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Regional Economic Models, Inc.

# Economic and Fiscal Impact of the New York State Film Tax Credit Program: 2023-2024

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# REMI Background & Experience

Regional Economic Models, Inc. (REMI) is an independent company with offices in Amherst, MA and Washington, D.C. that provides non-partisan economic analysis and modeling software to its clients, who include federal, state, and local government agencies, non-profit organizations, universities, and private companies. With over 40 years of experience, REMI is a worldwide leader in providing dynamic regional U.S. macroeconomic and demographic models used to evaluate economic development as well as many other policy issues such as taxes, health care, transportation, energy and the environment, and trade. REMI consultative services and modeling software have been utilized on several economic development and fiscal studies in New York and other states and countries, including the 2021-2022 edition of this study.

# Key Terms (Glossary)

**Employment:** Employment comprises estimates of the number of jobs, full-time plus part-time, by place of work for all industries.

> **Direct Jobs:** Full-time-equivalent (FTE) jobs derived from the total number of hires for all the projects evaluated as part of this study.
>
> **Indirect Jobs:** Full-time plus part-time jobs in upstream industries that supply and support the film production and post-production industries.
>
> **Induced Jobs:** All full-time plus part-time jobs that are neither Direct Jobs nor Indirect Jobs. This includes jobs in consumer goods and services industries affected by consumer spending of the wages from the direct and indirect jobs, jobs associated with residential and business investment caused by the additional population and economic growth, jobs associated with additional government spending, and others.

**GDP:** Gross Domestic Product. The market value of goods and services produced by labor and property. It is also the sum of value-added across all industries, which is economic output less the value of the intermediate inputs.

**Economic Output:** The amount of production, including all intermediate goods purchased as well as value added (compensation and profit). This can also be thought of as gross sales or supply.

**Disposable Personal Income:** Total after-tax income received by persons; it is the income available to persons for spending or saving.

> **Personal Income:** Income received by persons from all sources. It is the sum of wages and salaries, supplements to wages and salaries, proprietors' income, rental income, asset income, and personal current transfer receipts, net of contributions for government social insurance.

**Return on Investment (ROI):** A calculation measuring the economic and fiscal benefits relative to the costs of the tax credits issued. Both the numerator and denominator of the ratio are calculated as PVs in Real Dollars with the benefits occurring in 2023 and 2024 and the costs occurring over the 2025-2034 period when the credits are issued. The reported ROI metrics are applied to State Government Revenue, State & Local Government Spending (total fiscal benefit), GDP ROI, and Economic Output ROI.

> **Present Value (PV):** The current value of a future stream of cash flows given a specified rate of return. Future cash flows are discounted at the discount rate. For purposes of this analysis, the discount rate is the 5-year Treasury bond yield, which at the time of the analysis was 4.105%.
>
> **Nominal/Real Dollars:** Dollars representing the value of goods and services tied to the price level in the current/a given fixed year. Also referred to as Current/Fixed Dollars. For this study, the fixed year is 2023.

# Executive Summary

Empire State Development (ESD) serves as the economic development corporation for New York State. One of its responsibilities is administering the New York State Film Tax Credit Programs for film production and post-production. Started in 2004, the purpose of the programs is to attract film and television companies to the state to complete projects in both the production and post-production stages of development, with the purpose of creating and maintaining jobs in the industry and benefiting the overall economy. Regional Economic Models, Inc. (REMI) was retained by ESD to perform an economic and fiscal impact analysis of these credit programs at the state and local levels for the 2023-2024 period. REMI used a Tax-PI model including multiple economic regions in New York State and the rest of the nation. REMI's study included return on investment (ROI) calculations measuring the economic and fiscal benefits relative to the cost of the credits, which are to be distributed over the period 2025-2034.

Using program information provided by ESD for 155 film production and 134 post-production projects initiated during the study period, REMI found the following key results [1] for 2023-2024:

- The direct spending of $6.1 billion (nominal) from the 289 projects resulted in 92,172 jobs (direct/indirect/induced) across 2 years[2] for an average annual employment impact of 46,086 at the state level, with 44,153 resulting from production activity and 1,933 resulting from post-production activity.
- For every direct full-time-equivalent job, almost 2 additional jobs were created in the state economy.
- The projects grew the state economy significantly, adding $12.6 billion in Gross Domestic Product (GDP) across 2 years[3] for an annual average of $6.3 billion and $21.9 billion in economic output across 2 years[4] for an annual average of $10.9 billion.
- The projects added $6.7 billion in disposable personal income for New York State residents across 2 years[5] for an annual average of $3.4 billion.
- The projects generated $1.7 billion in state and local government revenue across 2 years[6] for an annual average of $827.9 million – resulting in a combined state and local fiscal ROI of 1.5.
- The projects added almost $12 to the State's GDP and almost $20 of economic output for every $1 of tax credit issued (GDP ROI 11.5 and Economic Output ROI 19.9).

[1] Unless otherwise stated, dollar figures are given in Fixed Local (Real) 2023 Dollars.
[2] This is in units of "job-years". Employment impacts are specific to each year, so these units acknowledge the addition across two years.
[3] This is an undiscounted sum across two years, as opposed to the present value (PV) shown below, which was discounted using the 5-year Treasury bond yield at the time of analysis of 4.105%.
[4] As above, this is an undiscounted sum across two years.
[5] As above, this is an undiscounted sum across two years.
[6] As above, this is an undiscounted sum across two years.

**Executive Summary Table**

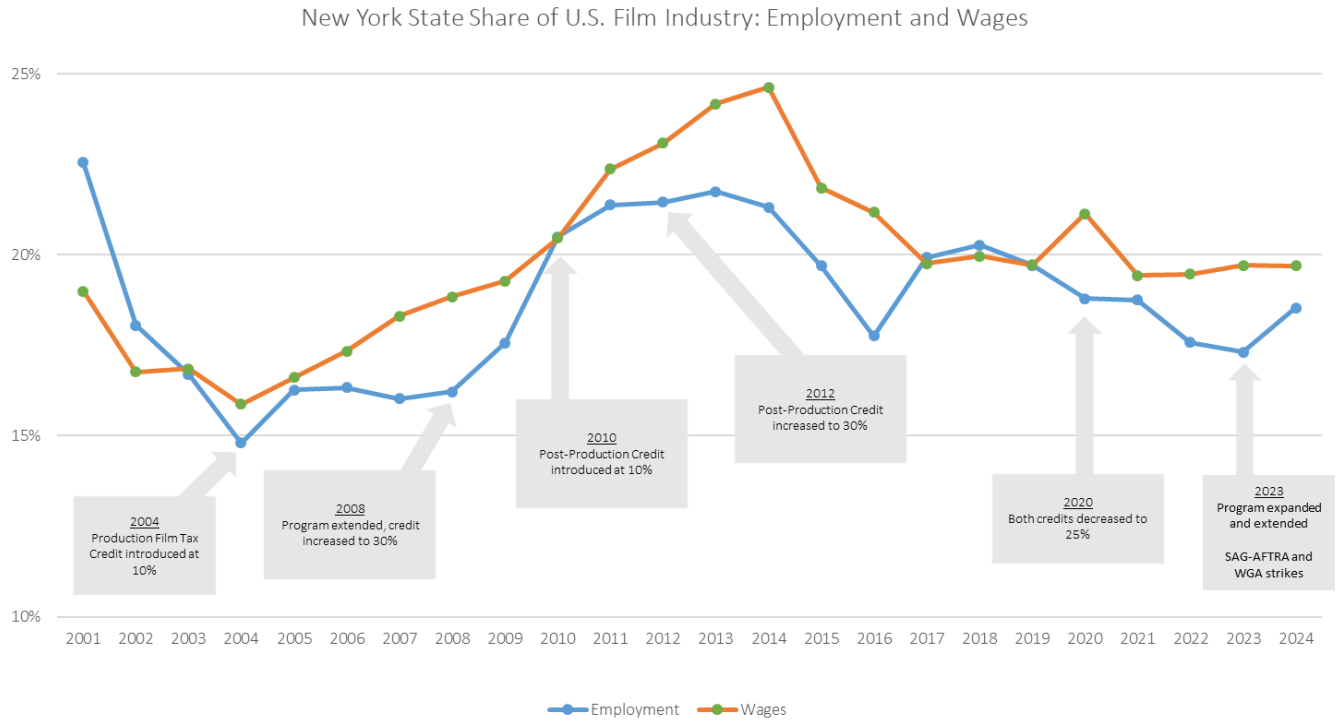
| Category | 2023 | 2024 | 2023-2024 Average | 2023-2024 PV |
|---|---|---|---|---|
| Employment (Jobs) | 37,026 | 55,146 | 46,086 | |
| Direct | 14,169 | 19,570 | 16,870 | |
| Indirect | 2,744 | 5,359 | 4,052 | |
| Induced | 20,113 | 30,217 | 25,165 | |
| Gross Domestic Product (Billions of Fixed Local 2023 Dollars) | 4.6 | 8.0 | 6.3 | 12.3 |
| Economic Output (Billions of Fixed Local 2023 Dollars) | 8.0 | 13.9 | 10.9 | 21.4 |
| Disposable Personal Income (Billions of Fixed Local 2023 Dollars) | 2.8 | 3.9 | 3.4 | 6.6 |
| State Government Revenue (Millions of Fixed Local 2023 Dollars) | 248.7 | 381.7 | 315.2 | 615.3 |
| Local Government Revenue (Millions of Fixed Local 2023 Dollars) | 396.6 | 628.9 | 512.8 | 1,000.7 |
| Total Credits (Millions of Local 2023 Dollars) | | | | 1,070.5 |
| **State Government Revenue ROI** | | | | **0.6** |
| **State & Local Government Revenue ROI** | | | | **1.5** |
| **Gross Domestic Product ROI** | | | | **11.5** |
| **Economic Output ROI** | | | | **19.9** |

**PV's (Present Values) were calculated based on the 5-year Treasury bond yield, which at the time of analysis was 4.105%. Totals, averages, and PV's may not correspond to impacts due to rounding.*

# Introduction

Empire State Development (ESD) is the umbrella organization for the New York State Urban Development Corporation and the Department of Economic Development, operationally joined since 1995. ESD's mission "is to promote a vigorous and growing state economy, encourage business investment and job creation, and support diverse, prosperous local economies across New York State through the efficient use of loans, grants, tax credits, real estate development, marketing, and other forms of assistance".

In response to a reduced presence of the film industry in New York State, and in order to compete with tax credits in other states, the New York State Film Tax Credit Program was introduced in 2004 as a 10 percent credit against qualified production costs. It was extended and increased to 30 percent in 2008. In 2010, the Post-Production Program was created to allow film productions that are filmed predominantly outside of New York State but post-produced by companies in New York State to participate. After a 2012 increase in the post-production credit to match the production credit at 30 percent and a subsequent decrease in both credits in 2020, the program provided a 25 percent credit to qualified below-the-line production costs and post-production costs. The decade after the introduction of the program saw growth in employment and earnings share, but that trend reversed in the late 2010's and has leveled off in the early 2020's.[7]




**Units: Employment in Jobs, Wages in Nominal Dollars.*
**Sources: U.S. Bureau of Labor Statistics Quarterly Census of Employment and Wages; Empire State Development.*

[7] The film industry is defined here as the aggregation of Motion Picture and Video Production, Motion Picture and Video Distribution, Teleproduction and Other Postproduction Services, and Other Motion Picture and Video Industries. This is likely an undercount, as some film jobs are categorized under other industries such as Independent Artists or Entertainment Payroll.

As of April 1, 2023, the tax incentive program was expanded and enhanced. In addition to moving up the issuance of the tax credit[8], the annual cap was raised to $700 million and extended until 2034, above-the-line salaries were covered (up to a cap) alongside the existing coverage for below-the-line salaries, the credit was reinstated to 30 percent, and credits were further enhanced for productions filmed upstate. In addition to the return to the 30 percent tax credit base rate, the Post-Production funding allocation was increased from $25 million to $45 million.

As such, for the period analyzed, the program budgeted $700 million annually to incentivize film and television production companies to produce their projects in New York State with the goal of creating and maintaining industry jobs and related economic activity, with $45 million of those funds allocated to post-production. In addition to the fully refundable credit of 30 percent of qualified in-state production costs, productions with budgets exceeding $500,000 may be able to receive an additional 10 percent credit on qualified labor expenses in many counties. Also, relocated series can apply for qualified relocation costs after filming two seasons of the series in-state.

For post-production costs, an additional 5 percent credit over and above the baseline of 30 percent was available for costs incurred in upstate New York. Similar to the production credit, productions with budgets exceeding $500,000 were able to receive an additional 10 percent credit on qualified labor expenses in many counties, with a maximum annual expenditure of $5 million.

Regional Economic Models, Inc. (REMI) was selected to perform an economic and fiscal impact analysis of the New York State Film Tax Credit Programs at the state and local levels over the period 2023-2024 using a multi-regional state and national Tax-PI model. Specifically, REMI considered how the film and television industry's operations and expenditures associated with 155 production and 134 post-production projects initiated during the period would affect employment, Gross Domestic Product (GDP), economic output, disposable personal income, state government revenue, and local government revenue for New York State and its constituent regions.

REMI found positive economic and fiscal impacts of the qualifying projects for New York State. These included average annual total employment of 46,086 jobs, with 33,350 located in New York City, real GDP and real economic output footprints of $6.3 billion and $10.9 billion per year respectively, and aggregate real disposable personal income of $3.4 billion annually. Associated real state government revenues grew $315.2 million per annum, and real local government revenues totaled $512.8 million on average, of which $312.9 million were collected in New York City.

The tax credits for the 2023-2024 activity will be distributed during the period 2025-2034, with a real present value (PV) of almost $1.1 billion.[9] Based on the economic and fiscal returns, real state government revenue will see a return on investment (ROI) of 0.6, while combined real state and local government revenue will generate a ROI of 1.5, a net increase in available funds across all New York State governments. Finally, as a measure of impacts on the economy, real GDP will have a ROI of 11.5 and real economic output will have a ROI of 19.9.

[8] The issuance of the tax credit went from the Allocation Year plus 1 year to the Allocation Year for initial applications submitted after April 1, 2023. The Allocation Year has been determined by studying data on how quickly final applications have historically been submitted.

[9] Tax credit averages and PV's were taken over the period 2023-2034 to be comparable to the government revenue impacts.

Two significant events affected results during the study period, specifically in 2023. An actor's strike (SAG-AFTRA) lasted for 119 days, from July 14 to November 9. A writer's strike (WGA) lasted 149 days, from May 2 to September 27. Since production was halted for extended periods, project spending and hiring across production and post-production were lowered, by 41 percent and by 50 percent respectively, compared to the prior review period of 2021-2022. Estimated tax credits were accordingly lower but by less, down only 23 percent, because the incentive levels had been returned to 30 percent in April 2023 from the lower levels of 25 percent in place during the prior review period. This had the effect of lowering the combined real state and local government revenue ROI from 1.7 in 2021-2022 to 1.5 in 2023-2024.

Since 2023, production trends have shifted globally; the growth in production for subscription services has tapered, and television and film production are moving to lower-cost formats, such as unscripted shows shot overseas.[10] In September 2024, the BBC reported that "as a whole, the number of U.S. productions during the second quarter of 2024 was down about 40 percent compared to the same period in 2022."[11] As the competition for industry productions tightens, other states are moving aggressively to draw business.

[10] The Death of Peak TV. A Special Report from Variety VIP+ and Luminate. March 2024. https://variety.com/vip-special-reports/the-death-of-peak-tv-special-report-1235921131/.

[11] Regan Morris. Hollywood's big boom has gone bust. BBC News, Los Angeles. September 28, 2024. https://www.bbc.com/news/articles/cj6er83ene6o. Formatting conventions in the quote were modified to match the report style.

# Methodology

In order to assess the economic and fiscal impacts of the New York State Film Tax Credit Program, REMI used a 12-region, 70-sector Tax-PI v3.2 model of New York State and the United States. Regions falling outside of New York State were not included in the inputs or results of the study, but allowed for more accurate results for the New York State regions. More detailed information is available about the model and the fiscal calibration in Appendix 1.

ESD provided REMI with detailed data for 155 qualifying production and 134 qualifying post-production projects during 2023-2024. This included employment data and nominal regional expenditures by year. Employment data included employment and wage data by position, separated into above-the-line (ATL), below-the-line (BTL), extras, and post-production. Different positions have different expected times of labor, the two extremes being extras who may work for a number of hours or days on multiple projects and post-production staff who are often part of a permanent post-production studio and work full-time on one or two projects. Based on available data, including average length of project, average length of employment by role, and average wage per hire, ESD converted project hires to full-time-equivalent jobs, which were used as direct employment inputs. These are displayed in the employment impact tables in the Results section. Expenditures are summarized in the Spending Inputs Table.

**Spending Inputs Table**

| Spending Category | 2023 | 2024 | Total |
|---|---|---|---|
| **Wage** | | | |
| *Production* | | | |
| New York State | 1,020,218,424 | 2,253,250,248 | 3,273,468,672 |
| New York City | 634,755,765 | 1,510,438,589 | 2,145,194,354 |
| *Post-Production* | | | |
| New York State | 81,650,051 | 100,782,769 | 182,432,820 |
| New York City | 61,799,676 | 87,985,000 | 149,784,676 |
| **Non-Wage** | | | |
| *Production* | | | |
| New York State | 927,993,072 | 1,875,933,467 | 2,803,926,539 |
| New York City | 774,242,551 | 1,687,823,145 | 2,462,065,696 |
| *Post-Production* | | | |
| New York State | 74,930,102 | 122,722,446 | 197,652,548 |
| New York City | 60,456,777 | 114,210,971 | 174,667,748 |
| **Totals** | | | |
| *Production* | | | |
| New York State | 1,948,211,496 | 4,129,183,715 | 6,077,395,211 |
| New York City | 1,408,998,316 | 3,198,261,734 | 4,607,260,050 |
| *Post-Production* | | | |
| New York State | 156,580,153 | 223,505,215 | 380,085,368 |
| New York City | 122,256,453 | 202,195,970 | 324,452,424 |
| **Grand Totals** | | | |
| New York State | 2,104,791,649 | 4,352,688,930 | 6,457,480,579 |
| New York City | 1,531,254,769 | 3,400,457,705 | 4,931,712,474 |

**Units: Nominal Dollars*

The amount of wages determined to remain and be spent in-state were adjusted primarily based on the percentage of hires that ESD estimated were in-state residents. Specifically, 48 percent of ATL wages[12], 93 percent of BTL and post-production wages, and 95 percent of extras wages were assumed to stay in New York State. Non-wage spending was treated as indirect economic output. These data points were combined to develop regional model inputs for employment and wages in the motion picture and sound recording industries and supply chain revenue by industry.[13]

[12] Given the discrepancy between the percentage of in-state residents and the percentage of in-state wages for ATL hires (driven in large part by highly paid out-of-state directors, executive producers, actors, etc.), the latter percentage was used to adjust ATL wages.

[13] Post-production data was only provided as Upstate and Downstate due to credit criteria, and so post-production inputs were spread across regions based on the model's baseline regional forecasts: wages by wages and salaries and non-wage spending by economic output. Upstate New York includes counties falling outside of the Metropolitan Commuter Transportation District.

# Results

This section reports the economic and fiscal impacts of the New York State Film Tax Credit Program over the period 2023-2024, specifically on employment, real GDP, real economic output, real disposable personal income, and real state and local government revenue.[14] Due to the role that New York City plays in the film and television industry, its results have been isolated alongside New York State's below.

### *Production Impacts*

Production credits account for the majority of program expenditures, and accordingly production activity accounts for the majority of the economic and fiscal impacts.

Tables 1A and 1B show the employment impacts for New York State and New York City, averaging 44,153 and 31,966 jobs per year respectively. New York City accounts for 87 percent of the direct impact and 72 percent of the total impact.

**Table 1A: New York State Production Credit Employment Impact**

| Employment Category | 2023 | 2024 | 2023-2024 Average |
|---|---|---|---|
| **Total Employment** | 35,347 | 52,959 | 44,153 |
| Direct Employment | 13,740 | 19,058 | 16,399 |
| Indirect Employment | 2,537 | 5,029 | 3,783 |
| Induced Employment | 19,070 | 28,872 | 23,971 |

**Units: Jobs. Totals and averages may not correspond to impacts due to rounding.*

**Table 1B: New York City Production Credit Employment Impact**

| Employment Category | 2023 | 2024 | 2023-2024 Average |
|---|---|---|---|
| **Total Employment** | 24,297 | 39,634 | 31,966 |
| Direct Employment | 11,464 | 17,147 | 14,305 |
| Indirect Employment | 2,168 | 4,569 | 3,369 |
| Induced Employment | 10,665 | 17,918 | 14,292 |

**Units: Jobs. Totals and averages may not correspond to impacts due to rounding.*

Tables 2A and 2B show the other economic impacts for New York State and New York City, with the former averaging $6.1 billion in GDP, $10.5 billion in economic output, and $3.2 billion in disposable personal income per year. New York City accounts for approximately 77 percent of the GDP and economic output impacts, in the same ballpark as the employment impacts, but only 57 percent of the disposable personal income impact. The latter observation can be attributed to the fact that many individuals who work in New York City commute from outside its borders, where their income is ultimately counted.

[14] The "real" descriptor is omitted in this section for brevity.

**Table 2A: New York State Production Credit Economic Impact**

| Economic Category | 2023 | 2024 | 2023-2024 Average | 2023-2024 PV |
|---|---|---|---|---|
| Gross Domestic Product | 4.4 | 7.7 | 6.1 | 11.8 |
| Economic Output | 7.7 | 13.4 | 10.5 | 20.5 |
| Disposable Personal Income | 2.7 | 3.7 | 3.2 | 6.3 |

**Units: Billions of Fixed Local 2023 Dollars. PV's were calculated based on the 5-year Treasury bond yield, which at the time of analysis was 4.105%. Averages and PV's may not correspond to impacts due to rounding.*

**Table 2B: New York City Production Credit Economic Impact**

| Economic Category | 2023 | 2024 | 2023-2024 Average | 2023-2024 PV |
|---|---|---|---|---|
| Gross Domestic Product | 3.2 | 6.1 | 4.7 | 9.1 |
| Economic Output | 5.6 | 10.6 | 8.1 | 15.8 |
| Disposable Personal Income | 1.4 | 2.3 | 1.8 | 3.5 |

**Units: Billions of Fixed Local 2023 Dollars. PV's were calculated based on the 5-year Treasury bond yield, which at the time of analysis was 4.105%. Averages and PV's may not correspond to impacts due to rounding.*

Table 3A shows local government revenue impacts aggregated over all of New York State, and Table 3B shows local government revenue impacts for New York City alone, averaging $489.0 million and $297.4 million per year respectively. While 48 percent of the New York State impacts are attributable to property taxes, only 39 percent of the New York City impacts come from property taxes. This can be partially explained by New York City's unique position of levying its own personal income taxes.

**Table 3A: New York State Production Credit Local Government Revenue Impact**

| Local Government Revenue Category | 2023 | 2024 | 2023-2024 Average | 2023-2024 PV |
|---|---|---|---|---|
| **Total** | 375.9 | 602.2 | 489.0 | 954.3 |
| Real Property Taxes and Assessments | 183.7 | 281.5 | 232.6 | 454.1 |
| Other Real Property Tax Items | 10.0 | 12.4 | 11.2 | 21.9 |
| Sales and Use Tax | 53.2 | 85.3 | 69.2 | 135.1 |
| Other Non-Property Taxes | 13.6 | 24.9 | 19.2 | 37.5 |
| Charges for Services | 23.4 | 35.0 | 29.2 | 56.9 |
| Use and Sale of Property | 2.8 | 3.6 | 3.2 | 6.3 |
| Other Local Revenues | 18.5 | 28.3 | 23.4 | 45.7 |
| Personal Income Taxes | 43.3 | 80.4 | 61.8 | 120.5 |
| Business Income/Franchise Tax | 27.4 | 50.9 | 39.2 | 76.4 |

**Units: Millions of Fixed Local 2023 Dollars. PV's were calculated based on the 5-year Treasury bond yield, which at the time of analysis was 4.105%. Totals, averages, and PV's may not correspond to impacts due to rounding.*

**Table 3B: New York City Production Credit Local Government Revenue Impact**

| Local Government Revenue Category | 2023 | 2024 | 2023-2024 Average | 2023-2024 PV |
|---|---|---|---|---|
| **Total** | 221.7 | 373.1 | 297.4 | 580.2 |
| Real Property Taxes and Assessments | 87.2 | 146.7 | 116.9 | 228.0 |
| Other Real Property Tax Items | 0.0 | 0.0 | 0.0 | 0.0 |
| Sales and Use Tax | 31.1 | 52.3 | 41.7 | 81.3 |
| Other Non-Property Taxes | 12.7 | 21.4 | 17.1 | 33.3 |
| Charges for Services | 10.3 | 17.3 | 13.8 | 26.9 |
| Use and Sale of Property | 0.0 | 0.0 | 0.0 | 0.0 |
| Other Local Revenues | 9.8 | 16.4 | 13.1 | 25.5 |
| Personal Income Taxes | 43.3 | 72.9 | 58.1 | 113.3 |
| Business Income/Franchise Tax | 27.4 | 46.2 | 36.8 | 71.8 |

**Units: Millions of Fixed Local 2023 Dollars. PV's were calculated based on the 5-year Treasury bond yield, which at the time of analysis was 4.105%. Totals, averages, and PV's may not correspond to impacts due to rounding.*

Table 4 shows the state government revenue impact for New York State, averaging $300.9 million per year. Almost two-thirds is attributable to the state's personal income tax and over 20 percent is brought in through the state sales tax and related taxes.

**Table 4: New York State Production Credit State Government Revenue Impact**

| State Government Revenue Category | 2023 | 2024 | 2023-2024 Average | 2023-2024 PV |
|---|---|---|---|---|
| **Total** | 236.0 | 365.7 | 300.9 | 587.3 |
| Personal Income | 155.6 | 241.1 | 198.4 | 387.2 |
| Corporation and Business | 22.0 | 34.1 | 28.1 | 54.8 |
| Sales, Excise and User | 50.2 | 77.8 | 64.0 | 124.9 |
| Property Transfers | 7.7 | 11.9 | 9.8 | 19.1 |
| Other Taxes and Fees | 0.5 | 0.8 | 0.7 | 1.3 |

**Units: Millions of Fixed Local 2023 Dollars. PV's were calculated based on the 5-year Treasury bond yield, which at the time of analysis was 4.105%. Totals, averages, and PV's may not correspond to impacts due to rounding.*

Table 5 shows the annual total production credits that ESD estimates will be disbursed based on 2023-2024 qualifying projects, which will average $112.0 million over the period 2023-2034.

**Table 5: New York State Production Credit Schedule**

| Category | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 | 2023-2034 Average | 2023-2034 PV |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Credits | 0.0 | 0.0 | 0.0 | 0.9 | 25.4 | 136.9 | 215.3 | 266.0 | 278.6 | 234.4 | 147.0 | 40.0 | 112.0 | 993.3 |

**Units: Millions of Fixed Local 2023 Dollars. PV's were calculated based on the 5-year Treasury bond yield, which at the time of analysis was 4.105%. Averages and PV's may not correspond to annual values due to rounding.*

Table 6 shows the ROIs for state government revenue, state and local government revenue, GDP, and economic output relative to the production credits, which are each calculated as the ratio of the present value (PV) of the associated fiscal or economic impact metric to the PV of the tax credits. The state government revenue ROI is 0.6, but the state and local government revenue ROI is more robust at 1.6. The GDP and economic output ROIs are 11.9 and 20.7 respectively. What the ROI results show is that $1.60 of state and local government revenue is generated for every $1 of program credit, while $11.90 is added to the State's GDP and economic output grows by $20.70.

**Table 6: Return on Investment (ROI) for Production Credit**

| Indicator | 2023-2024 PV | Total Credits 2023-2034 PV | ROI Ratio |
|---|---|---|---|
| State Government Revenue | 587.3 | 993.3 | 0.6 |
| State and Local Government Revenue | 1,541.7 | 993.3 | 1.6 |
| Gross Domestic Product | 11,808.5 | 993.3 | 11.9 |
| Economic Output | 20,548.0 | 993.3 | 20.7 |

**Units: Millions of Fixed Local 2023 Dollars.*

### *Post-Production Impacts*

Post-production credits account for a much smaller part of the program with only a $45 million yearly allocation for tax credits in the time period analyzed, but are treated separately due to the differences between production and post-production as well as the delineation in funding set out in the New York State Film Tax Credit Program. Results are displayed identically to production results.

Tables 7A and 7B show the employment impacts for New York State and New York City, averaging 1,933 and 1,385 jobs per year respectively. New York City accounts for 88 percent of the direct impact and 72 percent of the total impact.

**Table 7A: New York State Post-Production Credit Employment Impact**

| Employment Category | 2023 | 2024 | 2023-2024 Average |
|---|---|---|---|
| **Total Employment** | 1,679 | 2,187 | 1,933 |
| Direct Employment | 429 | 512 | 471 |
| Indirect Employment | 207 | 330 | 269 |
| Induced Employment | 1,043 | 1,345 | 1,194 |

**Units: Jobs. Totals and averages may not correspond to impacts due to rounding.*

**Table 7B: New York City Post-Production Credit Employment Impact**

| Employment Category | 2023 | 2024 | 2023-2024 Average |
|---|---|---|---|
| **Total Employment** | 1,110 | 1,659 | 1,385 |
| Direct Employment | 350 | 481 | 415 |
| Indirect Employment | 169 | 309 | 239 |
| Induced Employment | 591 | 869 | 730 |

**Units: Jobs. Totals and averages may not correspond to impacts due to rounding.*

Tables 8A and 8B show the other economic impacts for New York State and New York City, with the former averaging $241.2 million in GDP, $411.0 million in economic output, and $155.5 million in disposable personal income per year. New York City accounts for almost 79 percent of GDP and economic output, but only 61 percent of disposable personal income.

**Table 8A: New York State Post-Production Credit Economic Impact**

| Economic Category | 2023 | 2024 | 2023-2024 Average | 2023-2024 PV |
|---|---|---|---|---|
| Gross Domestic Product | 187.4 | 295.0 | 241.2 | 470.7 |
| Economic Output | 319.8 | 502.2 | 411.0 | 802.2 |
| Disposable Personal Income | 142.0 | 169.0 | 155.5 | 304.3 |

**Units: Millions of Fixed Local 2023 Dollars. PV's were calculated based on the 5-year Treasury bond yield, which at the time of analysis was 4.105%. Averages and PV's may not correspond to impacts due to rounding.*

**Table 8B: New York City Post-Production Credit Economic Impact**

| Economic Category | 2023 | 2024 | 2023-2024 Average | 2023-2024 PV |
|---|---|---|---|---|
| Gross Domestic Product | 137.7 | 241.8 | 189.8 | 370.0 |
| Economic Output | 233.5 | 410.8 | 322.1 | 628.1 |
| Disposable Personal Income | 79.0 | 109.0 | 94.0 | 183.7 |

**Units: Millions of Fixed Local 2023 Dollars. PV's were calculated based on the 5-year Treasury bond yield, which at the time of analysis was 4.105%. Averages and PV's may not correspond to impacts due to rounding.*

Table 9A shows local government revenue impacts aggregated over all of New York State, and Table 9B shows local government revenue impacts for New York City alone, averaging $23.7 million and $15.4 million per year respectively. While 46 percent of the New York State impacts are attributable to property taxes, only 39 percent of the New York City impacts come from property taxes.

**Table 9A: New York State Post-Production Credit Local Government Revenue Impact**

| Local Government Revenue Category | 2023 | 2024 | 2023-2024 Average | 2023-2024 PV |
|---|---|---|---|---|
| **Total** | 20.7 | 26.7 | 23.7 | 46.4 |
| Real Property Taxes and Assessments | 9.6 | 12.2 | 10.9 | 21.3 |
| Other Real Property Tax Items | 0.5 | 0.5 | 0.5 | 1.0 |
| Sales and Use Tax | 3.2 | 3.8 | 3.5 | 6.9 |
| Other Non-Property Taxes | 0.8 | 1.2 | 1.0 | 1.9 |
| Charges for Services | 1.4 | 1.5 | 1.4 | 2.8 |
| Use and Sale of Property | 0.2 | 0.1 | 0.2 | 0.3 |
| Other Local Revenues | 1.0 | 1.2 | 1.1 | 2.2 |
| Personal Income Taxes | 2.5 | 3.7 | 3.1 | 6.1 |
| Business Income/Franchise Tax | 1.6 | 2.4 | 2.0 | 3.9 |

**Units: Millions of Fixed Local 2023 Dollars. PV's were calculated based on the 5-year Treasury bond yield, which at the time of analysis was 4.105%. Totals, averages, and PV's may not correspond to impacts due to rounding.*

**Table 9B: New York City Post-Production Credit Local Government Revenue Impact**

| Local Government Revenue Category | 2023 | 2024 | 2023-2024 Average | 2023-2024 PV |
|---|---|---|---|---|
| **Total** | 12.8 | 18.0 | 15.4 | 30.1 |
| Real Property Taxes and Assessments | 5.0 | 7.1 | 6.1 | 11.8 |
| Other Real Property Tax Items | 0.0 | 0.0 | 0.0 | 0.0 |
| Sales and Use Tax | 1.8 | 2.5 | 2.2 | 4.2 |
| Other Non-Property Taxes | 0.7 | 1.0 | 0.9 | 1.7 |
| Charges for Services | 0.6 | 0.8 | 0.7 | 1.4 |
| Use and Sale of Property | 0.0 | 0.0 | 0.0 | 0.0 |
| Other Local Revenues | 0.6 | 0.8 | 0.7 | 1.3 |
| Personal Income Taxes | 2.5 | 3.5 | 3.0 | 5.9 |
| Business Income/Franchise Tax | 1.6 | 2.2 | 1.9 | 3.7 |

**Units: Millions of Fixed Local 2023 Dollars. PV's were calculated based on the 5-year Treasury bond yield, which at the time of analysis was 4.105%. Totals, averages, and PV's may not correspond to impacts due to rounding.*

Table 10 shows the state government revenue impact for New York State, averaging $14.3 million per year. Almost two-thirds is attributable to the state's personal income tax and over 20 percent is brought in through the state sales tax and related taxes.

**Table 10: New York State Post-Production Credit State Government Revenue Impact**

| State Government Revenue Category | 2023 | 2024 | 2023-2024 Average | 2023-2024 PV |
|---|---|---|---|---|
| **Total** | 12.6 | 16.0 | 14.3 | 28.0 |
| Personal Income | 8.3 | 10.5 | 9.4 | 18.4 |
| Corporation and Business | 1.2 | 1.5 | 1.3 | 2.6 |
| Sales, Excise and User | 2.7 | 3.4 | 3.0 | 5.9 |
| Property Transfers | 0.4 | 0.5 | 0.5 | 0.9 |
| Other Taxes and Fees | 0.0 | 0.0 | 0.0 | 0.1 |

**Units: Millions of Fixed Local 2023 Dollars. PV's were calculated based on the 5-year Treasury bond yield, which at the time of analysis was 4.105%. Totals, averages, and PV's may not correspond to impacts due to rounding.*

Table 11 shows the annual total post-production credits that ESD estimates will be disbursed based on 2023-2024 qualifying projects, which will average $7.7 million over the period 2023-2034.

**Table 11: New York State Post-Production Credit Schedule**

| Category | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 | 2023-2034 Average | 2023-2034 PV |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Credits | 0.0 | 0.0 | 4.1 | 16.2 | 28.6 | 28.6 | 11.0 | 1.9 | 1.6 | 0.0 | 0.0 | 0.0 | 7.7 | 77.1 |

**Units: Millions of Fixed Local 2023 Dollars. PV's were calculated based on the 5-year Treasury bond yield, which at the time of analysis was 4.105%. Averages and PV's may not correspond to annual values due to rounding.*

Table 12 shows the ROIs for state government revenue, state and local government revenue, GDP, and economic output. The state government revenue ROI is 0.4, but the state and local government revenue ROI is more robust at 1.0. The GDP and economic output ROIs are 6.1 and 10.4 respectively. What the ROI results show is that $1 of state and local government revenue is generated for every $1 of program credit, while $6.10 is added to the State's GDP and economic output grows by $10.40.

**Table 12: Return on Investment (ROI) for Post-Production Credit**

| Indicator | 2023-2024 PV | Total Credits 2023-2034 PV | ROI Ratio |
|---|---|---|---|
| State Government Revenue | 28.0 | 77.1 | 0.4 |
| State and Local Government Revenue | 74.3 | 77.1 | 1.0 |
| Gross Domestic Product | 470.7 | 77.1 | 6.1 |
| Economic Output | 802.2 | 77.1 | 10.4 |

**Units: Millions of Fixed Local 2023 Dollars.*

### *Total Impacts*

The total impacts will hew closely to the production impacts due to their relative size and the similarity of the ROIs.

Tables 13A and 13B show the employment impacts for New York State and New York City, averaging 46,086 and 33,350 jobs per year respectively. New York City accounts for 87 percent of the direct impact and 72 percent of the total impact.

**Table 13A: New York State Total Employment Impact**

| Employment Category | 2023 | 2024 | 2023-2024 Average |
|---|---|---|---|
| **Total Employment** | 37,026 | 55,146 | 46,086 |
| Direct Employment | 14,169 | 19,570 | 16,870 |
| Indirect Employment | 2,744 | 5,359 | 4,052 |
| Induced Employment | 20,113 | 30,217 | 25,165 |

**Units: Jobs. Totals and averages may not correspond to impacts due to rounding.*

**Table 13B: New York City Total Employment Impact**

| Employment Category | 2023 | 2024 | 2023-2024 Average |
|---|---|---|---|
| **Total Employment** | 25,407 | 41,293 | 33,350 |
| Direct Employment | 11,813 | 17,628 | 14,721 |
| Indirect Employment | 2,337 | 4,878 | 3,608 |
| Induced Employment | 11,257 | 18,787 | 15,022 |

**Units: Jobs. Totals and averages may not correspond to impacts due to rounding.*

Tables 14A and 14B show the other economic impacts for New York State and New York City, with the former averaging $6.3 billion in GDP, $10.9 billion in economic output, and $3.4 billion in disposable personal income per year. New York City accounts for approximately 77 percent of the GDP and economic output impacts, roughly in line with the employment impacts, but only 57 percent of the disposable personal income impact.

**Table 14A: New York State Total Economic Impact**

| Economic Category | 2023 | 2024 | 2023-2024 Average | 2023-2024 PV |
|---|---|---|---|---|
| Gross Domestic Product | 4.6 | 8.0 | 6.3 | 12.3 |
| Economic Output | 8.0 | 13.9 | 10.9 | 21.4 |
| Disposable Personal Income | 2.8 | 3.9 | 3.4 | 6.6 |

**Units: Billions of Fixed Local 2023 Dollars. PV's were calculated based on the 5-year Treasury bond yield, which at the time of analysis was 4.105%. Averages and PV's may not correspond to impacts due to rounding.*

**Table 14B: New York City Total Economic Impact**

| Economic Category | 2023 | 2024 | 2023-2024 Average | 2023-2024 PV |
|---|---|---|---|---|
| Gross Domestic Product | 3.4 | 6.4 | 4.9 | 9.5 |
| Economic Output | 5.8 | 11.0 | 8.4 | 16.4 |
| Disposable Personal Income | 1.4 | 2.4 | 1.9 | 3.7 |

**Units: Billions of Fixed Local 2023 Dollars. PV's were calculated based on the 5-year Treasury bond yield, which at the time of analysis was 4.105%. Averages and PV's may not correspond to impacts due to rounding.*

Table 15A shows local government revenue impacts aggregated over all of New York State, and Table 15B shows local government revenue impacts for New York City alone, averaging $512.8 million and $312.9 million per year respectively. While 48 percent of the New York State impacts are attributable to property taxes, only 39 percent of the New York City impacts come from property taxes.

**Table 15A: New York State Total Local Government Revenue Impact**

| Local Government Revenue Category | 2023 | 2024 | 2023-2024 Average | 2023-2024 PV |
|---|---|---|---|---|
| **Total** | 396.6 | 628.9 | 512.8 | 1,000.7 |
| Real Property Taxes and Assessments | 193.3 | 293.7 | 243.5 | 475.4 |
| Other Real Property Tax Items | 10.5 | 12.9 | 11.7 | 22.9 |
| Sales and Use Tax | 56.4 | 89.1 | 72.8 | 142.0 |
| Other Non-Property Taxes | 14.4 | 26.0 | 20.2 | 39.4 |
| Charges for Services | 24.7 | 36.5 | 30.6 | 59.8 |
| Use and Sale of Property | 3.0 | 3.8 | 3.4 | 6.6 |
| Other Local Revenues | 19.5 | 29.5 | 24.5 | 47.9 |
| Personal Income Taxes | 45.8 | 84.1 | 65.0 | 126.6 |
| Business Income/Franchise Tax | 29.0 | 53.3 | 41.2 | 80.2 |

**Units: Millions of Fixed Local 2023 Dollars. PV's were calculated based on the 5-year Treasury bond yield, which at the time of analysis was 4.105%. Totals, averages, and PV's may not correspond to impacts due to rounding.*

**Table 15B: New York City Total Local Government Revenue Impact**

| Local Government Revenue Category | 2023 | 2024 | 2023-2024 Average | 2023-2024 PV |
|---|---|---|---|---|
| **Total** | 234.6 | 391.1 | 312.9 | 610.3 |
| Real Property Taxes and Assessments | 92.2 | 153.7 | 123.0 | 239.9 |
| Other Real Property Tax Items | 0.0 | 0.0 | 0.0 | 0.0 |
| Sales and Use Tax | 32.9 | 54.8 | 43.8 | 85.5 |
| Other Non-Property Taxes | 13.5 | 22.5 | 18.0 | 35.1 |
| Charges for Services | 10.9 | 18.2 | 14.5 | 28.3 |
| Use and Sale of Property | 0.0 | 0.0 | 0.0 | 0.0 |
| Other Local Revenues | 10.3 | 17.2 | 13.8 | 26.9 |
| Personal Income Taxes | 45.8 | 76.4 | 61.1 | 119.2 |
| Business Income/Franchise Tax | 29.0 | 48.4 | 38.7 | 75.5 |

**Units: Millions of Fixed Local 2023 Dollars. PV's were calculated based on the 5-year Treasury bond yield, which at the time of analysis was 4.105%. Totals, averages, and PV's may not correspond to impacts due to rounding.*

Table 16 shows the state government revenue impact for New York State, averaging $315.2 million per year. Approximately two-thirds is attributable to the state's personal income tax and over 20 percent is brought in through the state sales tax and related taxes.

**Table 16: New York State Total State Government Revenue Impact**

| State Government Revenue Category | 2023 | 2024 | 2023-2024 Average | 2023-2024 PV |
|---|---|---|---|---|
| **Total** | 248.7 | 381.7 | 315.2 | 615.3 |
| Personal Income | 163.9 | 251.6 | 207.8 | 405.7 |
| Corporation and Business | 23.2 | 35.6 | 29.4 | 57.4 |
| Sales, Excise and User | 52.9 | 81.2 | 67.0 | 130.8 |
| Property Transfers | 8.1 | 12.4 | 10.2 | 20.0 |
| Other Taxes and Fees | 0.6 | 0.9 | 0.7 | 1.4 |

**Units: Millions of Fixed Local 2023 Dollars. PV's were calculated based on the 5-year Treasury bond yield, which at the time of analysis was 4.105%. Totals, averages, and PV's may not correspond to impacts due to rounding.*

Table 17 shows the annual total production and post-production credits that ESD estimates will be disbursed based on 2023-2024 qualifying projects, which will average $119.7 million over the period 2023-2034.

**Table 17: New York State Total Credit Schedule**

| Category | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 | 2023-2034 Average | 2023-2034 PV |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Credits | 0.0 | 0.0 | 4.1 | 17.1 | 53.9 | 165.5 | 226.3 | 267.9 | 280.2 | 234.4 | 147.0 | 40.0 | 119.7 | 1,070.5 |

Table 18 shows the ROIs for state government revenue, state and local government revenue, GDP, and economic output relative to the production credits, which are each calculated as the ratio of the present value (PV) of the associated fiscal or economic impact metric to the PV of the tax credits. The state government revenue ROI is 0.6, but the state and local government revenue ROI is more robust at 1.5. The GDP and economic output ROIs are 11.5 and 19.9 respectively. What the ROI results show is that $1.50 of state and local government revenue is generated for every $1 of program credit, while $11.50 is added to the State's GDP and economic output grows by $19.90.

**Table 18: Total Return on Investment (ROI)**

| Indicator | 2023-2024 PV | Total Credits 2023-2034 PV | ROI Ratio |
|---|---|---|---|
| State Government Revenue | 615.3 | 1,070.5 | 0.6 |
| State and Local Government Revenue | 1,616.0 | 1,070.5 | 1.5 |
| Gross Domestic Product | 12,279.2 | 1,070.5 | 11.5 |
| Economic Output | 21,350.2 | 1,070.5 | 19.9 |

**Units: Millions of Fixed Local 2023 Dollars.*

# Conclusion

The findings show that from 2023-2024, the average annual impact of the 289 projects was:

- an increase of 46,086 jobs, with 72 percent occurring in New York City;
- $6.3 billion in real GDP;
- $10.9 billion in real economic output; and
- $3.4 billion in real disposable personal income.

The total impact for both years was:[15]

- an increase of 92,172 jobs;
- $12.6 billion in real GDP;
- $21.9 billion in economic output; and
- $6.7 billion in real disposable personal income.

The projects were also associated with an average annual increase of $315.2 million in real state government revenue and $512.8 million in real local government revenue for a 2-year combined impact of $1.7 billion.[16]

In total, these government revenue impacts combined to a ROI of 1.5 relative to the total credits that will be distributed during 2025-2034. Overall economic ROIs are measured at 11.5 for real GDP and 19.9 for real economic output.

What this means is that for every $1 of program tax credit:

- $1.50 of real state and local government tax revenue is generated;
- $11.50 is added to real GDP; and
- $19.90 of additional real economic output is created.

Film and television production and post-production remain important pieces of the New York State and New York City economies, and the credit-eligible 2023-2024 projects comprised a significant fraction of the industry activity, supporting robust levels of overall employment and economic production and a combined positive fiscal position across state and local governments.

[15] As in footnotes 1-6 in the Executive Summary, this employment impact is in units of job-years and the remainder of these impacts are undiscounted sums.
[16] As above, this is an undiscounted sum.

# Literature Review

A literature review was conducted to understand the history and effectiveness of state-level film tax credit programs and the extent of related film and television tourism, which can bolster the direct benefits of production activity. The goals of such programs include attracting film and television companies to begin projects in or move projects to the state; maintaining the presence of those companies and projects; and producing net positive economic and fiscal impacts for the state and its residents and businesses. Film and television tourism – such as the "Tolkien tourism" effect seen in New Zealand – has also become of interest to policymakers due to its potential to attract visitors and their associated spending. This is especially true in New York State, which sees a sizable share of film and television production and maximizes the value of that exposure with the uniquely recognizable backdrop of New York City and the natural beauty of upstate New York. References are available in Appendix 2.

### *State Film Tax Credit Programs*

Economic and Fiscal Impact of the New York State Film Tax Credit Program: 2021-2022 – REMI

On behalf of ESD, REMI performed the previous mandatory two-year study of New York State's Film Tax Credit Program, for the years 2021-2022. For the 446 projects executed during that period, there was a jobs multiplier of approximately 2.5 on the full-time-equivalent direct jobs. This translated to a state government revenue ROI of 0.6 and a total government revenue (state and local) revenue ROI of 1.7.

Film Tax Incentives Back in the Spotlight – National Conference of State Legislatures

The first film tax credit was enacted by Louisiana in 1992, and expanded to most states in the early 2000's, peaking in 2010 with 45 states. Today, 35 states, Washington, D.C., Puerto Rico, and the U.S. Virgin Islands offer film tax incentives. While there is evidence of greater return on investment in other tax credit schemes, states such as Georgia have seen great returns in economic activity, state revenues, and tourism.

The Economic Impact of Montana Film Production – Econsult Solutions, Inc.

The Montana Economic Development Industry Advancement (MEDIA) Act of 2019 provides film tax credits for in-state projects. Over half of output and nearly half of the jobs in film projects is linked to the MEDIA Act incentives. These projects also have a ripple effect in the economy, including indirect demand in industries such as catering, hotels, and transportation, and wider impacts on tourism, arts and culture, and capital investment in studio facilities.

California Film and Television Tax Credit Program 2.0 – Los Angeles County Economic Development Corporation

LAEDC found a return on investment of 16.12 in GDP, 8.60 in wages, and 1.07 in state and local government revenue. In research on the larger impact of the film and television industry, a "critical mass" of labor and capital investment, as well as multi-season television series, incentivizes and secures long-term benefits to the state economy.

Economic Impact of the New Mexico Film Production Tax Credit – New Mexico Film Office

New Mexico's film tax credit was found to have a gross value added (GVA) return on investment of 7.83. This is comparable to GDP used in this report and can be used as a loose benchmark.

California's Film Tax Credit – California Legislative Analyst's Office

California and particularly Los Angeles County is the preeminent location for film and television production, accounting for about half of U.S. productions. Due in part to this dominance and the size of the tax credit investment, California officials have been skeptical of the utility of the program. However, the study found that credits influence location decisions for anywhere from 25 to 75 percent of credit recipients. Beyond this immediate attraction, a refundable tax credit – which New York employs – was determined to be more equitable, as it "delinks credit claiming from tax liability and thereby lessens differential treatment of taxpayers".

Evaluation: Film Incentives – Virginia Joint Legislative Audit and Review Commission

In evaluating Virginia's film tax credit incentives, JLARC found ROIs of 0.20 and 0.30 for its credit and grant programs, respectively. Virginia's incentive scheme is substantially smaller than New York's – $47.5 million over 5 years compared to $420 million annually. The grant program has an in-kind advertising incentive to boost tourism in the state.

### *Film & Television Tourism*

Promoting Destinations via Film Tourism – University of South Carolina

It was found that the majority of state and national tourism departments saw increases in tourism when using film-focused marketing initiatives, particularly when coordinating with film studios on content and direction. The study offers key insights into the possibilities of proactively promoting in-state film productions and emphasizes the importance of either the film or television show's plot being explicitly set in the state or country of production – thereby highlighting cultural, environmental, and other features of the state. Notable U.S. examples of increases in annual tourism numbers included Close Encounters of the Third Kind (75 percent initial, 20 percent year-by-year in Wyoming) and Little Women (65 percent in Massachusetts).

Tourist See Tourist Do – University of North Texas

This study conducted an extensive literature review and surveyed respondents on movie and television preferences and factors to travel. There is greater and wider access to leisure travel than ever before due to a combination of economic and technological advances. Online resources such as discount booking sites and travel guides are aided by social media, and media of all kinds is also nearly ubiquitous due to smartphone and internet use. Overall, it was found that movies and television create a positive impact on individuals' inclination to engage in travel tourism. The main driver of such tourism was determined by one's television viewing behavior – what specific programs participants watched – followed by the image of the destination as portrayed in either film or television, as well as by movie viewing behavior.

# Appendix 1: REMI Model Framework & Fiscal Calibration

### *REMI Model Framework*

Tax-PI is a structural economic, demographic, and fiscal forecasting and policy analysis model. The following core framework applies to all REMI model builds. The model integrates input-output, computable general equilibrium, econometric and economic geography methodologies. The model is dynamic, with forecasts and simulations generated on an annual basis and behavioral responses to compensation, price, and other economic factors.

The model consists of thousands of simultaneous equations with a structure that is relatively straightforward. The exact number of equations used varies depending on the extent of industry, demographic, demand, and other detail in the specific model being used. The overall structure of the model can be summarized in five major blocks: (1) Output and Demand, (2) Labor and Capital Demand, (3) Population and Labor Supply, (4) Compensation, Prices, and Costs, and (5) Market Shares. The blocks and their key interactions are shown in Figures A1.1 and A1.2.

**Figure A1.1: REMI Model Linkages**

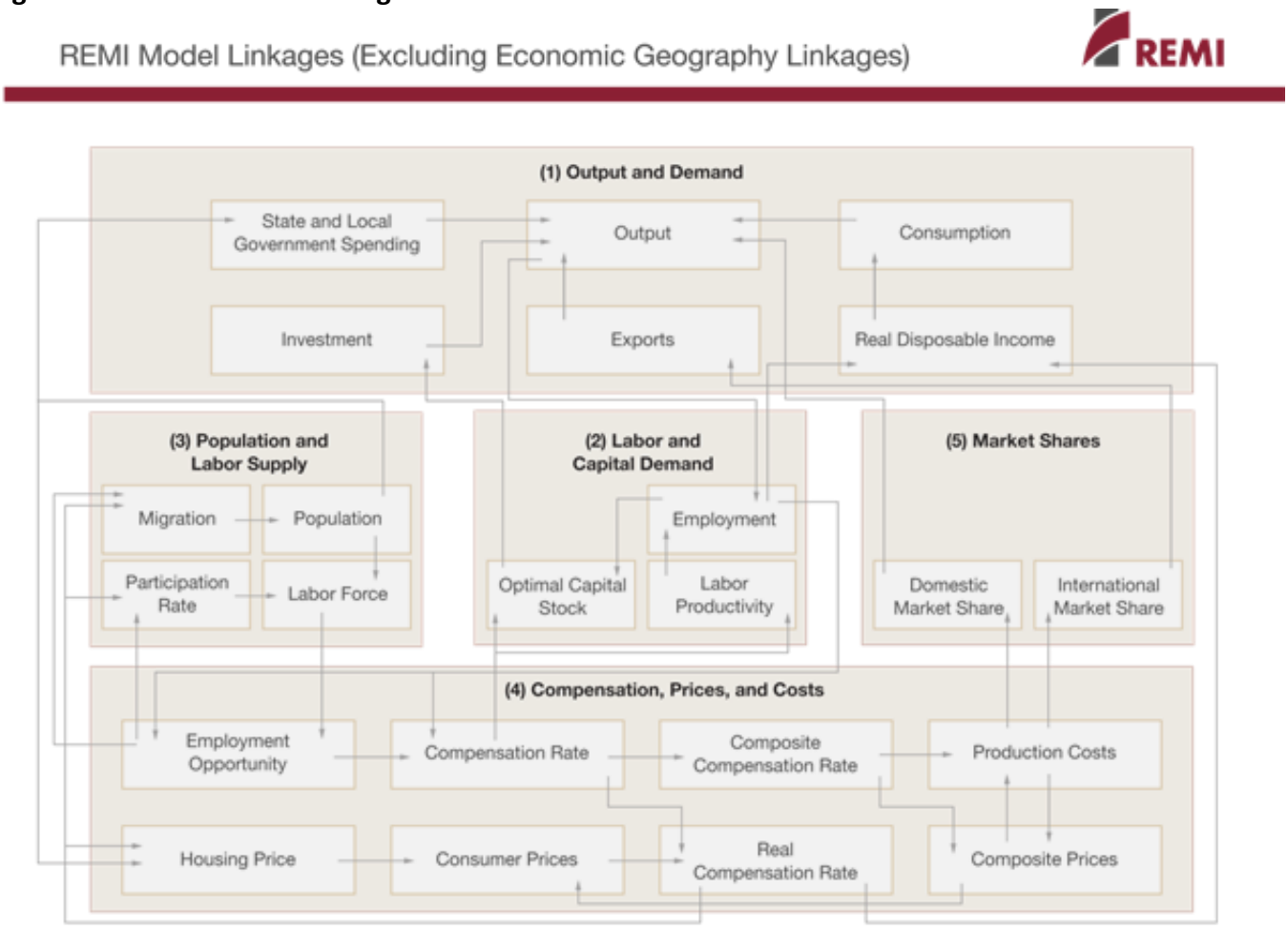
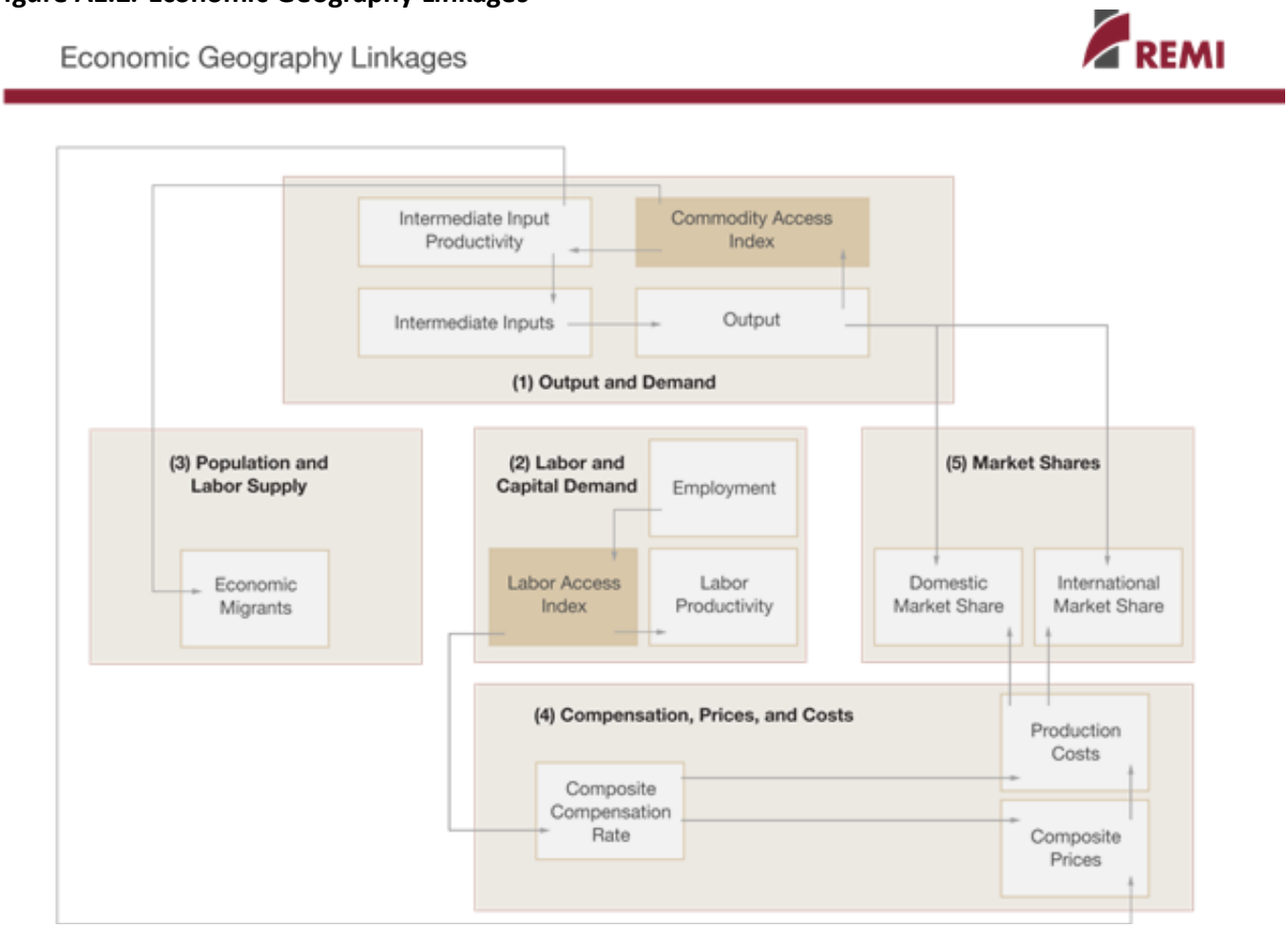


**Figure A1.2: Economic Geography Linkages**

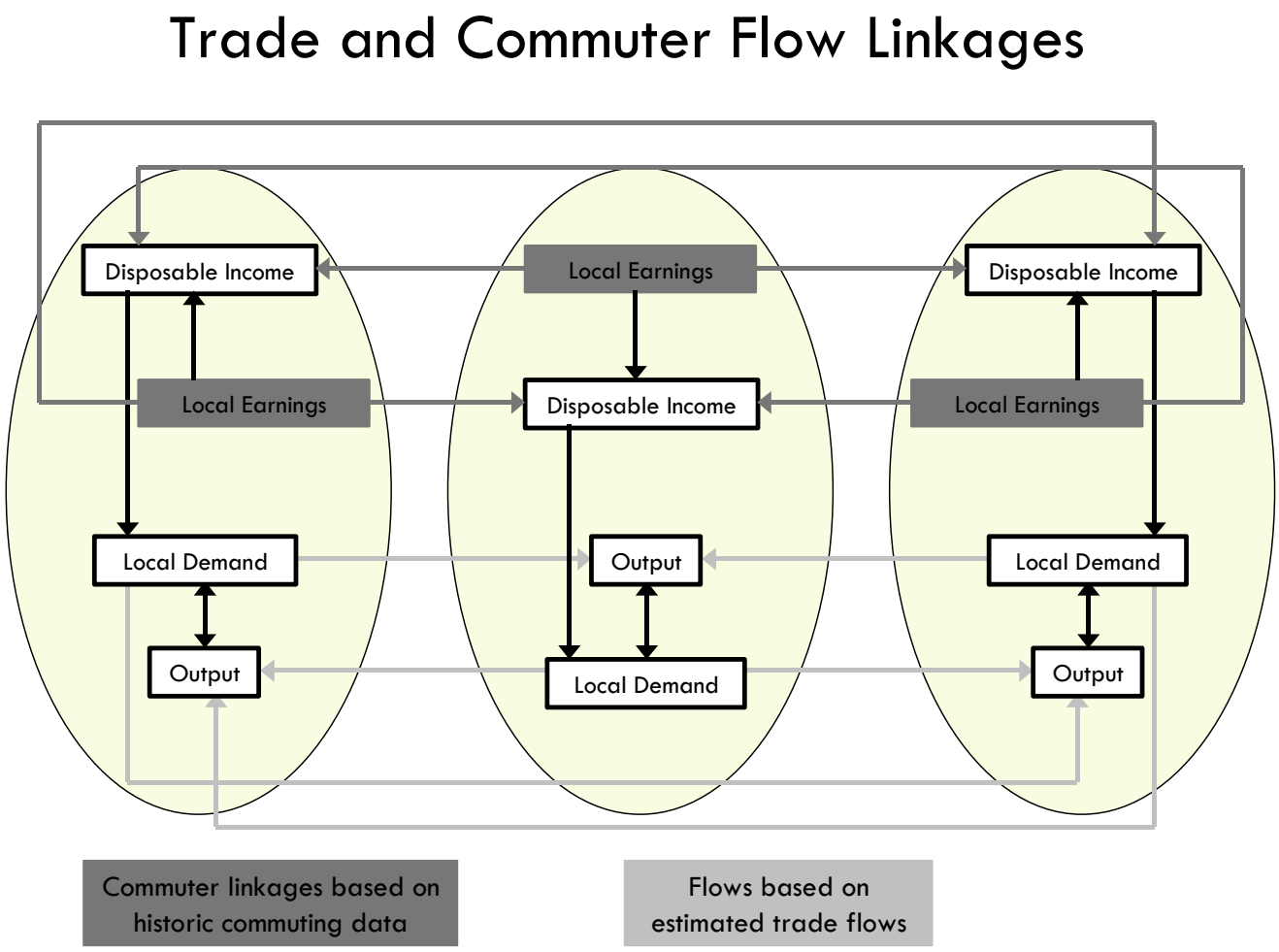



The Output and Demand block consists of output, demand, consumption, investment, government spending, exports, and imports, as well as feedback from output change due to the change in the productivity of intermediate inputs. The Labor and Capital Demand block includes labor intensity and productivity as well as demand for labor and capital. Labor force participation rate and migration equations are in the Population and Labor Supply block. The Compensation, Prices, and Costs block includes composite prices, determinants of production costs, the consumption price deflator, housing prices, and the compensation equations. The proportion of local, inter-regional, and export markets captured by each region is included in the Market Shares block.

Models can be built as single region, multi-region, or multi-region national models. A region is defined broadly as a sub-national area, and could consist of a state, province, county, or city, or any combination of sub-national areas.

Single-region models consist of an individual region, called the home region. The rest of the nation is also represented in the model. However, since the home region is only a small part of the total nation, the changes in the region do not have an endogenous effect on the variables in the rest of the nation. Multi-regional models have interactions among regions, such as trade and commuting flows. These interactions include trade flows from each region to each of the other regions. These flows are illustrated for a three-region model in Figure A1.3.

**Figure A1.3: Trade and Commuter Flow Linkages**




Multiregional national models also include a central bank monetary response that constrains labor markets. Models that only encompass a relatively small portion of a nation are not endogenously constrained by changes in exchange rates or monetary responses.

*Block 1. Output and Demand*

This block includes output, demand, consumption, investment, government spending, import, commodity access, and export concepts. Output for each industry in the home region is determined by industry demand in all regions in the nation, the home region's share of each market, and international exports from the region.

For each industry, demand is determined by the amount of output, consumption, investment, and capital demand on that industry. Consumption depends on real disposable personal income per capita, relative prices, differential income elasticities, and population. Input productivity depends on access to inputs because a larger choice set of inputs means it is more likely that the input with the specific characteristics required for the job will be found. In the capital stock adjustment process, investment occurs to fill the difference between optimal and actual capital stock for residential, non-residential, and equipment investment. Government spending changes are determined by changes in the population.

*Block 2. Labor and Capital Demand*

The Labor and Capital Demand block includes the determination of labor productivity, labor intensity, and the optimal capital stocks. Industry-specific labor productivity depends on the availability of workers with differentiated skills for the occupations used in each industry. The occupational labor supply and commuting costs determine firms' access to a specialized labor force.

Labor intensity is determined by the cost of labor relative to the other factor inputs, capital and fuel. Demand for capital is driven by the optimal capital stock equation for both non-residential capital and equipment. Optimal capital stock for each industry depends on the relative cost of labor and capital, and the employment weighted by capital use for each industry. Employment in private industries is determined by the value added and employment per unit of value added in each industry.

*Block 3. Population and Labor Supply*

The Population and Labor Supply block includes detailed demographic information about the region. Population data is given for age, gender, and race, with birth and survival rates for each group. The size and labor force participation rate of each group determines the labor supply. These participation rates respond to changes in employment relative to the potential labor force and to changes in the real after-tax compensation rate. Migration includes retirement, military, international, and economic migration. Economic migration is determined by the relative real after-tax compensation rate, relative employment opportunity, and consumer access to variety.

*Block 4. Compensation, Prices and Costs*

This block includes delivered prices, production costs, equipment cost, the consumption deflator, consumer prices, the price of housing, and the compensation equation. Economic geography concepts account for the productivity and price effects of access to specialized labor, goods, and services.

These prices measure the price of the industry output, taking into account the access to production locations. This access is important due to the specialization of production that takes place within each industry, and because transportation and transaction costs of distance are significant. Composite prices for each industry are then calculated based on the production costs of supplying regions, the effective distance to these regions, and the index of access to the variety of outputs in the industry relative to the access by other uses of the product.

The cost of production for each industry is determined by the cost of labor, capital, fuel, and intermediate inputs. Labor costs reflect a productivity adjustment to account for access to specialized labor, as well as underlying compensation rates. Capital costs include costs of non-residential structures and equipment, while fuel costs incorporate electricity, natural gas, and residual fuels.

The consumption deflator converts industry prices to prices for consumption commodities. For potential migrants, the consumer price is additionally calculated to include housing prices. Housing prices change from their initial level depending on changes in income and population density.

Compensation changes are due to changes in labor demand and supply conditions and changes in the national compensation rate. Changes in employment opportunities relative to the labor force and occupational demand change determine compensation rates by industry.

*Block 5. Market Shares*

The market shares equations measure the proportion of local and export markets that are captured by each industry. These depend on relative production costs, the estimated price elasticity of demand, and the effective distance between the home region and each of the other regions. The change in share of a specific area in any region depends on changes in its delivered price and the quantity it produces compared with the same factors for competitors in that market. The share of local and external markets then drives the exports from and imports to the home economy.

### *Fiscal Calibration*

Each Tax-PI budget category is assigned an "Economic Indicator" that allows it to respond to changes in a specific economic variable (e.g., Personal Income for Personal Income Tax Revenue). Because the Tax-PI model integrates the economic outlook into fiscal projections, this analysis captures the interaction between economic activity and the level of tax revenue.

# Appendix 2: References


Brainerd, Jackson & Jimenez, Andrea (2022, May 5) *Film Tax Incentives Back in the Spotlight*. National Conference of State Legislatures.

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