



Regional Economic Models, Inc.



Economic Impact of Establishing HQ2 in New York State

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Sponsor
Empire State Development



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Executive Summary

Amazon is seeking a location to open a new headquarters in North America. Empire State Development has retained Regional Economic Models, Inc. (REMI) to evaluate the potential economic and fiscal impacts of locating the headquarters in New York City, where Amazon expects to make a major investment of \$3.7 billion in the construction and fit-out of new facilities over 15 years and to employ 40,000 workers by 2033. Most of that direct employment is in management positions, and Amazon is expected to compensate employees at a higher rate than other companies for similar positions.

REMI uses a New York State-specific version of its economic and fiscal impact model Tax-PI to perform the impact analysis. The model inputs data on direct investment, employment, and compensation provided by Empire State Development on behalf of Amazon. The analysis runs from the beginning of the build-out in 2019 to 10 years after the end of the build-out in 2043.

During 2019-2043, the average employment impact of Amazon's investment and hiring on New York State in a given year is an increase of 76,461 jobs. The increase in employment over and above Amazon's direct activity is driven mainly by a combination of higher in-state consumption and supply chain demand that allow New York businesses to expand their operations.

The average statewide compensation impact in a given year is \$10.5 billion, of which \$3.9 billion is attributable to salary increases for New York State jobs that would exist in the absence of the Amazon headquarters. This is a key driver of the average consumption impact, which is an increase of \$6.9 billion. Also, the average supply chain demand impact is an increase of \$11.0 billion, and many of the supply chain jobs are related to professional services, which have a strong presence in the state. The average impact on the size of the state economy, as measured by Gross State Product (GSP), is an increase of \$11.6 billion. During 2019-2043, the present value of the increase in statewide compensation (discounted at 3%) is \$168.5 billion, and the present value of the increase in GSP is \$186.0 billion.

The rise in personal income, consumption, and business activity in New York State generated by Amazon's new headquarters would expand the state's tax base, so state revenues increase. REMI Tax-PI estimates that the project will generate a present value of \$9.0 billion in additional revenues over the analysis period, of which 64% comes from individual income taxes, 20% comes from sales and gross receipt taxes, and 7% comes from corporate income taxes - the three largest revenue sources in the state. This fiscal benefit exceeds the combined incentives and grants offered to Amazon by New York State by a factor of 6.3 to 1.

Build-Out Impacts

Introduction

The study analyzes the 15-year build-out period from 2019 through 2033 plus the 10 years immediately afterward through 2043. The build-out consists of construction spending on the headquarters location. This produces three types of impacts on the New York State economy: direct impacts from the spending; intermediate impacts from an increase in supply chain demand; and induced impacts mainly from an increase in consumer spending. During 2019-2033, the build-out raises total statewide employment by an average of 2,150 jobs and Gross State Product (GSP) by a present value (discounted at 3%) of \$3.0 billion.

Direct Economic Impacts

Empire State Development has provided direct investment spending data to REMI on behalf of Amazon. REMI has input the data into the REMI Tax-PI model as exogenous output in the construction sector. Table 1.1 shows this direct spending along the implied number of direct construction jobs based on REMI labor productivity data.

Table 1.1: Direct Construction Spending and Employment for the Build-Out

Policy Variable	Units	2019	2021	2023	2025	2027	2029	2031	2033	Average
Industry Sales (Exogenous Production): Construction	Millions of 2019 Dollars	64.5	276.5	368.6	184.3	217.6	138.2	368.6	460.8	245.8
Direct Employment	Individuals (Jobs)	397	1,636	2,095	1,008	1,145	703	1,817	2,203	1,313

Indirect Economic Impacts

The direct investment spending from the construction has indirect impacts on the New York State economy. These are divided into intermediate demand, i.e., supply chain, impacts and induced impacts, which are mainly driven by increased consumer spending but also include impacts on investment activity, government demand, and domestic and international exports. The total indirect employment impact to the state averages 837 jobs during the build-out period, where 290 are intermediate demand jobs and 546 are induced jobs. Table 1.2 provides an annual breakdown of these impacts.

Table 1.2: Indirect Employment Impacts of the Build-Out

Category	Units	2019	2021	2023	2025	2027	2029	2031	2033	Average
Intermediate Demand Employment	Individuals (Jobs)	105	417	519	200	217	110	395	495	290
Induced Employment	Individuals (Jobs)	192	770	981	415	413	215	711	906	546
Total Indirect Employment	Individuals (Jobs)	298	1,188	1,500	615	630	324	1,107	1,401	837

Intermediate Demand Impacts

The construction of the headquarters relies on a mix of in-state and out-of-state suppliers to support its operations. The extent to which a state economy benefits from intermediate demand depends on how much of that demand is satisfied by in-state suppliers. The percentage of the demand met by in-state suppliers is called the Regional Purchase Coefficient (RPC) in the REMI Tax-PI model.

Table 1.3 lists the six industries for which the construction spending generates the highest level of intermediate demand, along with their respective RPC's and intermediate demand employment impacts. Three of the six industries rely primarily on New York suppliers and support over 40% of the intermediate demand jobs generated, while the other three, which represent some of the primary construction materials, rely more heavily on out-of-state suppliers and support under 6% of the intermediate demand jobs.

Table 1.3: Construction Supply Chain

Industry	Supply Chain Contribution	Regional Purchase Coefficient (2019)	Intermediate Demand Employment Impact (Individuals)
Petroleum and coal products manufacturing	11%	7%	0
Fabricated metal product manufacturing	10%	23%	8
Wholesale trade	10%	69%	29
Professional, scientific, and technical services	9%	84%	57
Nonmetallic mineral product manufacturing	8%	37%	8
Retail trade	5%	89%	41
<i>Combined Top 6 Industries</i>	<i>53%</i>		<i>144</i>
<i>All Industries</i>	<i>100%</i>		<i>290</i>

Induced Impacts

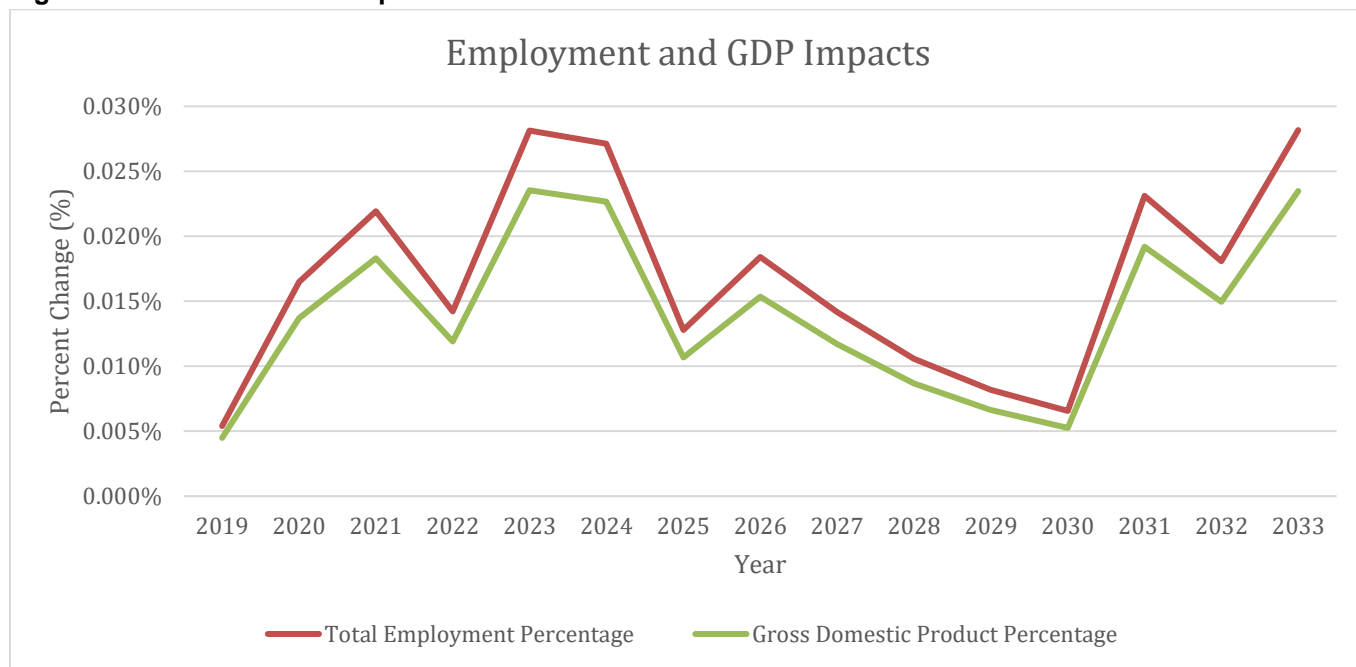
The increased employment attracts population into the state and means that more New Yorkers are earning a salary, a large portion of which will be spent in the state economy. This impact is significant especially because construction is a labor-intensive industry (labor accounts for about 36% of output), so the investment spending generates a large number of direct jobs. The increase in consumer spending supports expansion in a variety of consumer-facing industries such as retail trade, health care, restaurants, social assistance, real estate, and education. These six industries support approximately 55% of the induced jobs. Table 1.4 shows some of the key drivers of the induced employment impacts, including increases in disposable income and population.

Table 1.4: Induced Effects of Construction Spending

Category	Units	2019	2021	2023	2025	2027	2029	2031	2033	Average
Disposable Personal Income	Millions of 2019 Dollars	35.9	143.9	207.1	97.2	120.5	88.2	213.6	256.8	137.0
Population	Individuals	177	1,173	1,898	2,127	2,216	1,947	2,273	2,891	1,834
Local Consumption Demand	Millions of 2019 Dollars	43.6	171.2	244.7	116.6	148.3	111.4	261.2	312.8	166.3
Induced Employment	Individuals (Jobs)	192	770	981	415	413	215	711	906	546

Total Economic Impacts

The total economic impact of the build-out is the sum of the direct and indirect impacts. The direct employment impact on the New York State economy averages 1,313 jobs during 2019-2033, about 61% of the total impact in a typical year, while the indirect impact averages 837 jobs, about 39% of the total impact. In total, employment rises by an average of 2,150 jobs and GSP rises by an average of \$244.8 million. During 2019-2033, GSP increases by a present value (discounted at 3% annually) of \$3.0 billion. Figure 1.1 shows the co-evolution of employment and GSP impacts over the build-out period.

Figure 1.1: Build-out Total Impacts

Operations Impacts

Introduction

The operations phase of the headquarters, which REMI analyzes during the period 2019-2043, includes the direct hires made by Amazon. As with construction impacts, operations has not only direct impacts on the New York State economy, but also intermediate impacts from an increase in supply chain demand and induced impacts mainly from an increase in consumer spending. During 2019-2043, Amazon's operations raise total statewide employment by an average of 75.2 thousand and Gross State Product (GSP) by a discounted total of \$183.1 billion.

Direct Economic Impacts

Empire State Development has provided direct hiring and payroll data to REMI on behalf of Amazon. REMI has input the hiring data as exogenous employment in the North American Industrial Classification System's (NAICS) Management of Companies and Enterprises industry (NAICS code 55). Specifically, hiring ramps up from 700 in 2019 to 40,000 by 2033 and is assumed to remain constant thereafter.

Compensation Adjustment

REMI has also added a compensation adjustment for the direct hires to reflect the fact that Amazon headquarters employees will be paid a higher compensation rate than the average compensation rate contained in the REMI model for the Management of Companies and Enterprises sector in New York State. Specifically, the state's average managerial compensation rate in the model is \$156,611, while the compensation for headquarters employees will be \$168,900. Table 2.1 shows the direct employment and the compensation adjustments that have been made.

Table 2.1: Direct Operations Employment Inputs

Policy Variable	Units	2019	2021	2023	2025	2027	2029	2031	2033	2043	Average
Direct Employment	Individuals (Jobs)	700	5,900	11,900	17,900	23,150	26,500	31,750	40,000	40,000	27,722
Compensation Adjustment	Millions of 2019 Dollars	9.3	78.4	158.1	237.9	307.6	352.2	421.9	531.6	531.6	368.4

Indirect Economic Impacts

The operations phase has indirect impacts on the New York State economy. These are divided into intermediate demand, i.e., supply chain, impacts and induced impacts, which are mainly driven by increased consumer spending but also include impacts on investment activity, government demand, and domestic and international exports. The total indirect employment impact to the state averages 47,440 jobs during the operations phase, where 19,244 are intermediate demand jobs and 28,197 are induced jobs. Table 2.2 provides an annual breakdown of these impacts.

Table 2.2: Indirect Employment for Operations Phase

Category	Units	2019	2021	2023	2025	2027	2029	2031	2033	2043	Average
Intermediate Demand Employment	Individuals (Jobs)	535	4,452	8,822	12,924	16,204	18,133	21,609	27,503	28,311	19,244
Induced Employment	Individuals (Jobs)	837	7,064	14,209	20,936	25,528	27,896	32,216	40,149	38,778	28,197
Total Indirect Employment	Individuals (Jobs)	1,372	11,516	23,031	33,860	41,733	46,029	53,825	67,653	67,089	47,440

Intermediate Demand Impacts

The management sector relies on a mix of in-state and out-of-state suppliers to support its operations. The extent to which a state economy benefits from intermediate demand depends on how much of that demand is satisfied by in-state suppliers. The percentage of the demand met by in-state suppliers is called the Regional Purchase Coefficient (RPC) in the REMI Tax-PI model.

Table 2.3 lists the six industries for which the increase in management sector employment generates the highest level of intermediate demand, along with their respective RPC's and intermediate demand employment impacts. The top six major sectors contribute to approximately two-thirds of the management supply chain, five of which have an RPC above 70% and three of which have an RPC above 84% in New York State. This demonstrates that the state can meet a high proportion of the intermediate demand for goods and services through in-state production, as opposed to being fulfilled by imports from outside the state.

Table 2.3: Management Supply Chain and Regional Purchase Coefficients

Industry	Supply Chain Contribution (2019)	Regional Purchase Coefficient (2019)	Intermediate Demand Employment Impact (Individuals)
Professional, scientific, and technical services	32%	84%	7,131
Rental and leasing services; Lessors of nonfinancial intangible assets	9%	50%	374
Real estate	8%	70%	1,169
Administrative and support services	6%	71%	3,572
Data processing, hosting, and related services; Other information services	5%	89%	616
Monetary authorities - central bank; Credit intermediation and related activities	5%	98%	342
<i>Combined Top 6 Industries</i>	<i>64%</i>		<i>13,204</i>
<i>All Industries</i>	<i>100%</i>		<i>19,244</i>

Induced Impacts

The increased employment attracts population into the state and means that more New Yorkers are earning a salary, a large portion of which will be spent in the state economy. This impact is significant especially because management is a well-paying industry. The increase in consumer spending supports expansion in a variety of consumer-facing industries such as retail trade, health care, restaurants, social assistance, real estate, and personal services. These six industries support approximately 61% of the induced jobs. Table 2.4 shows some of the key drivers of the induced employment impacts.

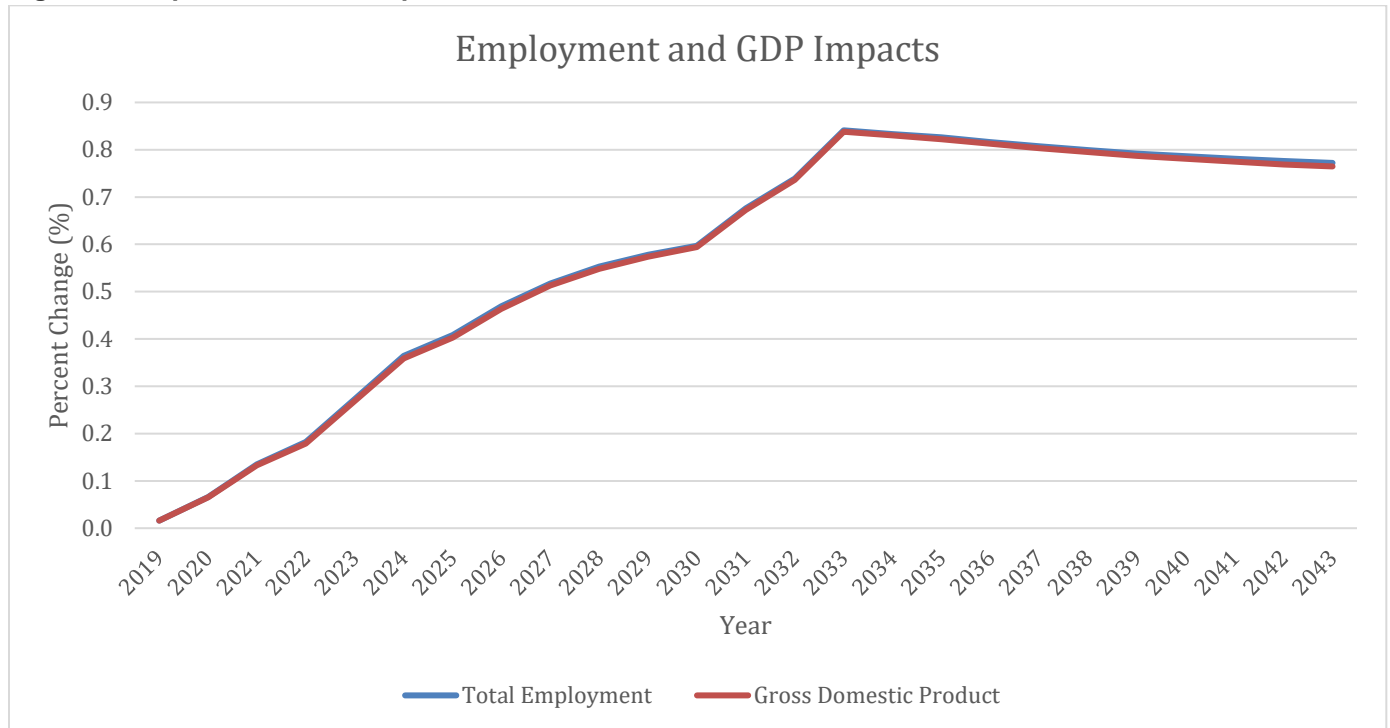
Table 2.4: Induced Effects of Operations

Category	Units	2019	2021	2023	2025	2027	2029	2031	2033	2043	Average
Disposable Personal Income	Billions of 2019 Dollars	0.1	1.2	2.5	3.9	5.1	6.1	7.6	9.8	10.2	7.1
Population	Individuals	501	5,833	15,435	29,058	42,926	55,794	69,036	87,454	131,144	69,292
Local Consumption Demand	Billions of 2019 Dollars	0.2	1.4	3.0	4.6	6.1	7.3	9.1	11.8	14.9	8.6
Induced Employment	Individuals (Jobs)	837	7,064	14,209	20,936	25,528	27,896	32,216	40,149	38,778	28,197

Total Economic Impacts

The total economic impact of the build-out is the sum of the direct and indirect impacts. The direct employment impact on the New York State economy averages 27,722 jobs during 2019-2043, about 37% of the total impact in a typical year, while the indirect impact averages 47,440 jobs, about 63% of the total impact. In total, employment rises by an average of 75,212 jobs and GSP rises by an average of \$11.4 billion. During 2019-2043, GSP increases by a present value (discounted at 3% annually) of \$183.1 billion. Figure 2.1 shows the co-evolution of employment and GSP impacts over the build-out period.

Figure 2.1: Operations Total Impacts



Combined Build-Out and Operations Impacts

Introduction

The combined build-out and operations of the headquarters, which REMI analyzes during the period 2019-2043, includes the construction spending and the direct hires made by Amazon. This spending results in direct impacts on the New York State economy, intermediate impacts from an increase in supply chain demand, and induced impacts, primarily from additional consumer spending. During 2019-2043, Amazon's construction and operations raise total New York State employment by an average of 76,461, total compensation by a discounted total of \$168.5 billion (an annual average of \$10.5 billion, of which \$3.9 billion is attributable to salary increases for New York State jobs that would exist in the absence of the Amazon headquarters), and Gross State Product (GSP) by a discounted total of \$186.0 billion (an annual average of \$11.6 billion). The total impacts are driven heavily by the operations phase, both because it generates much higher direct employment and because it sustains into the future even after the build-out ends.

Direct Economic Impacts

Table 3.1 shows the combined direct economic impacts of Amazon's construction and annual operations.

Table 3.1: Combined Build-Out and Operations Direct Impacts

Category	Units	2019	2021	2023	2025	2027	2029	2031	2033	2043	Average
Industry Sales (Exogenous Production): Construction	Millions of 2019 Dollars	64.5	276.5	368.6	184.3	217.6	138.2	368.6	460.8	0.0	245.8
Direct Employment: Construction	Individuals (Jobs)	397	1,636	2,095	1,008	1,145	703	1,817	2,203	0	1,313
Direct Employment: Management	Individuals (Jobs)	700	5,900	11,900	17,900	23,150	26,500	31,750	40,000	40,000	27,722
Total Direct Employment	Individuals (Jobs)	1,097	7,536	13,995	18,908	24,295	27,203	33,567	42,203	40,000	28,509
Compensation Adjustment	Millions of 2019 Dollars	9.3	78.4	158.1	237.9	307.6	352.2	421.9	531.6	531.6	368.4

Indirect Economic Impacts

Table 3.2 shows the combined indirect economic impacts of Amazon's construction and annual operations.

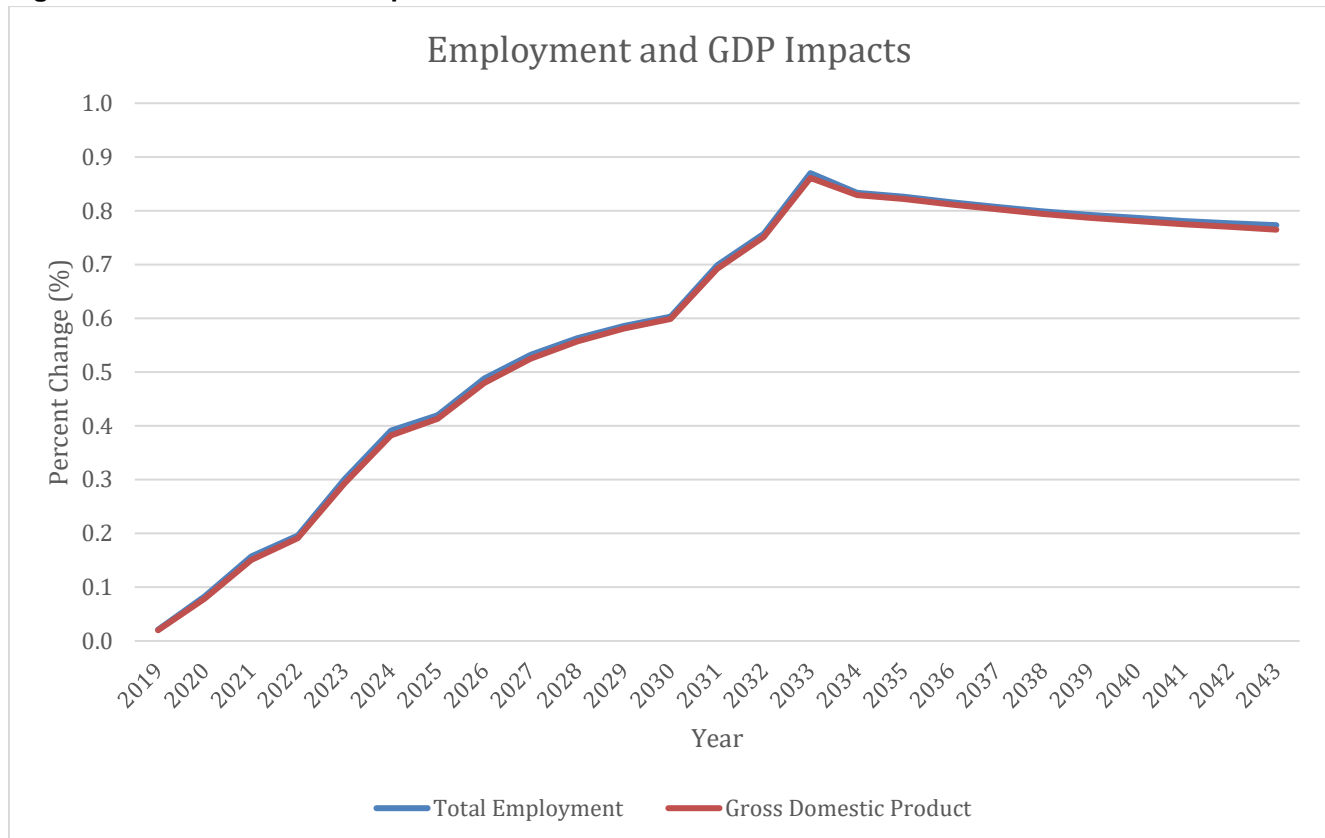
Table 3.2: Indirect Employment Impacts of Combined Build-Out and Operations Scenario

Category	Units	2019	2021	2023	2025	2027	2029	2031	2033	2043	Average
Intermediate Demand Employment	Individuals (Jobs)	640	4,869	9,340	13,124	16,422	18,242	22,004	27,999	28,322	19,411
Induced Employment	Individuals (Jobs)	1,029	7,833	15,191	21,350	25,941	28,112	32,928	41,058	38,861	28,540
Total Indirect Employment	Individuals (Jobs)	1,669	12,702	24,531	34,474	42,363	46,354	54,932	69,057	67,183	47,951

Total Economic Impacts

The total economic impact of the build-out is the sum of the direct and indirect impacts. Figure 3.1 shows the co-evolution of employment and GSP impacts over the build-out period.

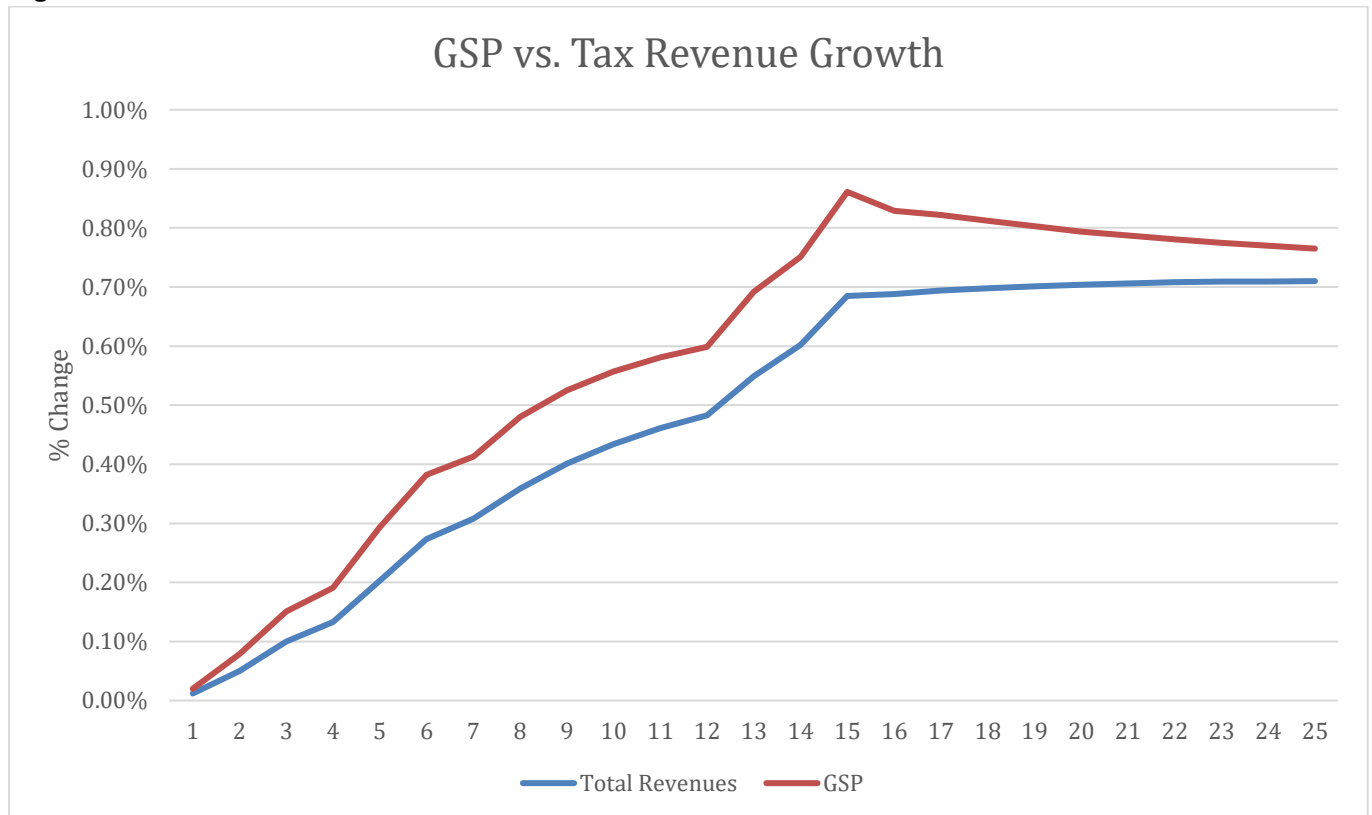
Figure 3.1: Combined Total Impacts



Fiscal Impacts

The growth in the New York State economy from the construction and operation of the Amazon headquarters generates an increase in state revenue by raising the tax base, mainly through individual income taxes, sales and gross receipts taxes, and corporate income taxes. Figure 4.1 illustrates the close connection between the expansion of economic activity in the state as measured by GSP and the increase in state tax revenues.

Figure 4.1: Co-evolution of GSP and Revenue Growth



Tax-PI captures fiscal impacts by linking the state's tax revenues to their underlying economic drivers. This study uses the 2016 State Government Tax Tables from the U.S. Census Bureau to establish those linkages in the model. Tax-PI model then calculates the change in each of the relevant economic variables in order to account for impacts to each of the state tax revenue categories.

The present value of the revenue impact over 2019-2043 is \$9.0 billion. Individual income taxes make up 64% of the total impact, sales and gross receipt taxes make up 20%, and corporate income taxes make up 7%. Table 4.1 breaks out tax revenue impacts by major categories.

Table 4.1: Tax Revenue Impacts by Category (Millions of 2019 Dollars)

Revenue Category	Units	2019	2021	2023	2025	2027	2029	2031	2033	2043	Average
Individual Income Taxes	Millions of 2019 Dollars	6.6	58.1	123.2	195.0	262.7	313.9	386.3	500.2	623.1	363.9
Sales & Gross Receipts Taxes	Millions of 2019 Dollars	2.5	19.5	39.4	59.4	78.3	92.6	116.1	150.6	194.7	110.6
Corporate Income Taxes	Millions of 2019 Dollars	0.8	7.0	14.8	23.2	30.1	34.9	41.8	53.9	58.8	38.0
Other Tax Revenues	Millions of 2019 Dollars	1.0	8.2	17.3	27.3	37.1	45.0	55.7	70.8	93.0	53.1
Total Tax Revenues	Millions of 2019 Dollars	10.8	92.8	194.6	304.9	408.3	486.4	599.9	775.5	969.6	565.6

Benefit-Cost Analysis

This analysis has so far laid out the economic and fiscal impacts of the new proposed headquarters without regard to the costs. It must be noted that this headquarters would earn tax incentives and grants, decreasing overall government revenue. Empire State Development has provided REMI with annual data on the amounts of the proposed incentives and grants, which include Excelsior Tax Credit, Capital Grant, Workforce Development Funds, and a grant for site preparation.

This section calculates a benefit-cost ratio weighing the taxes gained by the state through the overall increase in economic activity against the revenues deferred through tax incentives and grants. Specifically, the benefit-cost ratio is the ratio of the present value of the increase in revenues during 2019-2043 to the present value of the total incentives and grants, both discounted at 3% in order to match other Empire State Development analyses. Table 4.2 shows the annual data on the revenues, incentives, and grants. The benefit-cost ratio is 6.3. An alternative analysis using a 6% discount rate can be found in the Appendix.

Table 4.2: Benefit-Cost Analysis (3% Discount Rate)

Category	Units	2019	2021	2023	2025	2027	2029	2031	2033	2043	Total
Total Tax Revenues	Millions of 2019 Dollars	10.8	87.5	172.9	255.3	322.3	361.9	420.7	512.7	477.0	8,955.3
Total Incentives + Grants	Millions of 2019 Dollars	45.8	87.7	141.6	154.2	185.5	13.4	33.7	39.7	0.0	1,416.6

Note: Figures discounted at 3% relative to 2019.

Appendix

Tax-PI Calibration Methodology

The economic and fiscal analysis of the proposed headquarters has been conducted by Regional Economic Models, Inc. (REMI) using their Tax-PI v2.2 software, which is a dynamic regional macroeconomic, demographic, and fiscal model. Specifically, REMI has used a 1-region custom model of New York that is calibrated to revenues and expenditures from the New York state budget.

Each budget category is assigned both an “economic driver” that allows it to respond to changes in a specific economic variable (e.g., Personal Income for Personal Income Tax Revenue) and a “policy variable” that allows it to directly impact a specific economic variable (e.g., Personal Taxes for Personal Income Tax Revenue). Because the Tax-PI model integrates the economic outlook with fiscal projections, this analysis captures the interaction between economic activity and the level of tax revenue.

This model utilizes New York State government data from the 2016 State Government Tax Tables from the U.S. Census Bureau to calibrate state revenues.

Benefit-Cost With 6% Discount Rate

Table A.1: Benefit-Cost Analysis (6% Discount Rate)

Category	Units	2019	2021	2023	2025	2027	2029	2031	2033	2043	Total
Total Tax Revenues	Millions of 2019 Dollars	10.8	82.6	154.1	214.9	256.2	271.6	298.1	343	239.5	5,916.5
Total Incentives + Grants	Millions of 2019 Dollars	45.8	82.9	126.2	129.8	147.4	10.1	23.9	26.5	0.0	1,189.7

Note: Figures discounted at 6% relative to 2019.

Benefit-cost ratio: 5.0

Glossary

North American Industry Classification System (NAICS): The North American Industry Classification System (NAICS) is the standard used by federal statistical agencies in classifying business establishments for the purpose of collecting, analyzing, and publishing statistical data related to the U.S. business economy.

Direct Employment: In this analysis, direct employment represents the employees directly hired by the operation of the headquarters, and the employment created by the construction spending. All other employment growth is indirect employment. Direct employment is an “exogenous shock” within the model.

Exogenous Production: Industrial production that is factored into the model as an input from outside of the model.

Indirect Employment: All employment not caused directly by the employment and operation of the headquarters and those workers satisfying the construction spending.

Intermediate Demand: Demand which is created throughout the entire supply chain to satisfy any direct spending.

Local Consumption Demand: The demand for consumer goods within New York State.

Induced Employment: All indirect employment that is not generated by the change in intermediate demand, often driven mainly by an increase in local consumption demand.

GDP/GSP: Gross Domestic Product/Gross State Product. The market value of goods produced and services provided in a country/state during one year.

Regional Purchase Coefficient (RPC): The percentage of local demand for goods and services from an industry that is satisfied locally.

Output: The total value of goods sold by an industry.