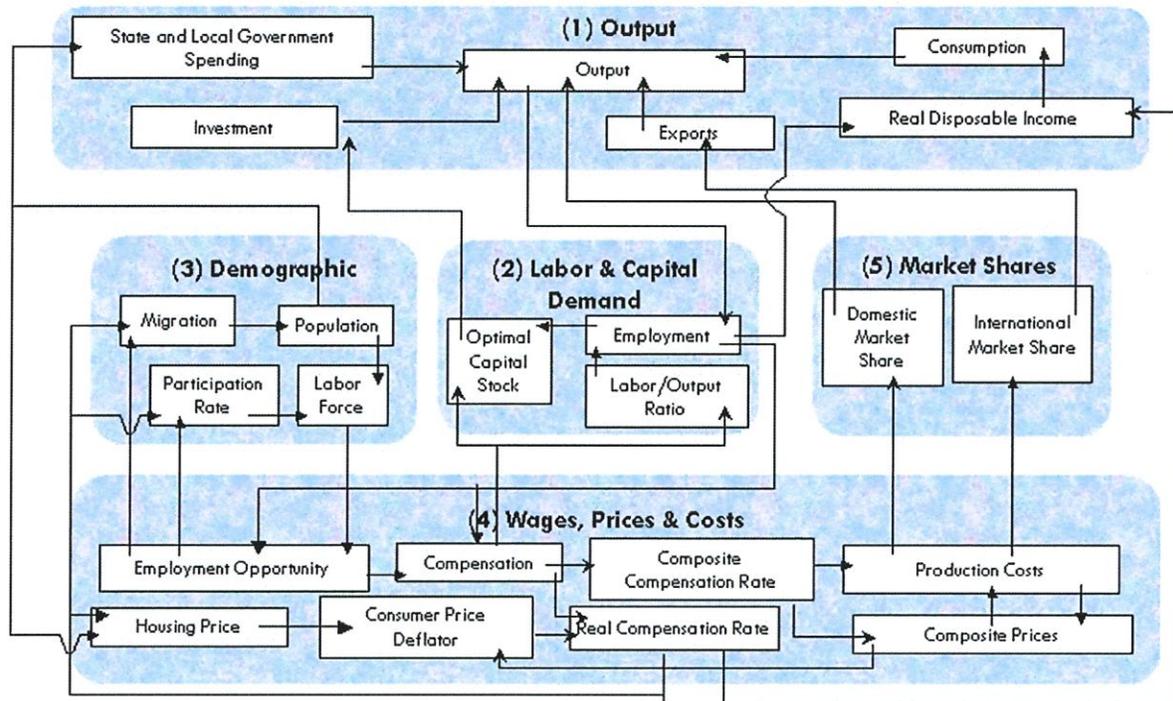


Source: Authors' compilation using own data and data from the U.S. Census Bureau.

Methods for measuring the economic impact of population growth scenarios

REMI and IMPACT analysis for PLANning (IMPLAN) are utilized to account for inter-industry relationships and to determine how economic activities spurred by net-migration affect the Rhode Island economy. REMI Policy Insight (PI+) provides year-by-year dynamic estimates of the effects of simulated net-migration on a wide range of metrics including employment, wages, output, and demographic effects. The model was calibrated using the Providence County economic structure and indicators and then adjusting all estimates to produce metrics for the city of Providence. REMI's dynamic economic impact estimates are utilized as input into IMPLAN to determine the fiscal impact of the population growth scenarios. The tax revenue projections presented in this report assume current tax laws and policies remain in place.

Figure 17: REMI model schematic



Source: REMI.

The economic impact assessment focuses on four key metrics:

- *Employment:* the total number of jobs supported in the economy.
- *Income:* the labor income paid to employees.
- *Output:* the total value or contribution to the City's Gross Domestic Product (GDP).
- *Tax Revenues:* the total tax revenues received by state and local governments.

The estimates and projections produced by REMI and IMPLAN are complemented by descriptive statistics and econometric analysis to quantify the potential impact of population growth on the demand for public school and public safety services as well as to project additional expenses with "other" public services. This part of the report also analyzes the impact of population growth on the demand for housing.

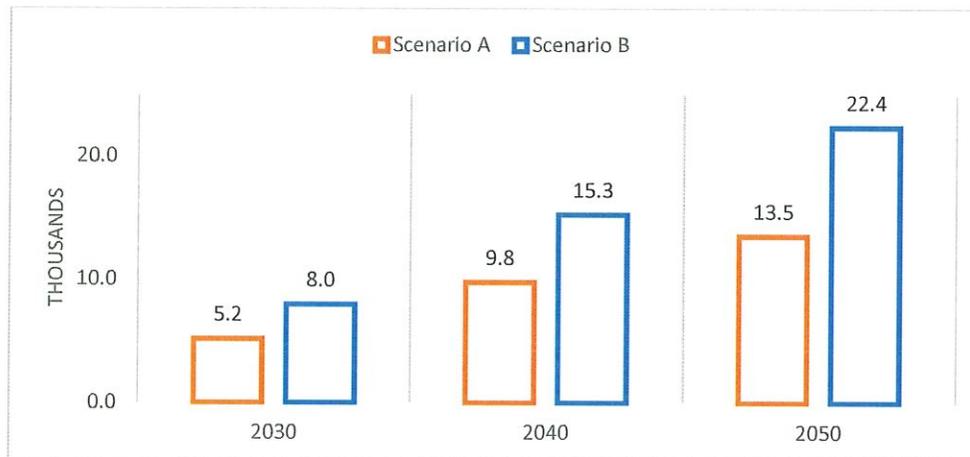
Economic impact

This section of the report considers the simulation results using REMI and IMPLAN and discusses the economic impact of both Scenarios A and B on employment across industries, income paid to workers, the value of all final goods and services, and tax revenues received by the City of Providence and the State of Rhode Island.

Employment

An increase in population will lead to employment growth in the city of Providence, but the pace of population growth produces significantly different employment outcomes. Figure 18 summarizes the total number of additional jobs created under each scenario. In particular, it is estimated that there will be an additional 5,200 jobs under Scenario A and 8,000 more jobs under Scenario B in 2030 (recall that Scenario A assumes 0.5 percent annual growth in population and Scenario B assumes 1.1 percent annual growth in population starting in 2020). By 2040, there are an additional 9,800 jobs under Scenario A and 15,300 more jobs under Scenario B. As expected, a growing population continues to generate job growth by 2050. Specifically, it is estimated that by 2050 there will be an additional 13,500 jobs under Scenario A and 22,400 more jobs under Scenario B. Overall, this implies annual employment growth of 0.37 percent under Scenario A and 0.59 percent under Scenario B during the 2020-2050 period.

Figure 18: Projected changes in employment (thousands), Providence, 2030-2050

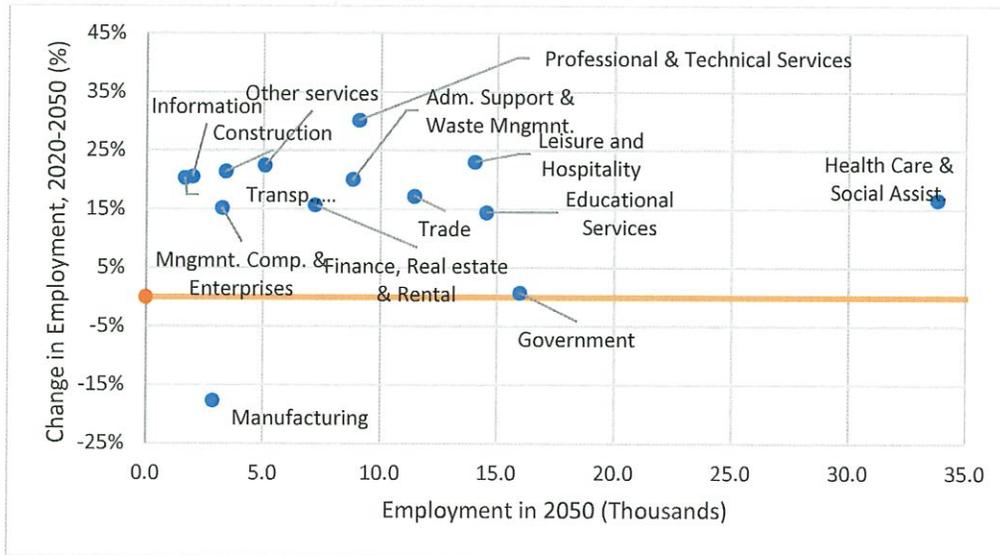


Source: Authors' compilation using data from REMI.

Most industries are projected to experience employment growth from 2020 to 2050, albeit the growth of employment varies across sectors and scenarios. Under Scenario B, the city of Providence is estimated to continue to experience considerable employment growth in the health care sector of about 16.7 percent from 2020 to 2050, which is an increase of about 4,825 jobs (Figure 19). This result is similar to the growth of employment that took place during the 2002 to 2019 period (Figure 3). However, the estimates show that the largest growth in employment takes place in the professional and technical services sector, 30.2 percent (2,104 jobs). During the same time period, the next largest growth in employment takes place in leisure and hospitality, 23.1 percent (2,633 jobs), followed by construction, 21.5 percent (600 jobs), information, 20.6 percent (339 jobs), and transportation, warehousing and utilities, 20.3 percent

(282 jobs). The smallest change in employment takes place in the public sector, 0.7 percent (116 jobs). Additionally, the city is estimated to continue to experience a decline in employment in the manufacturing sector of 17.7 percent, equivalent to losing about 617 jobs during the same period.

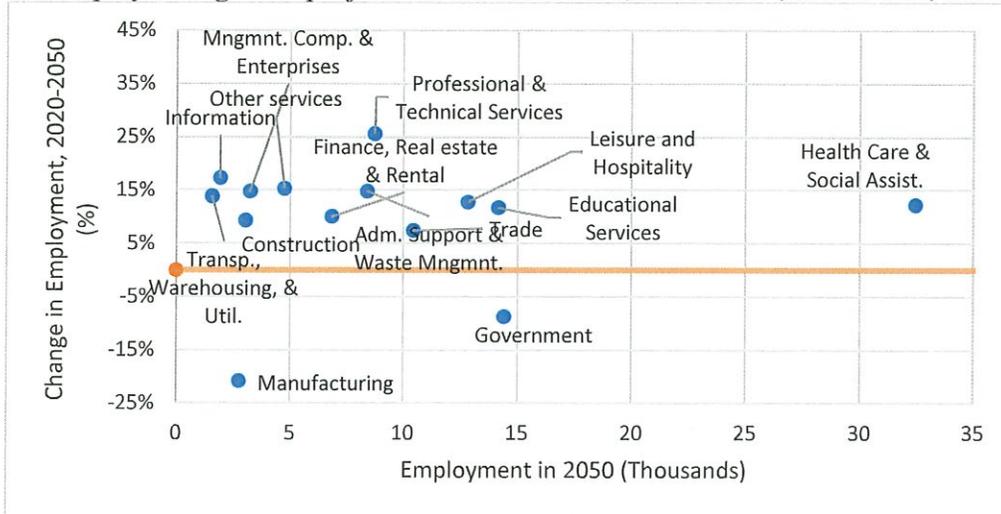
Figure 19: Employment growth projections across sectors, Providence, Scenario B, 2020-2050



Source: Authors' compilation using data from REMI.

Employment growth projections across sectors from 2020 to 2050 under Scenario A are smaller than those in Scenario B (Figure 20). From 2020 to 2050, the health care sector is estimated to experience employment growth of about 12.2 percent (3,538 jobs). Furthermore, the largest growth in employment takes place in professional and technical services sector, 25.6 percent, adding approximately 1,777 jobs. During the same period, the next largest growth in employment takes place in information, 17.3 percent (284 jobs), followed by administrative support and waste management, 14.8 percent (1,081 job), management of companies and enterprises, 14.7 percent (416 jobs), and transportation, warehousing, and utilities, 13.8 percent (191 jobs). The smallest change in employment takes place in the trade (wholesale and retail) sector, where employment growth is about 7.4 percent, or the equivalent of adding 719 jobs. Additionally, the city is estimated to observe a decrease in jobs in the public sector, 8.7 percent (1,380 jobs), and manufacturing sector, 20.8 percent (724 jobs) during the same period.

Figure 20: Employment growth projections across sectors, Providence, Scenario A, 2020-2050

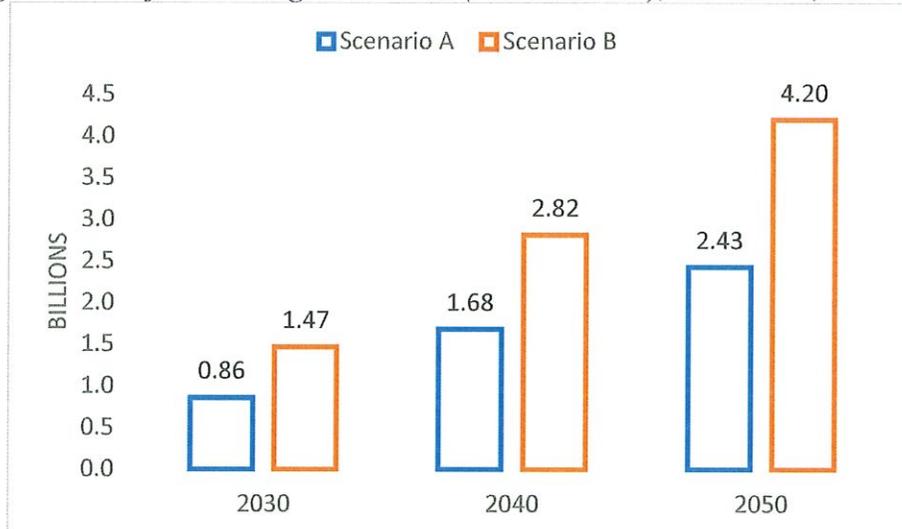


Source: Authors' compilation using data from REMI.

Income

Figure 21 presents the projected changes in labor income (inflation adjusted) for the period of 2030-2050 for Scenarios A and B. Both scenarios are projected to generate additional income paid to workers. Specifically, labor income would increase \$0.86 billion under Scenario A and \$1.47 billion under Scenario B by 2030. The increase in population would continue to contribute to expand economic activity causing labor income to increase \$1.68 billion under Scenario A and \$2.82 billion under Scenario B by 2040 and increase \$2.43 billion under Scenario A and \$4.20 billion under Scenario B by 2050.

Figure 21: Projected changes in income (billions \$2020), Providence, 2030-2050

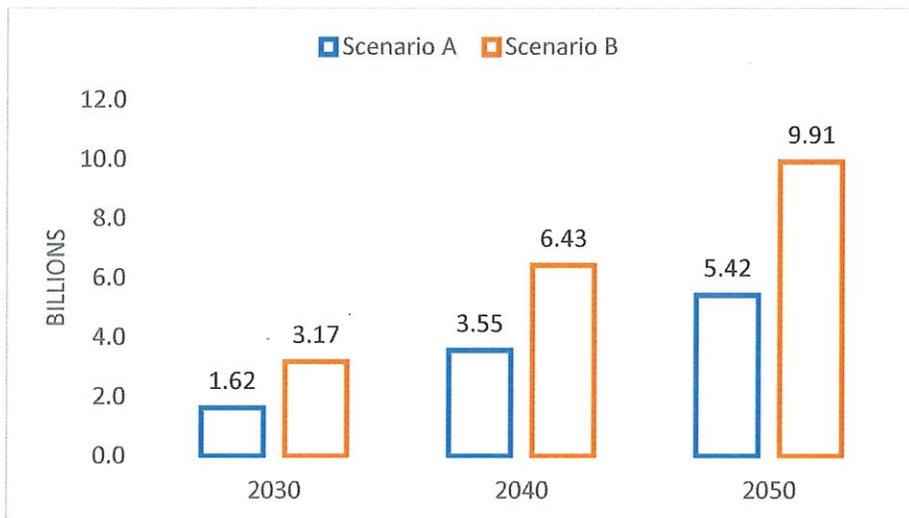


Source: Authors' compilation using data from REMI and IMPLAN.

Total economic activity (Output)

The city of Providence is also projected to experience an increase in total economic activity under both scenarios. Figure 22 provides projections of the increase in economic activity from 2030 to 2050. Under constant prices (inflation-adjusted), the city is projected to generate additional economic activity of \$1.62 billion under Scenario A and \$3.17 billion under Scenario B in the first decade (2030). By 2040, it is estimated that economic activity will increase by \$3.55 billion under Scenario A and \$6.43 billion under Scenario B. By 2050, the city is estimated to generate additional economic activity of \$5.42 billion under Scenario A and \$9.91 billion under Scenario B.

Figure 22: Projected changes in total economic activity (billions \$2020), Providence, 2030-2050

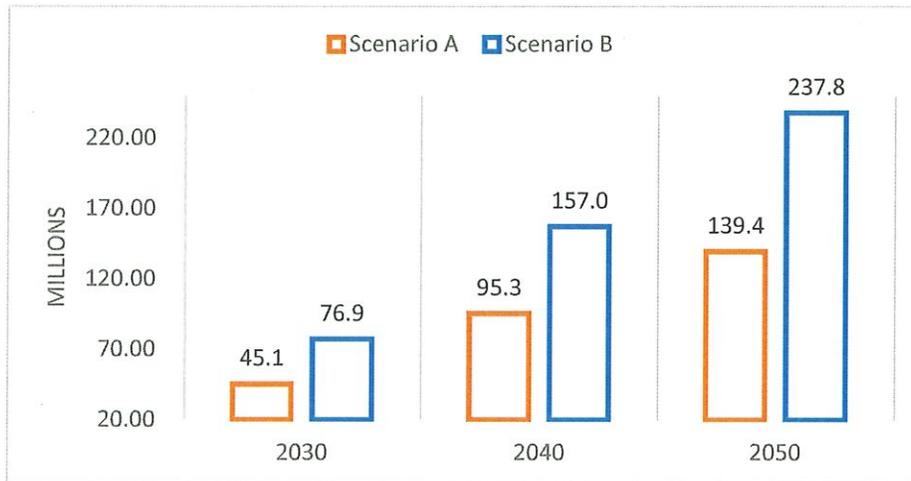


Source: Authors' compilation using data from REMI and IMPLAN.

Tax revenue changes

Figure 23 illustrates the projected changes in total tax revenue for each scenario for 2030-2050. Total tax revenue figures below group commercial/industrial and personal/household categories and therefore include tax revenues from such things as personal income taxes, corporate profits taxes, sales taxes, property taxes and motor vehicle licenses. Therefore, the data in Figure 23 represent the tax revenue impact of Scenarios A and B for the City of Providence and the State of Rhode Island. By 2030, the total tax revenues for the City of Providence and the State of Rhode Island are projected to increase by \$45.1 million under Scenario A and \$76.9 million under Scenario B. One can observe a similar pattern in the next two decades, 2040 and 2050. In 2040, tax revenues for the City of Providence and the State of Rhode Island are projected to increase by approximately \$95.3 million under Scenario A and \$157 million under Scenario B and, in 2050, tax revenue is estimated to increase by about \$139.4 million under Scenario A and \$237.8 million under Scenario B.

Figure 23: Projected changes in tax revenue (millions \$2020), City of Providence and State of Rhode Island, 2030-2050



Source: Authors' compilation using data from REMI and IMPLAN.

Notice that the figures reported in the additional total tax revenues above (Figure 23) include the revenue that is received by the State of Rhode Island and the City of Providence. In particular, tax revenues from personal income taxes, corporate profits taxes, sales taxes, and motor vehicle licenses are received by the State government, whereas the City receives only the revenue from the real estate taxes. **Error! Reference source not found.**

Table 1 disaggregates the various projected changes in tax revenues for the State of Rhode Island and for Providence, for each scenario, for 2030-2050. Under Scenario A, in 2050, out of the \$139.4 million in tax revenues, it is estimated that the State of Rhode Island will receive about 46 percent or \$64.4 million while the City of Providence will receive about 48 percent or \$67.9 million. Approximately 6 percent (or \$7.1 million in 2050) of the projected tax revenues cannot be clearly identified as revenues for either the City of Providence or the State Government. The share of total tax revenue that is received by the State and the City remains the same under Scenario B. Out of the \$237.8 million in tax revenues, the State of Rhode Island is projected to receive \$110.4 million whereas the City is projected to receive \$115.3 million.

These figures indicate that the state government would be a major beneficiary of population growth through increases in income taxes, corporate profit taxes, and sales taxes. Because the City would bear most of the additional costs associated with providing public services, this would create an imbalance in terms of accruing the benefits and sharing the costs of population growth between the City and the state government.

Table 1: Projected changes in tax revenue (millions \$2020), city of Providence and State of Rhode Island, 2030-2050

	Scenario A			Scenario B		
	2030	2040	2050	2030	2040	2050
<i>State of Rhode Island</i>						
<i>Personal Income</i>	6.1	12.0	17.4	10.5	20.1	30.0
<i>Corporate Profits Tax</i>	0.7	1.6	2.5	1.5	3.0	4.8
<i>Sales Taxes</i>	14.0	30.0	44.0	23.8	49.2	74.6
<i>Motor Vehicle</i>	0.2	0.4	0.6	0.3	0.6	1.0
Total State	21.0	44.0	64.4	36.1	72.9	110.4
<i>City of Providence</i>						
Property Taxes	21.7	46.4	67.9	36.8	76.0	115.3
<i>State and City</i>						
<i>Other Fees and Taxes</i>	2.4	4.9	7.1	4.1	8.1	12.2
Total Tax Revenue	45.1	95.3	139.4	76.9	157.0	237.8

Source: Authors' compilation using data from REMI and IMPLAN.

Figure 24 illustrates the projected changes in property tax revenue for each scenario from 2030 to 2050. The figures for the property tax revenue below include property taxes from residential, commercial, and industrial sources. In 2030, the City of Providence is estimated to receive an additional property tax revenue of about \$21.7 million under Scenario A and \$36.8 million under Scenario B. By 2040, the City is projected to receive an additional property tax revenue of about \$46.4 million under Scenario A and \$76 million under Scenario B. In 2050, the additional property tax revenue received by the City is expected to be about \$67.9 million under Scenario A and \$115.3 million under Scenario B.

Figure 24: Projected changes in property tax revenue (millions \$2020), Providence, 2030-2050



Source: Authors' compilation using data from REMI and IMPLAN.

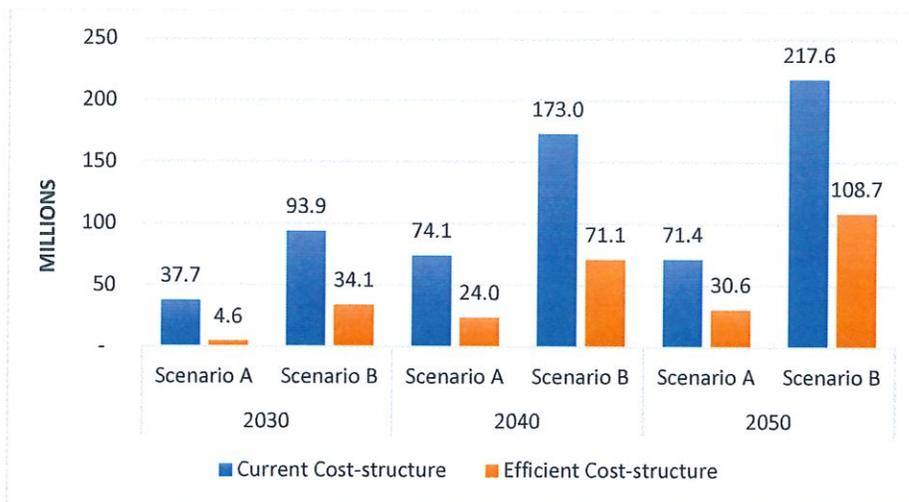
Spending on public services

The simulation discussed in the previous section shows that population growth would generate jobs and income as well as increase tax revenues for the City of Providence and the State of Rhode Island. Population changes, however, also impact spending associated with the provision of public goods and services. This section addresses this issue by providing estimates of the added costs for the provision of public services for Scenarios A and B for the City of Providence.

Increases in population as described by the simulations in Scenarios A and B would require a significant increase in public spending by the City of Providence. Spending projections using the *current cost-structure*¹² and if population grows as indicated by Scenario A imply that the provision of education, safety, and other public services would require an additional \$37.7 million by 2030, \$74.1 million by 2040, and \$71.4 million by 2050. These figures increase substantially with the population growth simulated in Scenario B, jumping to \$93.9 million in 2030, \$173.0 million in 2040, and to \$217.6 million in 2050.

There are, however, opportunities to take advantage of density and economies of scale, and to promote a more efficient delivery of public services as population increases. Accordingly, this report also provides estimates of the potential additional spending on public services under a relatively more *efficient cost-structure* to deliver public services that is not only feasible, but within reach in Providence (details are discussed below). Under a more *efficient cost-structure*, public spending would have to be increased by only \$4.6 million in 2030, \$24.0 million in 2040, and \$30.6 million by 2050 in Scenario A and by \$34.1 million in 2030, \$71.1 million in 2040, and by \$108.7 million in 2050 in Scenario B. Assumptions and methods used to estimate these figures are discussed below.

Figure 25: Projected changes in total spending (millions \$2020), Providence, 2030-2050



Source: Authors' compilation using data from REMI and IMPLAN.

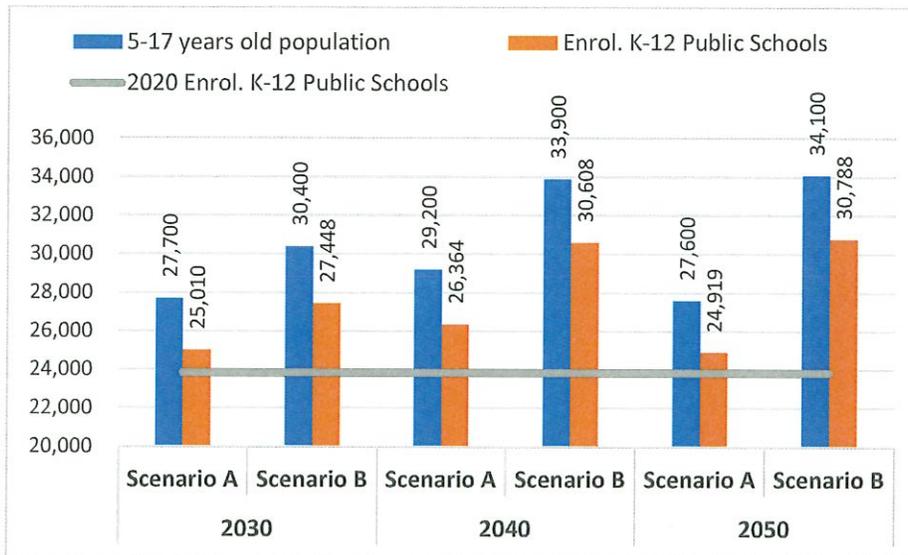
Note: The estimates above are net of transfers from the state government associated with the school funding formula.

¹² The "*current cost-structure*" scenario assumes that current spending per capita or spending per pupil remains the same in the City of Providence throughout the simulation horizon.

K- 12 spending

K-12 public education spending represents the largest item in the budget of most cities and towns in the United States. In 2020, the Providence Public School District alone accounted for 51 percent of total spending by the City of Providence. Hence, an increase in population will also bring about an increase in the school-age population and of enrollment in K-12 public schools in Providence. Figure 26 shows that under Scenario A, enrollment in K-12 public schools will increase to 25,010 students in 2030 and to 26,334 students in 2040 but would once again start to decline and shrink to 24,419 students in 2050. Under Scenario B, however, enrollment in K-12 public schools increases throughout the simulation horizon reaching 27,448 students in 2030, 30,608 students in 2040, and 30,788 students in 2050. According to a 2017 report by the Rhode Island Department of Education, aspirational school capacity is at 97.1 percent in the city of Providence, thus school-capacity would have to increase to meet the demand for public education in both Scenarios A and B.

Figure 26: Projected enrollment in K-12 public schools, Providence, 2030-2050



Source: Authors' compilation using own calculations and data from multiple sources.

Estimates of the net-increase in spending in K-12 public schools in Providence that are associated with Scenarios A and B are provided in Figure 27. These estimates are net in the sense that they subtract projected transfers to the City of Providence by the state via the school funding formula as determined by current policy.¹³ These estimates include current spending (personnel, logistic, etc.) and the service (interest and principal payments) of capital outlays.

Considering the current cost-structure¹⁴ to provide public K-12 education, Scenario A would require spending an additional \$11.8 million by 2030, \$25.4 million by 2040, and \$10.9 million

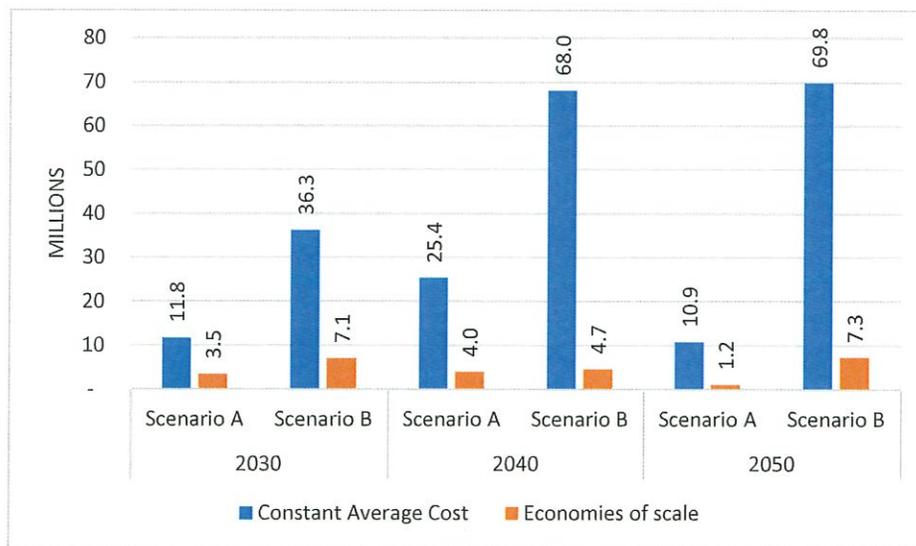
¹³ Federal grants or other general grants are not considered because they do not represent a steady flow of revenues.

¹⁴ The estimates are calculated assuming that the average inflation-adjusted cost per student will stay the same as observed in 2019 throughout the horizon of the study.

by 2050. These figures increase substantially in Scenario B, reaching \$36.3 million in 2030, \$68 million in 2040, and \$68.8 million in 2050.

Econometric analysis¹⁵ conducted as part of this report indicates that there can be economies of scale in the provision of public education in Providence. More precisely, larger K-12 enrollment may lead to lower average spending per pupil. The estimated cost-saving rate due to economies of scale ranges from a 1.6 percent reduction in the average cost per pupil in 2030 in Scenario A to a 10.6 percent reduction in the average cost per pupil in 2050 in Scenario B. More precisely, under Scenario B, the average cost per pupil would reduce from \$20,508 in 2019 to \$19,490 in 2030, \$18,598 in 2040, and \$18,547 in 2050 (constant dollars). The cost-savings are accrued from both current students as well as from new students who would be added to the school system due to the increase in population. Considering these figures and factoring out transfers from the state government that are determined by the school funding formula, under Scenario A the City of Providence would have to increase K-12 public school spending by only \$3.5 million in 2030, \$4.0 million in 2040, and \$1.2 million in 2050. Under Scenario B, spending to support K-12 public schools would have to increase by \$7.1 million in 2030, \$4.7 million in 2040, and \$7.3 million in 2050. These figures imply that most of the marginal cost to increase the supply of K-12 schooling would be offset by transfers from the state government provided that the City take advantage of economies of scale.

Figure 27: Projected changes in K-12 school spending (millions \$2020), Providence, 2030-2050



Source: Authors' compilation using own calculations and data from multiple sources.

¹⁵ The econometric analysis consisted of estimating a model using data for all school districts in Rhode Island from 2001 to 2017. The dependent variable was average cost per pupil and the model accounted for the number of students who are eligible for free or reduced lunch, which is a proxy for socio-economic conditions across school districts. Regression results are not reported in the report.

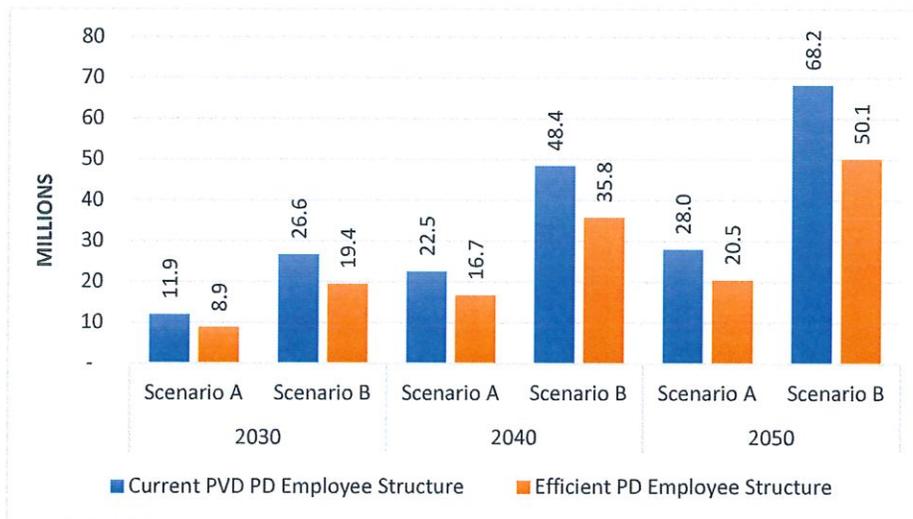
Public safety spending

Although empirical evidence (e.g., see Figure 9) indicates that the size of the population does not reflect demands placed on law enforcement and that the size of the police department of Providence is relatively larger than the national average and that of other cities of similar size, an increase in population will likely lead to an increase in spending for law enforcement in the city.

This report provides two set of estimates. The first set of estimates assumes that the number of officers will increase at a pace needed to keep the number of officers per capita the same and that the current cost-structure of the Public Safety Department will also stay the same during the report analysis timeframe. Under this assumption, Scenario A would require increasing spending on public safety by \$11.9 million by 2030, \$22.5 million by 2040, and \$28 million by 2050. These figures increase to \$26.6 million in 2030, \$48.4 million in 2040, and \$68.2 million in 2050 under Scenario B.

This report also provides alternative estimates of spending for public safety associated with population growth by assuming that the cost-structure of the police department would be streamlined and aligned to the national police staffing structure, resulting in reduced costs to provide public safety. This is an ambitious target that would require a concerted effort by policy makers and by the police department to meet required cost-savings and improved efficiency. Under this assumption, Scenario A would require increasing spending on public safety by \$8.9 million by 2030, \$16.7 million by 2040, and \$20.5 million by 2050. These figures increase to \$19.4 million in 2030, \$35.8 million in 2040, and \$50.1 million in 2050 under Scenario B.

Figure 28: Projected changes in public safety spending (millions \$2020), Providence, 2030-2050



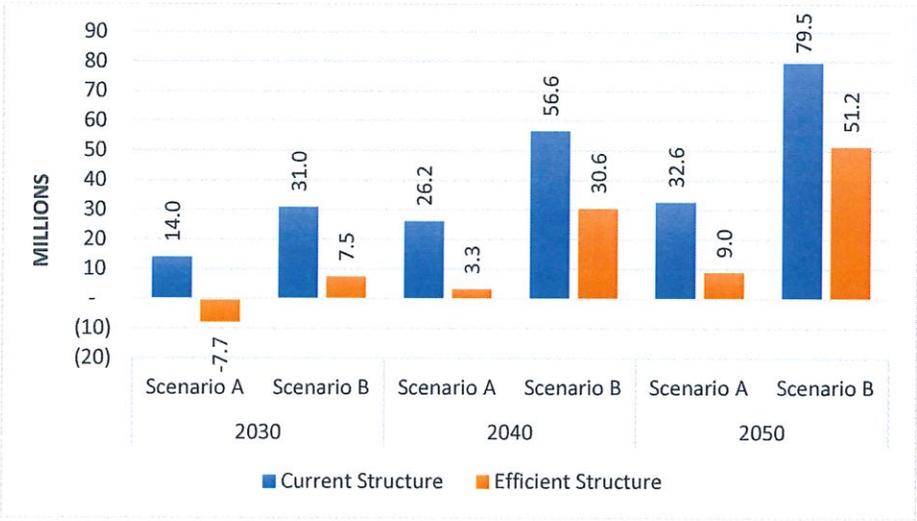
Source: Authors' compilation using own calculations and data from multiple sources.

Spending on other public services

The provision of all other public services excluding public schools and public safety account for about one-quarter of the City of Providence's 2020 budget. These *other* services include public works, parks and recreation, planning and urban development, service of municipal debt, among other items. Under the City's current cost-structure and assuming that spending on these services

would increase proportionally to the increase in population, Scenario A would require raising spending by \$14 million by 2030, \$26.2 million by 2040, and \$32.6 million by 2050. In Scenario B, these figures increase to \$31 million in 2030, \$56.6 million in 2040, and \$79.5 million in 2050. An alternative set of estimates was calculated assuming that scale efficiencies would allow meeting the demand for these other public services while at the same time reducing spending per capita (total spending would still increase) on *other* public services to 90 percent of current levels. Under this relatively more efficient cost-structure, spending on other services would decrease \$7.7 million by 2030, then increase \$3.3 million by 2040, and increase \$9 million by 2050. Scenario B would require increasing spending by \$7.5 million by 2030, \$30.6 million by 2040, and \$51.2 million by 2050.

Figure 29: Projected changes in other public services spending (millions \$2020), Providence, 2030-2050



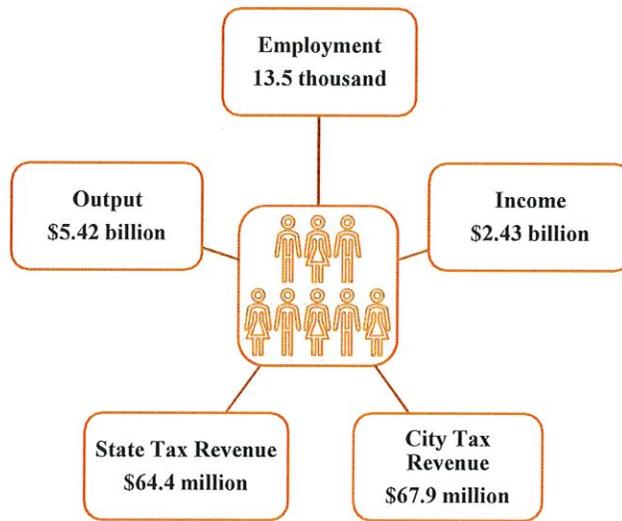
Source: Authors' compilation using own calculations and data from multiple sources.

Summary of benefits and costs

Scenario A

Figure 30 summarizes the economic impact of Scenario A on employment, income, output, and tax revenues (State and City). If population grows at the 0.5 percent annual rate assumed in Scenario A, the City of Providence is projected to experience an increase of 13.5 thousand jobs, \$2.43 billion in income, \$5.42 billion in output, and \$67.9 million in property tax revenue by 2050. Moreover, the State of Rhode Island is estimated to receive an additional \$64.4 million in tax revenue by 2050.

Figure 30: Summary of economic impact analysis, Providence, 2050, Scenario A



Source: Authors' compilation using data from REMI and IMPLAN.

Figure 31 presents a summary of public service spending under Scenario A for the current cost structure (Panel A) and a relatively more efficient cost structure (Panel B). It is projected that Providence would have to increase spending on public service by \$71.4 million under the current cost structure or \$30.6 million under a more efficient cost structure by 2050. These resources would support required public services including education, public safety, and other services.

Figure 31: Summary of spending on public services, Providence, 2050, Scenario A
 Panel A: Current cost structure Panel B: Efficient cost structure

Spending on Public Services \$71.4 million			Spending on Public Services \$30.6 million		
Education \$10.9 million	Public Safety \$28.0 million	Other Services \$32.6 million	Education \$1.2 million	Public Safety \$20.5 million	Other Services \$9.0 million

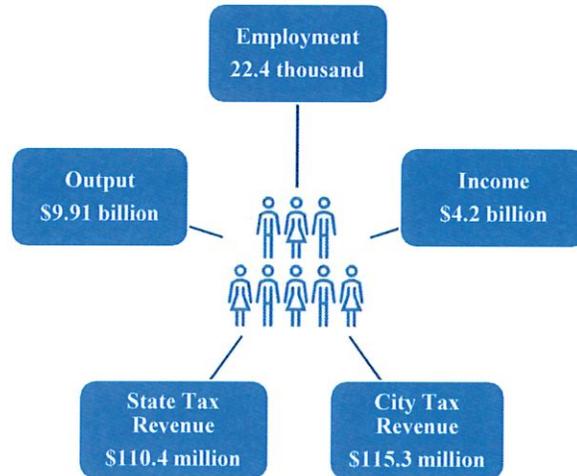
Source: Authors' compilation using own calculations and data from multiple sources.

Scenario B

Figure 32 summarizes the economic impact of Scenario B on employment, income, output, and tax revenue (State and City). If population grows at the 1.1 percent annual rate assumed in Scenario B, the City of Providence is estimated to experience an increase of 22.4 thousand jobs, \$4.2 billion in income, \$9.91 billion in output, and \$115.3 million in property tax revenue by

2050. Moreover, the State of Rhode Island is projected to receive an additional \$110.4 million in tax revenue by 2050.

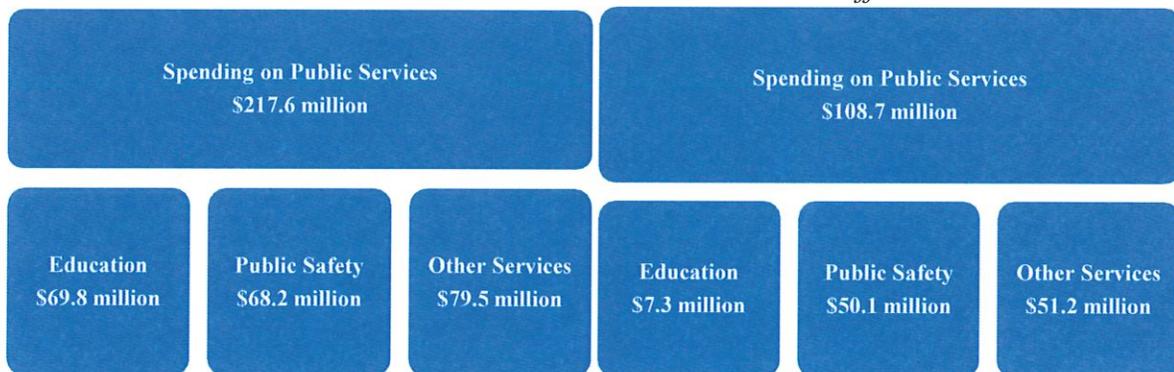
Figure 32: Summary of economic impact analysis, Providence, 2050, Scenario B



Source: Authors' compilation using data from REMI and IMPLAN.

Figure 33 provides a summary of spending on public services under Scenario B. By 2050, it is estimated that the City would have to increase spending on public services by \$217.6 million under the current cost structure and \$108.7 million under the efficient cost structure. Under the current cost structure, the spending to provide public services exceeds tax revenues. However, under the efficient cost structure, the tax revenues received by the City cover the costs of providing additional public services.

Figure 33: Summary of spending on public services, Providence, 2050, Scenario B
 Panel A: Current cost structure
 Panel B: Efficient cost structure



Source: Authors' compilation using own calculations and data from multiple sources.

These figures imply that under Scenarios A and B and the City's current cost structure, spending on additional public services would exceed tax revenues for Providence. Tax revenues for the City of Providence could, however, increase at about the same pace of spending if the City could take advantage of economies of scale and implement measures to increase the efficiency in the delivery of public services as considered under the efficient cost structure scenario.

Regardless of the cost-structure considered to deliver public services, the simulations indicate that the State of Rhode Island would benefit significantly through an increase in tax revenues. Thus, there is an imbalance in terms of benefits and costs of population growth between the City and the State of Rhode Island. The City of Providence would bear most of the additional costs associated with population growth while the benefits of population growth are more equitably divided between the City and the State Government.

Housing

Current data and analysis indicate that the housing stock must expand both in Providence and statewide to accommodate population growth and projected decline in average household size. The simulations considered in this report indicate that population growth will lead to household formation and, in turn, will increase demand for both rental and ownership housing in Providence.

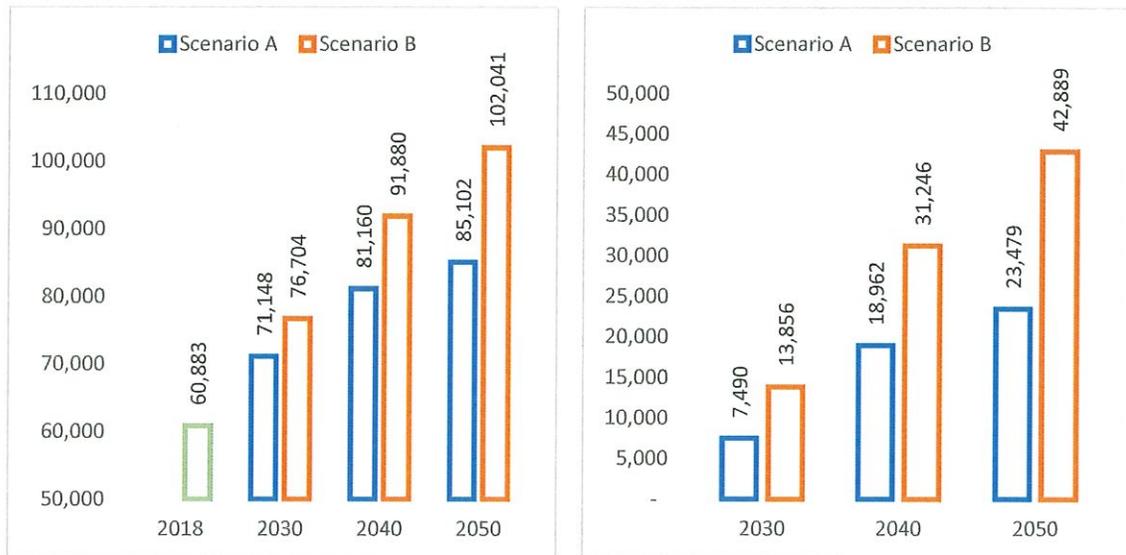
The prediction of demand for housing presented in this report is conditional on a) population growth Scenarios A and B discussed above, b) current housing supply which is discussed in a previous section of this report, and c) projected household formation that will accompany population growth. Household formation in Providence is projected considering both local and national headship trends in which the average number of persons per household has been decreasing over time,¹⁶ which would cause an increase in the number of households regardless of growth in population. This effect combined with simulations of population growth in Scenarios A and B project significant increase in the number of households in the city of Providence.

Panel A of Figure 34 shows that under Scenario A, household formation would increase from 60,883 households in 2018 to 71,184 households in 2030, to 81,160 households in 2040 and to 85,102 households in 2050, which represents an average increase of 807 households per year until 2050. Under Scenario B, household formation would increase at an average of 1,372 households per year during the simulation horizon, reaching 76,704 households by 2030, 91,880 households by 2040, and 102,041 households by 2050.

Construction of additional housing units is not keeping up with current housing demand. This means that to balance supply and demand under Scenarios A and B will require significant new units to expand housing supply in Providence. Panel B of Figure 34 shows that Providence must increase housing supply significantly to enable population growth as simulated in Scenarios A and B. More precisely, in Scenario A, housing supply would have to increase by 7,490 by 2030, by 18,962 by 2040 and by 23,479 by 2050, an average of 783 new construction units per year. Scenario B requires an average of 1,430 new units per year, which imply a construction of 13,856 new units by 2030, 31,246 new units by 2040, and 42,889 new units by 2050.

¹⁶ More precisely, the simulations assume that the average number of persons per household would decrease from 2.95 in 2018 to 2.7 by 2030, 2.5 by 2040 and 2.45 by 2050. These figures are subject to significant uncertainty and depend on a variety of factors that cannot be fully accounted for in this analysis including the dynamics of net-migration. They should be taken as conservative or low-bound estimates conditional on the population growth scenario under consideration.

Figure 34: Number of households (Panel A) and new housing units to meet demand (Panel B)



Source: Authors' compilation using own calculations and data from multiple sources.

It is important to emphasize that housing supply is perhaps the most relevant factor to enable Scenarios A and B to materialize. An adequate supply of housing influences opportunities for population to increase through migration because it reduces transaction costs (i.e., housing costs) and facilitates people's decision to relocate their residences to a city.¹⁷ In addition, household formation by single people who leave their parental home or by people who marry or cohabitate also increases with housing supply, which expands choices for these people and reduces the cost of renting or buying a new home.

The key takeaway is that in the long run, migration and new household formation will follow the supply of housing, and the number of dwellings in an area will be the most important predictor of the number of households, and thus the city's population. Furthermore, because of constrained land supply, housing development would have to be focused on multi-family residential structures to accommodate the increase in population density in Providence.

Discussion and policy implications

Since the late 1700s, the city of Providence experienced a long period of considerable growth in population, reaching more than 250,000 people in the 1930s and 1940s. The following several decades, however, were marked by a decline in population in the city. In particular, the population of Providence was 179,883 people in 2019, which was similar to the population in the 1970s. What is more concerning is that population growth estimates for the next two decades indicate that the working-age population will shrink while the 65-years-and-older cohorts will

¹⁷ New construction of housing is affected by laws, regulations, and overall cost-structure to build new homes. A constrained supply of housing will make housing expensive and reduce incentives for people to locate their residences in the area.

increase. This is especially concerning because the supply of labor will decrease while the demand for public services to meet the needs of an aging population will grow in the city.

Would it be economically beneficial to promote inward migration to tackle the potential decline in the working-age population in Providence? What would be the impact of migration-driven population growth on the City's public finances? Population growth and migration are multifaceted issues and their economic impacts depend on local socio-economic conditions and the demographic composition of the city.

The analysis provided in this report tackles these questions and the main findings show that population growth is projected to:

- i) Generate significant job growth and an overall expansion of economic opportunities for current and future residents of the city of Providence and the state of Rhode Island,
- ii) Increase revenues from personal income taxes, real estate property taxes, corporate profit taxes, sales taxes, and motor vehicle fees that will be accrued by the City of Providence and the State of Rhode Island,
- iii) Increase the demand for public services and thus will require an increase in spending on public services such as education and public safety,
- iv) Have a neutral-fiscal impact if the City takes advantage of economies of scale and implements measures to increase efficiency in the delivery of public services. Spending to provide additional public services may exceed tax revenues if the City implements no measures to increase efficiency in the delivery of public services,
- v) Require a City-State partnership to develop and promote population growth policies that are socially, economically, and fiscally sustainable. The lack of joint-efforts and partnerships would lead to imbalances in accruing the benefits and sharing the costs of population growth between the City and the state government.

Overall, the analysis and simulations conducted as part of this report show that a growing population will lead to job, income, and total economic activity growth in Providence, although the extent of the positive economic impact is responsive to the pace of population growth. To balance public finances, however, the City will have to improve the efficiency in the delivery of public services to cope with the increased spending for public services. More precisely, if the current cost structure (same unit cost per population) to provide public services persists, then population growth may lead to a situation in which spending on additional public services will exceed the additional tax revenues. Hence, the City must take advantage of economies of scale and implement measures to increase efficiency in the delivery of public services. Doing so would lead to a situation in which population growth would produce enough tax revenue to cover the costs of providing required public services in the City of Providence, while helping its residents take advantage of increased job opportunities associated with higher population growth.

This report also shows that there is an imbalance in terms of accruing the benefits and sharing the costs of population growth between the City and the State of Rhode Island. While there is a significant increase in tax revenue received by the City and the State, the projections show that the State is a major beneficiary through increases in income taxes, corporate profits taxes, and

sales taxes. The major source of revenue for the City is real estate taxes. Overall, the tax revenues are fairly evenly divided between the City and the State Government, but the City would bear most of the additional costs associated with an increase in population growth. This implies that the state would benefit by supporting Providence's efforts to grow its population, including some form of revenue and cost-sharing agreements associated with population growth initiatives.

The analysis and discussion presented in this report also indicate that low housing supply and overall economic conditions are the major barriers to inward migration to the city of Providence. Providence's strategic location and amenities, both within its borders and in surrounding areas, makes it a particularly attractive place. The area has also significant potential to grow economically and support a larger economic base that is critical to generate employment and income growth. However, current limited housing supply and high cost of ownership or renting are barriers, hindering benefits, and increasing costs for people to relocate their residences to Providence. Overall, Scenarios A and B will only materialize if there is an increase in supply of new housing units.

Policy Implications

The findings and analysis presented in this report indicate that a strategy to foster population growth in Providence must be supported by innovative strategies and policies that enable economically and financially balanced migration flows to the City. More precisely, there is a need to consider and implement policies in the following strategic areas:

- Enhance inward migration incentives;
- Increase the supply of housing and the number of dwellings including the development of multi-family and well-designed high-density residential structures;
- Increase efficiency in the delivery of public services and take advantage of economies of scale in the provision of public services;
- The state would benefit by supporting Providence's efforts to grow its population and ensure that the benefits (tax revenues) and costs (provision of public services) of population growth are more equitably divided between the City of Providence and the state of Rhode Island;
- Establish City-State partnerships to develop vital infrastructure that promotes and supports population growth policies that are socially, economically, and fiscally sustainable; and
- Create an economic environment that facilitates more entrepreneurial activity and job creation in Providence.

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