Analysis of Proposals to Enhance and Extend the Section 179D Energy Efficient Commercial Buildings Tax Deduction

Prepared by Regional Economic Models, Inc. (REMI) May 2017

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Executive Summary

Section 179D of the Internal Revenue Code, the Energy Efficient Commercial Buildings Deduction, was originally enacted by Congress as part of the Energy Policy Act of 2005 to promote energy independence. Section 179D promotes the proper allocation of incentives in the real estate development process. A key challenge to realizing the benefits of energy-efficient improvements is that the associated cost savings flow to building occupants, not developers. By helping offset the cost of energy efficient investments, Section 179D allows building owners to share in the incentive to install energy-efficient improvements that help their occupants save money on electricity, water, and climate control costs. In so doing, Section 179D promotes private-sector solutions to improve conservation practices and modernize national infrastructure.

In this analysis, REMI evaluates the economic impact of three potential approaches to the Section 179D deduction, which most recently expired at the end of 2016:

1. **Strengthening and Modernizing Section 179D**,[1] which would increase the value of the deduction to $3.00 per square foot from $1.80, increase the applicable energy efficiency standards, make it available to support improvements to existing as well as new buildings, and extend the deduction.
2. **Extension of Current Law Section 179D plus Expansion to Non-Profits and Tribal Governments**,[2] modeled on 2015 legislation developed by the Senate Finance Committee under Chairman Orrin Hatch (R-UT), which would extend the deduction, expand availability of the deduction to nonprofit organizations and tribal governments and increase the applicable energy efficiency standards.
3. **Extension of Current Law Section 179D**,[3] modeled on the two-year extension of current law enacted as part of the Protecting Americans from Tax Hikes ("PATH") Act of 2015.

The results of this analysis show that in addition to advancing the goal of energy independence, **Section 179D is an engine of economic and employment growth**. As captured in the table below, this study quantifies these impacts, finding that:

- Strengthening and extending the Section 179D Energy-Efficiency Commercial Buildings Deduction will create jobs and expand the nation's economy. These benefits would be compounded by increasing the dollar value of the deduction in accordance with several Congressional and administration proposals.

- These enhancements to Section 179D would support up to 76,529 jobs annually and contribute annually almost $7.4 billion to national gross domestic product ("GDP"), as well as over $5.7 billion towards national personal income.

[1] Proposals along these lines include Title I of S. 2189, sponsored by Senator Cardin (D-MD) in the 113th Congress and the President's FY 2017 Budget Proposal. *See* Description of Certain Revenue Provisions Contained in the President's Fiscal Year 2017 Budget Proposal, Joint Committee on Taxation, July 2016, JCS-2-16.
[2] *See* Description of the Chairman's Mark of a Bill to Extend Certain Expired Tax Provisions, July 17, 2015, JCX-101-15, and Description of the Chairman's Modification to the Chairman's Mark of a Bill to Extend Certain Expired Tax Provisions, July 21, 2015, JCX-103-15. In addition to the Senate Finance Committee extenders bill, other proposals along these lines include H.R. 6376, sponsored by Congressman Reichert (R-WA) in the 114th Congress.
[3] General Explanation of Tax Legislation Enacted in 2015, Joint Committee on Taxation, March 2016, JCS-1-16.

- Expanding the availability of the deduction to nonprofit organizations and tribal governments, while increasing the applicable energy efficiency standards, also provide clear positive impacts to the economy.

Table 1. Average Annual Economic Impacts for First Ten Years

	Strengthen and Modernize	Extension plus Expansion	Extension of Current Law
Jobs	76,529	39,388	40,749
GDP (millions of dollars)	7,398	3,730	3,860
Personal Income (millions of dollars)	5,729	3,017	3,128

Introduction

Section 179D offers an enhanced tax deduction to offset the cost of investments in certain energy efficient commercial building property. A deduction of up to $1.80 per square foot is available to owners of new or existing buildings who install (1) interior lighting, (2) building envelope, or (3) heating, cooling, ventilation, or hot water system improvements that reduce the building's total energy and power cost by 50% or more in comparison to a building meeting minimum requirements set by ASHRAE Standard 90.1-2001 (for buildings and systems placed in service before January 1, 2016) or 90.1-2007 (for buildings and systems placed in service before January 1, 2017).

A deduction of up to $0.60 per square foot is available to owners of buildings in which individual lighting, building envelope, or heating and cooling systems partially qualify to meet the applicable target levels, or through an interim rule for lighting fixtures promulgated by the IRS.

Table 2. Summary of 179D Tax Deductions[4]

	Fully Qualifying Property	**Partially Qualifying Property**				**Interim Lighting Rule**
		IRS Notice (Effective Dates)	**Envelope**	**HVAC and HW**	**Lighting**	
Savings Requirements*	50%	2006-52 (1/1/06 - 12/31/08)	16 2/3%	16 2/3%	16 2/3%	25%-40% lower lighting power density (50% for warehouses)
		2008-40 (1/1/06 - 12/31/13)	10%	20%	20%	
		2012-26 (3/12/12 - 12/31/16)	10%	15%	25%	
Tax Deduction (not to exceed cost of qualifying property)	$1.80/ft²		$0.60/ft²	$0.60/ft²	$0.60/ft²	$0.60/ft² times applicable percentage**

* Savings refer to the reduction in the energy and power costs of the combined energy for the interior lighting, HVAC, and HW systems as compared to a reference building that meets the minimum requirements of ASHRAE Standard 90.1-2001 for buildings placed in service prior to 1/1/2016 and ASHRAE Standard 90.1-2007 for buildings placed in service on or after 1/1/2016.

** The tax deduction is prorated depending on the reduction in LPD. See IRS Notice 2006-52 for the definition of "applicable percentage."

[4] ENERGY.GOV, Office of Energy Efficiency & Renewable Energy. https://energy.gov/eere/buildings/179d-commercial-buildings-energy-efficiency-tax-deduction

Energy savings must be calculated using qualified computer software, and certified by an independent third party in accordance with procedures established by the IRS.

Section 179D also includes an allocation provision that allows tax-exempt public entities to allocate the deduction to the designer of a building or efficiency project (such as an architect or engineer). This provision allows tax-exempt entities to transfer the value of the deduction to taxpayers that are able to realize its value, providing cost-effective support for the development of energy-efficient buildings by school districts, state governments, and other public sector entities. Ultimately, it helps save taxpayer money through lower energy costs.

As noted above, Section 179D was originally passed by Congress as part of the Energy Policy Act of 2005 in order to enhance the participation of the commercial building sector in the national effort to achieve energy independence through increased energy efficiency. According to the U.S. Department of Energy's Buildings Energy Data Book (March 2012)[5], commercial buildings accounted for 18.6% of all primary energy consumption in the U.S. in 2010. Of this, electricity accounted for 77%, the majority of which (62.9%) went for lighting, heating, cooling, and ventilation.

Due to budget constraints, the deduction was initially enacted on a temporary, albeit multi-year, basis. Section 179D has since been included among a package of temporary tax provisions that have expired and been reinstated many times over the years. The provision was most recently extended through December 31, 2016 by the PATH Act of 2015 (Division Q of H.R. 2029).

The proposals considered in this analysis represent three potential approaches to continuing to provide tax incentives for energy efficient commercial buildings. These potential approaches are not exhaustive, but instead are intended to be illustrative in terms of the magnitude of economic and jobs impact that may be garnered from various ways to use the tax code to overcome barriers to investment in energy efficiency technologies. The proposal to strengthen and modernize Section 179D is a reform proposal, aimed at incentivizing the next generation of energy efficiency enhancements to new and existing commercial building stock. The model is based on previous proposals to reform Section 179D and, although it cannot be directly extrapolated, provides a proxy baseline for a proposal along the lines of a technology-neutral energy efficiency incentive in the context of tax reform. The remaining two proposals considered in the analysis demonstrate the significant economic and jobs impact of extending current law with modest expansions to the allocation provision to include nonprofit organizations and tribal governments while increasing the applicable energy efficiency standards, as well as merely extending current law.

[5] The Buildings Energy Data Book, developed by the Building Technologies Program within the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy, includes statistics on residential and commercial building energy consumption. http://buildingsdatabook.eren.doe.gov/

Figure 1. Buildings Share of U.S. Primary Energy Consumption, 1980-2010

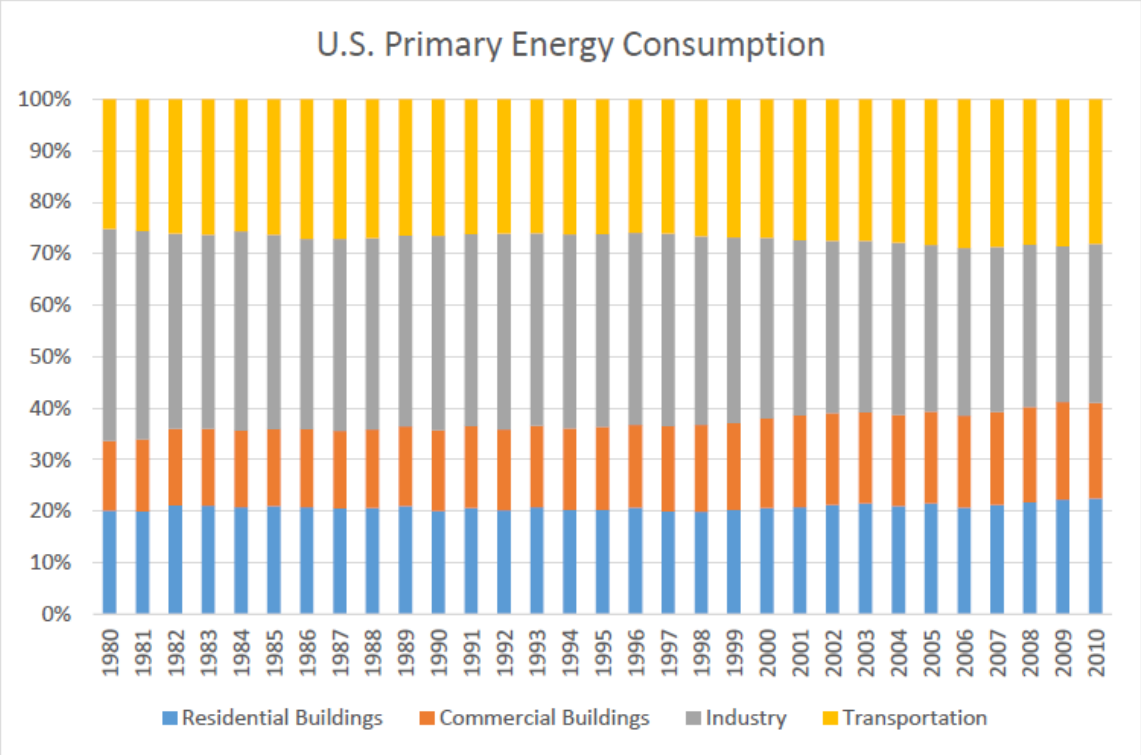


Figure 2. Commercial Sector Energy Consumption, 1980-2010

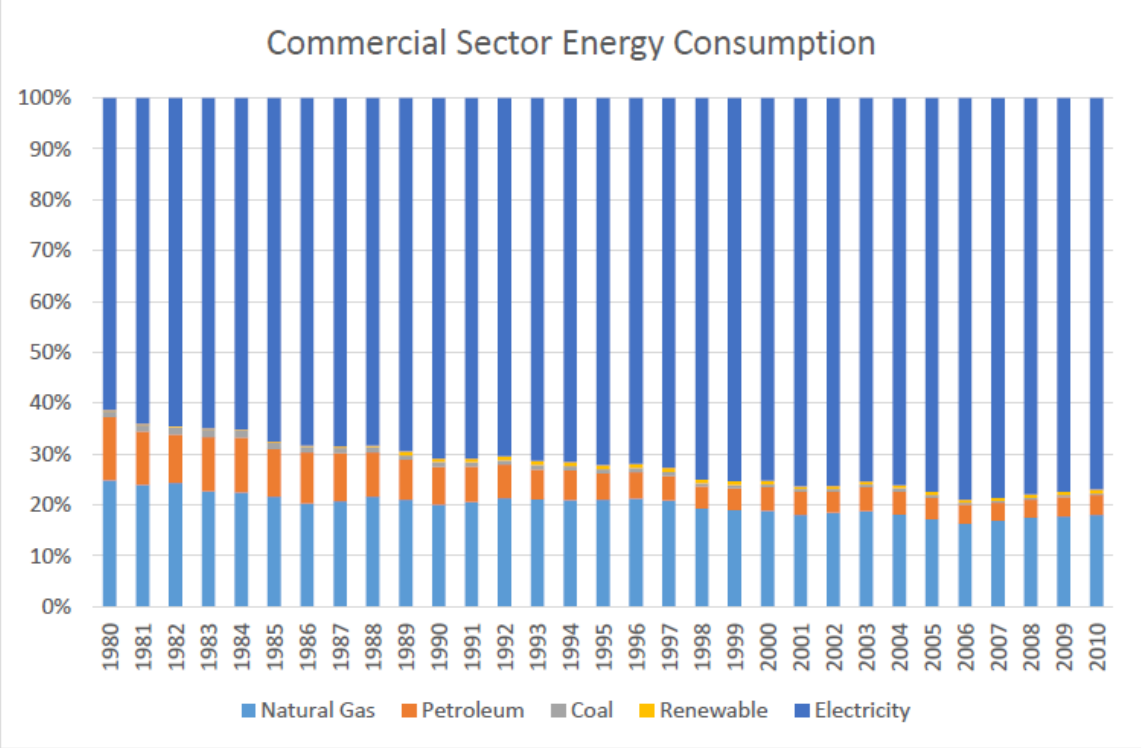
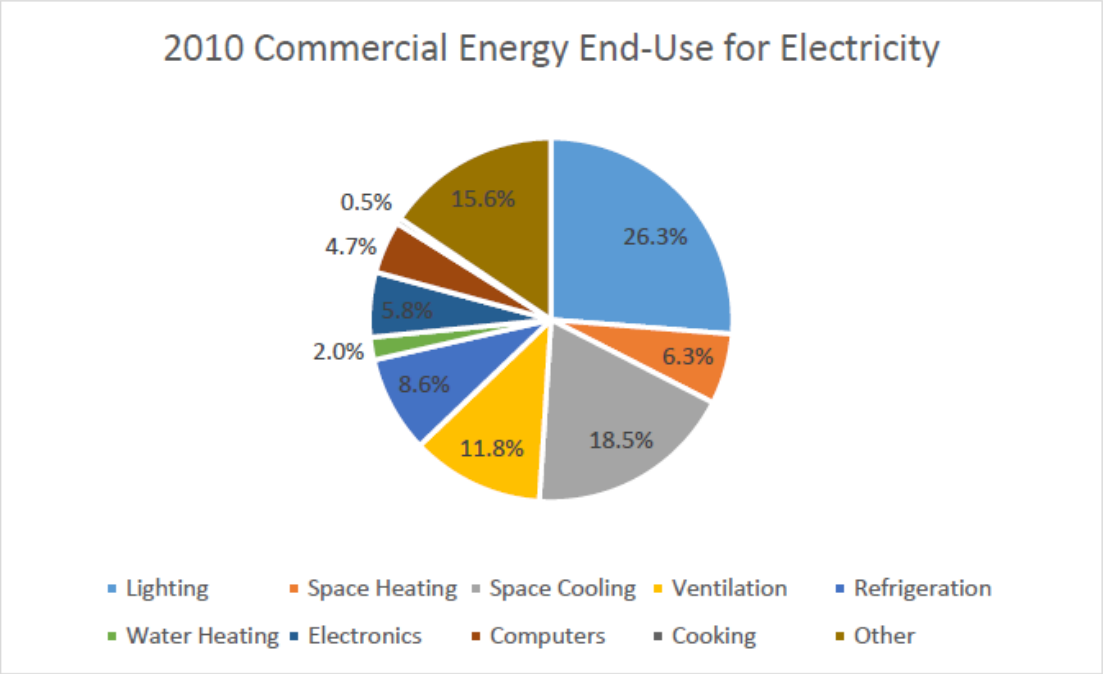


Figure 3. 2010 Commercial Energy End-Use for Electricity



Policy Context and Modeling Approach

Energy efficiency policies, from regulations to tax incentives, result in significant implications for industries that design, construct, and maintain commercial buildings, as well as those that innovate, develop, and manufacture energy efficient enhancements. These industries play an important role in state and local economies, creating jobs and revenue. Public policies that support these businesses can have both direct and indirect effects on a region's employment, economic output, and personal income.

Expanding, modifying, and extending Section 179D would reduce utility bills, lower energy costs, cut pollution, and increase jobs and economic growth. Commercial buildings have high energy needs. In addition to large energy bills for building owners and tenants (an estimated $38 billion a year goes towards lighting alone, according to the U.S. Department of Energy), commercial buildings can also put great strain on the nation's power grids during peak periods. Developing more efficient buildings helps ensure a steady supply of affordable power and significantly lowers operating costs for businesses and taxpayers alike.

Section 179D promotes the proper allocation of incentives in the real estate development process. As noted above, a key challenge to realizing the benefits of energy efficient improvements is that the associated cost savings flow to building occupants, not developers. In the short-term, Section 179D enables building owners to offset the often costly investments associated with energy efficiency enhancements. In the longer term, occupants of buildings that take advantage of the deduction realize significantly lower energy costs, the benefits of leading-edge design and construction that enhances the building's long-term market value, and the benefits of a reduced environmental footprint.

Section 179D has been an extremely effective tool in both respects. Since its enactment in 2005, the

deduction has leveraged billions of dollars in private capital, resulting in the energy efficient construction and renovation of thousands of buildings, while creating and preserving hundreds of thousands of jobs. It has also encouraged the research and development of new energy efficient innovations, enhancing its contributions to economic and employment growth. As such, it stands as of the best examples of the tremendous impact that tax incentives can have on financing energy efficient property[6].

While different tax structures are likely to result in different economic outcomes, one can only estimate the likely effect of tax proposals with integrated fiscal and economic analysis. To conduct this analysis, we first estimate the direct tax implications of the proposed changes. Next, we translate these direct tax changes into "policy variables" which are input into the REMI PI+ 70-sector model of the United States. We then run the model, which calculates the macroeconomic effect of the policy change, including detailed employment, output, income and other macroeconomic changes.

The REMI model is an integrated econometric/input-output/general equilibrium model of the US economy. It incorporates income and product accounts, demographics, price and production costs changes, and the labor market. Changes in taxes result in economic changes throughout the economy. While tax policy proposals should be carefully considered, we can best evaluate the economic implications of these policies using fiscal and economic analysis. This includes not only the direct tax changes to firms and individuals, but also how these changes affect the dynamic responses of firms and individuals in the overall economy.

A more detailed overview of the REMI model and its structure is available in Appendix 1.

[6] Statement for the Record of The American Institute of Architects for the Hearing on "Benefits of Permanent Tax Policy for America's Job Creators", before the U.S. House of Representatives Committee on Ways & Means, April 8, 2014.
http://waysandmeans.house.gov/wp-content/uploads/2015/10/The-American-Institute-of-Architects-040814SFR.pdf

Economic Impact Analysis: Strengthening and Modernizing Section 179D

Overview

Strengthening and modernizing Section 179D is a reform proposal, aimed at incentivizing the next generation of energy efficiency enhancements to new and existing commercial building stock. The economic model presented below is based on the President's FY 2017 Budget Proposal, which would have increased the value of the deduction to $3.00 per square foot from $1.80, made it available to support improvements to existing as well as new buildings, and extended the availability of the provision. In addition, it would have updated the applicable energy efficiency standard of a reference building to the minimum requirement of ASHRAE Standard 90.1-2010. Many of these modifications and enhancements are also reflected in Title I of the Energy Efficiency Tax Incentives Act (S. 2189 in the 113th Congress).

As noted above, although this model is based on previous Section 179D proposals and it cannot be directly extrapolated, it provides a proxy baseline for a proposal along the lines of a technology neutral energy efficiency incentive in the context of tax reform.

Methodology and Model Inputs

In order to analyze the potential economic impact of modifying and extending the deduction for energy efficient commercial building property, REMI evaluated both the costs and benefits of the program in terms of the value of the tax deduction, the additional leveraged investment spending it directly generates, and the future energy savings that results from it. These factors were estimated for both the private and government sectors.

Value of Tax Deduction

The cost of the President's FY 2017 Budget Proposal was estimated by the Joint Committee on Taxation to be $6.7 billion over 10 years[7]. This analysis projects the economic impact of the first ten years of this policy.

Since the JCT reports in fiscal years, and the REMI model is based on calendar years, the revenue costs were converted to represent calendar years. The value of the tax deduction represented by the JCT's estimate of the budget effect was estimated based on the assumption of an effective corporate tax rate of 18.6%[8] (the budget estimate was divided by the tax rate to yield an estimate of the tax deduction). Since the tax deduction is available for both private and government-owned buildings, also taking into account the modifications intended to strengthen and modernize the law, it was split between the two sectors based on Bureau of Economic Analysis nonresidential structures investment data for 2015[9],

[7] Estimated Budget Effects of the Revenue Provisions Contained in the President's Fiscal Year 2017 Budget Proposal, Joint Committee on Taxation, March 24, 2016, JCX-15-16.
[8] International Comparisons of Corporate Income Tax Rates, CBO, March 2017. https://www.cbo.gov/publication/52419
[9] BEA Table 4.7. Investment in Private Nonresidential Fixed Assets by Industry Group and Legal Form of Organization, and Table 7.5B. Investment in Government Fixed Assets. http://www.bea.gov

resulting in a breakdown of 81% private and 19% government. This contrasts with the assumptions used to evaluate the other two proposals.

Table 3. Estimated Budget Effect of Section 179D Tax Deduction: Strengthen and Modernize

	2017	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**
JCT Budget Estimates (Fiscal Year, millions of 2016 dollars)	($363)	($714)	($727)	($743)	($734)	($706)	($708)	($695)	($672)	($670)
JCT Budget Estimates (Calendar Year, millions of 2016 dollars)	($542)	($717)	($731)	($741)	($727)	($707)	($705)	($689)	($672)	($670)

Table 4. Total Value of Section 179D Tax Deductions: Strengthen and Modernize

	2017	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**
Total Value of Tax Deductions (millions of 2016 dollars)	$2,911	$3,856	$3,930	$3,983	$3,909	$3,798	$3,789	$3,706	$3,610	$3,602
Private Sector (81%)	$2,362	$3,129	$3,189	$3,231	$3,171	$3,082	$3,074	$3,006	$2,929	$2,922
Government Sector (19%)	$549	$728	$742	$751	$737	$717	$715	$699	$681	$680

The value of these tax deductions is used to estimate associated investment and energy cost savings to private businesses and governments. Since Section 179D accelerates to the year placed in service the depreciation deduction for the cost of the energy efficient asset (up to the allowed amount), therefore just changing the timing of when the deduction may be taken, the impact on the federal budget (deficit) is not accounted for.

The full amount of the tax deduction earned by private commercial businesses each year is entered as a reduction in their cost of doing business.

Although governments do not file federal tax returns, and therefore cannot receive the tax deduction directly, they are allowed to pass the tax deduction on to the contractor responsible for designing their energy efficiency project. This amount is entered as a reduction in the cost of doing business for the professional, scientific, and technical services industry.

Table 5. Recipients of Benefit of Section 179D Tax Deduction: Strengthen and Modernize

	2017	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**
Recipient of Tax Deduction (millions of 2016 dollars)	$2,911	$3,856	$3,930	$3,983	$3,909	$3,798	$3,789	$3,706	$3,610	$3,602
Private Commercial Businesses	$2,362	$3,129	$3,189	$3,231	$3,171	$3,082	$3,074	$3,006	$2,929	$2,922
Professional Services	$549	$728	$742	$751	$737	$717	$715	$699	$681	$680

Leveraged Investment

Since the tax deduction is based on only a portion of the investment spending, it is assumed that each dollar of tax deduction is leveraged by a certain amount of investment spending. The tax incentive is calculated on a per square foot basis, and varies depending on the measured (and certified) improvement in energy efficiency. This leverage value was calculated from industry data provided to REMI by a third-party certifier[10], which showed an average of $3.12 of private investment for each $1 of federal tax deduction. This translates into an almost 17 to 1 ratio of investment to tax reduction. The incentive is meant to produce a rising share of energy efficient investment activity over a 5-10 year period, at which point the standard for receiving the incentive could be adjusted to account for the development of new technologies. For this reason, the amount of the leveraged investment is phased in over the ten year period of analysis, beginning at 50% in 2017, then incrementing 5% each year, reaching 95% in 2026.

The leveraged investment spending is split between labor (30%) and materials (70%) based on Garrett-Peltier[11], and the materials distributed to equipment type (75% HVAC, 25% Lighting) based on industry data provided to REMI by a third-party certifier.

Table 6. Leveraged Investment of Section 179D Tax Deduction: Strengthen and Modernize

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Leveraged Investment (millions of 2016 dollars)	$4,545	$6,622	$7,363	$8,083	$8,543	$8,895	$9,465	$9,835	$10,146	$10,685
Private Sector	$3,688	$5,373	$5,974	$6,558	$6,931	$7,217	$7,679	$7,979	$8,231	$8,669
A/C and Boiler equipment (53%)	$1,947	$2,836	$3,153	$3,462	$3,659	$3,809	$4,053	$4,212	$4,345	$4,576
Light fixtures, etc. (17%)	$635	$925	$1,028	$1,129	$1,193	$1,242	$1,322	$1,374	$1,417	$1,492
Labor (30%)	$1,106	$1,612	$1,792	$1,967	$2,079	$2,165	$2,304	$2,394	$2,469	$2,601
Government Sector	$858	$1,250	$1,389	$1,525	$1,612	$1,678	$1,786	$1,856	$1,914	$2,016
A/C and Boiler equipment (53%)	$453	$660	$733	$805	$851	$886	$943	$980	$1,010	$1,064
Light fixtures, etc. (17%)	$148	$215	$239	$263	$277	$289	$307	$319	$330	$347
Labor (30%)	$257	$375	$417	$458	$484	$504	$536	$557	$574	$605

Energy Savings

Industry data provided to REMI by a third-party certifier was used to calculate the average annual energy savings per dollar of tax deduction. This value was determined to be 8% (8 cents of future energy savings for every dollar of tax deduction). The total value of energy savings to the private sector was entered as a reduction in the cost of production, spread across all commercial industries in the model. A corresponding decrease in demand for electricity was also entered[12]. For energy savings to government,

[10] Energy Tax Savers, Inc.

[11] Employment Estimates for Energy Efficiency Retrofits of Commercial Buildings, Dr. Heidi Garrett-Peltier, Political Economy Research Institute, University of Massachusetts, Amherst, June 2011.

[12] Given the availability of capacity in electric power generation, it is assumed that reduced utility demand will not have a significant impact on investment in power plants. Rate adjustments and potential environmental and health effects of reduced demand for electricity were also not taken into account.

an increase in government spending was entered due to the availability of more resources for other areas of the budget as a result of the lower energy costs. As with the private sector, a corresponding decrease in demand for electricity was entered.

Table 7. Energy Savings of Section 179D Tax Deduction: Strengthen and Modernize

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Energy Savings (millions of 2016 dollars)	$236	$548	$866	$1,188	$1,504	$1,811	$2,118	$2,418	$2,710	$3,001
Private Sector	$191	$444	$702	$964	$1,220	$1,470	$1,718	$1,962	$2,199	$2,435
Government Sector	$44	$103	$163	$224	$284	$342	$400	$456	$511	$566

Table 8. Reduced Demand for Utilities of Section 179D Tax Deduction: Strengthen and Modernize

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Utility Demand (millions of 2016 dollars)	($236)	($548)	($866)	($1,188)	($1,504)	($1,811)	($2,118)	($2,418)	($2,710)	($3,001)
Private Sector	($191)	($444)	($702)	($964)	($1,220)	($1,470)	($1,718)	($1,962)	($2,199)	($2,435)
Government Sector	($44)	($103)	($163)	($224)	($284)	($342)	($400)	($456)	($511)	($566)

Investment Offset

For this analysis, we assume that for each dollar spent in a given year on investment in order to achieve the energy efficiency requirements, an equal dollar of investment is removed from spending spread over the next ten years. Therefore it is assumed that the tax deduction incentivizes the timing of the investment, leading to more immediate investment instead of longer term investment that is spread over many years.

Table 9. Investment Offset of Section 179D Tax Deduction: Strengthen and Modernize

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Investment Offset (millions of 2016 dollars)	($455)	($1,117)	($1,853)	($2,661)	($3,516)	($4,405)	($5,352)	($6,335)	($7,350)	($8,418)
Private Sector	($369)	($906)	($1,503)	($2,159)	($2,852)	($3,574)	($4,342)	($5,140)	($5,963)	($6,830)
Government Sector	($86)	($211)	($350)	($502)	($663)	($831)	($1,010)	($1,195)	($1,387)	($1,588)

Economic Impact Results

REMI modeled the scenario related to the President's FY 2017 Budget Proposal to modify and extend the deduction for energy efficient building property over the ten-year time period 2017-2026 based on the revenue score provided by the Joint Committee on Taxation. Over the first ten years of the extension, the net leveraged investment, energy savings, and accelerated tax deduction combined yield a net average gain of 76,529 jobs per year nationwide (see Figure 4). The construction industry gains the majority of these jobs (over 17,000), while Manufacturing, Trade, and Professional Services combined account for over 23,000 jobs. This is a result of the direct investment in energy efficiency technology and associated building construction and/or retrofitting. The Utilities industry loses some jobs (-1,750) due to reduced demand for electricity as a result of the increased energy efficiency.

Figure 4. Strengthen and Modernize: Total and Average Jobs

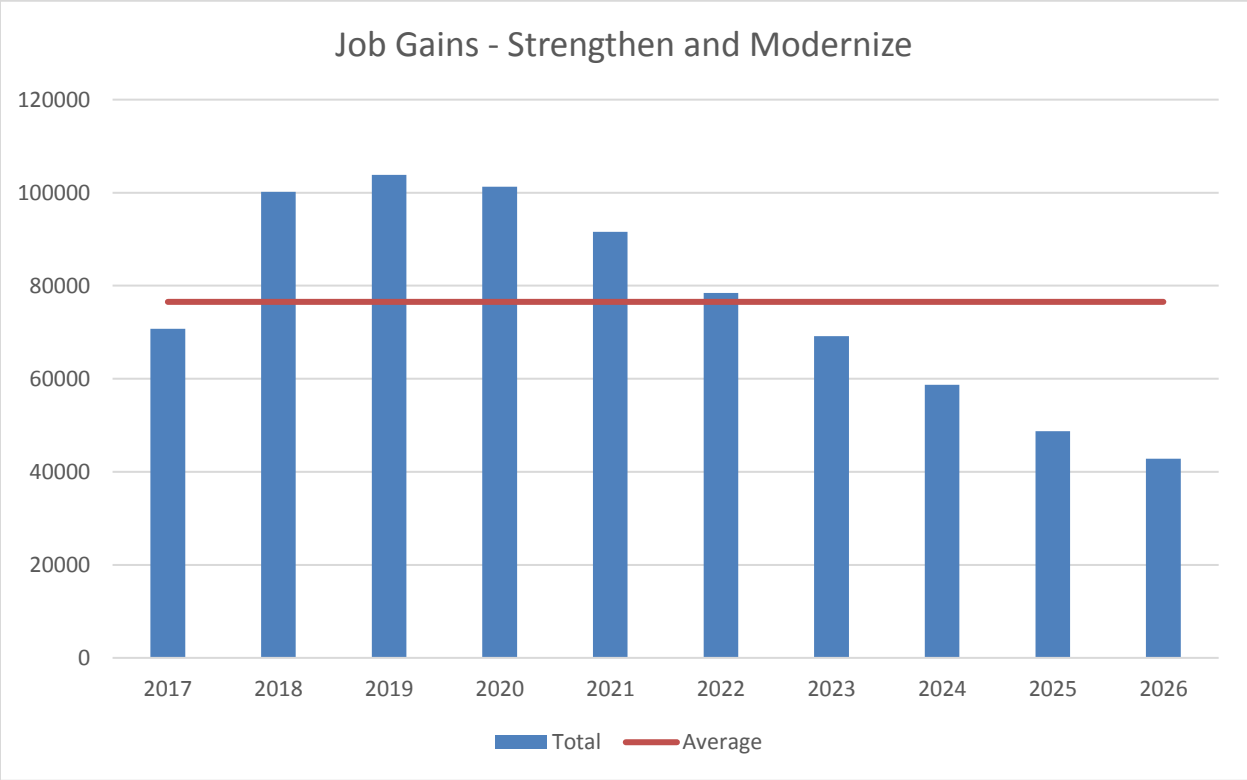
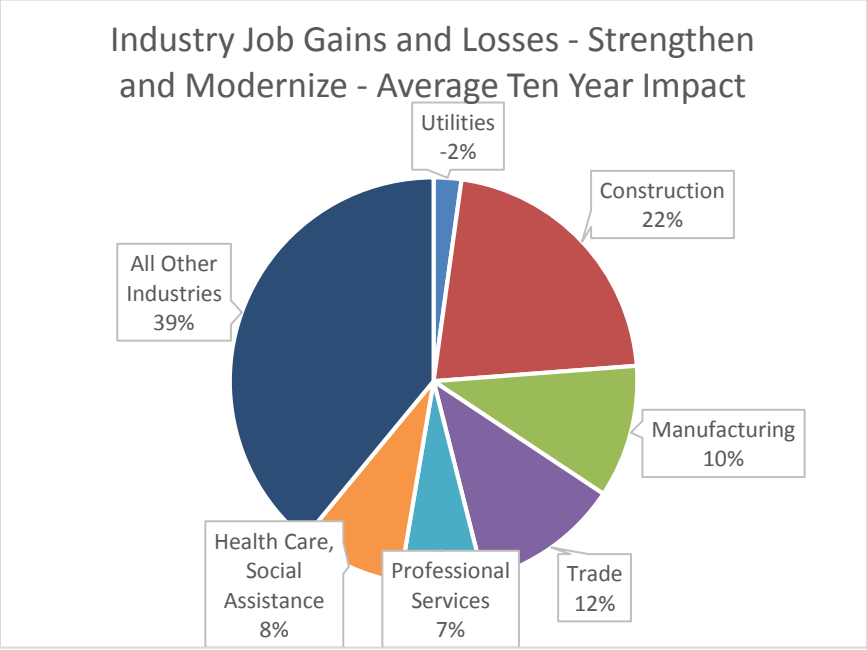
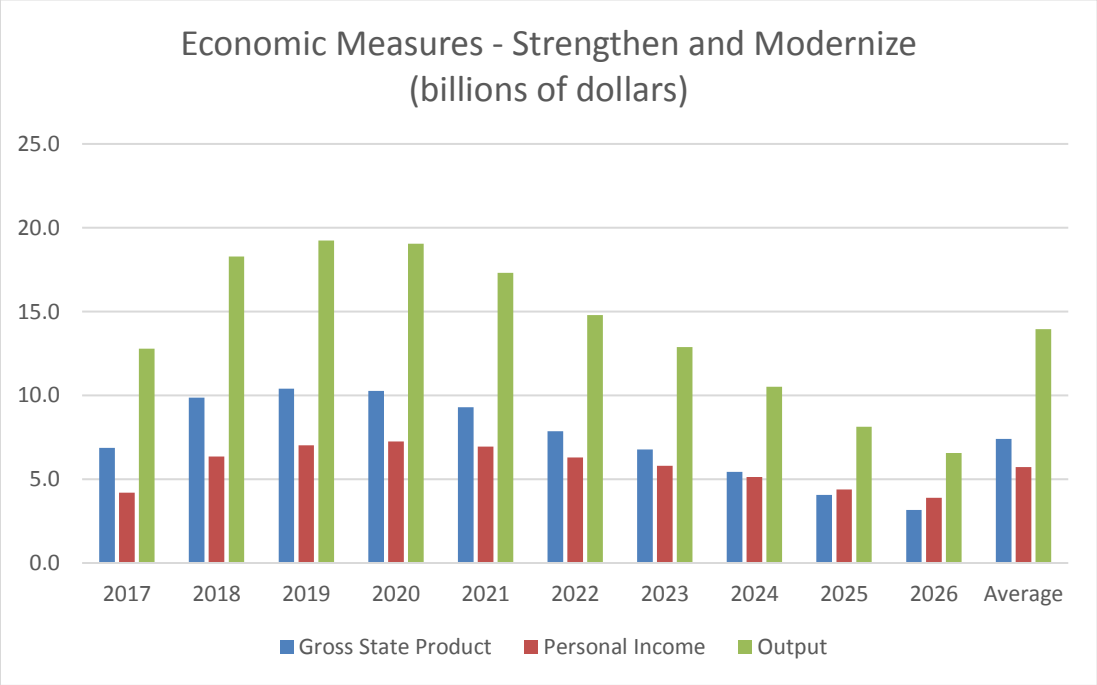


Figure 5. Strengthen and Modernize: Industry Jobs



In addition to the employment impact, Gross Domestic Product increased by an average of $7.4 billion nationwide. Similarly, personal income increased an average of $5.7 billion, while increased output averaged $14 billion.

Figure 6. Strengthen and Modernize: Economic Measures



Economic Impact Analysis: Extension and Expansion of Section 179D

Overview

As noted above, the 2015 legislative proposal developed by the Senate Finance Committee under Chairman Hatch would permit non-profit organizations (as defined in Section 501(c)(3) of the tax code) and tribal governments to allocate the deduction to the person primarily responsible for designing the property in the same manner as is allowed for public property. This change would create new opportunities for tax-exempt entities to enjoy the benefits of energy efficient improvements. Additionally, the modification would increase the applicable energy efficiency standards to ASHRAE 90.1-2007, and extend the deduction.

Methodology and Model Inputs

In order to analyze the potential economic impact of expanding and extending the deduction for energy efficient commercial building property, REMI evaluated both the costs and benefits of the program in terms of the value of the tax deduction, the additional leveraged investment spending it directly generates, and the future energy savings that results from it. These factors were estimated for both the private and government sectors.

Value of Tax Deduction

The cost of the Senate Finance Committee proposal for one year was estimated by the Joint Committee on Taxation to be $315 million over 10 years[13]. This analysis projects the economic impact of the first ten years of an extension based upon JCT's evaluation of this one-year extension.

Since the JCT reports in fiscal years, and the REMI model is based on calendar years, the revenue costs were converted to represent calendar years. The value of the tax deduction represented by the JCT's estimate of the budget effect was estimated based on the assumption of an effective corporate tax rate of 18.6% (the budget estimate was divided by the tax rate to yield an estimate of the tax deduction).

Since the tax deduction is available for both private and government-owned buildings, but the participants of the current program are primarily government entities, it was split between the two sectors based on a breakdown of 20% private and 80% government (this assumption differs from that used in the Extension of Current Law scenario based on Bureau of Economic Analysis nonresidential structures investment data for 2015[14] along with Bureau of Labor Statistics employment data for 2015[15] that reports nonresidential fixed assets of non-profits to be 9% of the private sector, and tribal governments to be 2% of the government sector, shifting the weight more towards the private sector).

[13] Estimated Revenue Effects of the Chairman's Modification to the Chairman's Mark of a Bill to Extend Certain Expired Provisions Scheduled for Markup by the Committee on Finance on July 21, 2015, Joint Committee on Taxation, July 21, 2015, JCX-104-15.

[14] BEA Table 4.7. Investment in Private Nonresidential Fixed Assets by Industry Group and Legal Form of Organization, and Table 7.5B. Investment in Government Fixed Assets. http://www.bea.gov

[15] BLS Quarterly Census of Employment and Wages data was used to determine the tribal government proportion of state and local government. http://ww.bls.gov

Table 10. Estimated Budget Effect of Section 179D Tax Deduction: Extension and Expansion

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Based on JCT Revenue Estimates (Fiscal Year, millions of 2016 dollars)	($295)	($353)	($346)	($339)	($333)	($328)	($324)	($321)	($318)	($315)
Based on JCT Revenue Estimates (Calendar Year, millions of 2016 dollars)	($383)	($351)	($344)	($338)	($332)	($327)	($323)	($320)	($317)	($315)

Table 11. Total Value of Section 179D Tax Deductions: Extension and Expansion

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Total Value of Tax Deductions (millions of 2016 dollars)	$2,060	$1,888	$1,851	$1,815	$1,784	$1,758	$1,737	$1,719	$1,704	$1,694
Private Sector (20%)	$412	$378	$370	$363	$357	$352	$347	$344	$341	$339
Government Sector (80%)	$1,648	$1,511	$1,481	$1,452	$1,427	$1,406	$1,390	$1,375	$1,363	$1,355

The value of these tax deductions are used to estimate associated investment and energy cost savings to private commercial businesses, including non-profits, and government entities, including tribal governments. Since Section 179D accelerates to the year placed in service the depreciation deduction for the cost of the energy efficient asset (up to the allowed amount), therefore just changing the timing of when the deduction may be taken, the impact on the federal budget (deficit) is not accounted for.

The full amount of the tax deduction earned by private for-profit commercial businesses each year is entered as a reduction in their cost of doing business.

Although non-profits and governments do not file federal tax returns, and therefore cannot receive the tax deduction directly, they are allowed to pass the tax deduction on to the contractor responsible for designing their energy efficiency project. This amount is entered as a reduction in the cost of doing business for the professional, scientific, and technical services industry.

Table 12. Recipients of Benefit of Section 179D Tax Deduction: Extension and Expansion

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Recipient of Tax Deduction (millions of 2016 dollars)	$2,060	$1,888	$1,851	$1,815	$1,784	$1,758	$1,737	$1,719	$1,704	$1,694
Private Commercial Businesses	$412	$378	$370	$363	$357	$352	$347	$344	$341	$339
Professional Services	$1,648	$1,511	$1,481	$1,452	$1,427	$1,406	$1,390	$1,375	$1,363	$1,355

Leveraged Investment

Since the tax deduction is based on only a portion of the investment spending, it is assumed that each dollar of tax deduction is leveraged by a certain amount of investment spending. The tax incentive is calculated on a per square foot basis, and varies depending on the measured (and certified) improvement in energy efficiency. This leverage value was calculated from industry data provided to REMI by a third-party certifier, which showed an average of $3.12 of private investment for each $1 of federal tax deduction. This translates into an almost 17 to 1 ratio of investment to tax reduction. The incentive is meant to produce a rising share of energy efficient investment activity over a 5-10 year period, at which point the standard for receiving the incentive could be adjusted to account for the development of new technologies. For this reason, the amount of the leveraged investment is phased in over the ten year period of analysis, beginning at 50% in 2017, then incrementing 5% each year, reaching 95% in 2026.

The leveraged investment spending is split between labor (30%) and materials (70%) based on Garrett-Peltier, and the materials distributed to equipment type (75% HVAC, 25% Lighting) based on industry data provided to REMI by a third-party certifier.

Table 13. Leveraged Investment of Section 179D Tax Deduction: Extension and Expansion

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Leveraged Investment (millions of 2016 dollars)	$3,217	$3,243	$3,467	$3,683	$3,898	$4,117	$4,340	$4,563	$4,788	$5,024
Private Sector	$643	$649	$693	$737	$780	$823	$868	$913	$958	$1,005
A/C and Boiler equipment (53%)	$340	$342	$366	$389	$412	$435	$458	$482	$505	$530
Light fixtures, etc. (17%)	$111	$112	$119	$127	$134	$142	$149	$157	$165	$173
Labor (30%)	$193	$195	$208	$221	$234	$247	$260	$274	$287	$301
Government Sector	$2,574	$2,595	$2,774	$2,946	$3,119	$3,294	$3,472	$3,650	$3,830	$4,019
A/C and Boiler equipment (53%)	$1,358	$1,370	$1,464	$1,555	$1,646	$1,739	$1,833	$1,927	$2,022	$2,121
Light fixtures, etc. (17%)	$443	$447	$478	$507	$537	$567	$598	$628	$659	$692
Labor (30%)	$772	$778	$832	$884	$936	$988	$1,041	$1,095	$1,149	$1,206

Energy Savings

Industry data provided to REMI by a third-party certifier was used to calculate the average annual energy savings per dollar of tax deduction. This value was determined to be 8% (8 cents of future energy savings for every dollar of tax deduction). The total value of energy savings to the private sector was entered as a reduction in the cost of production, spread across all commercial industries in the model. A corresponding decrease in demand for electricity was also entered. For energy savings to government, an increase in government spending was entered due to the availability of more resources for other areas of the budget as a result of the lower energy costs. As with the private sector, a corresponding decrease in demand for electricity was entered.

Table 14. Energy Savings of Section 179D Tax Deduction: Extension and Expansion

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Energy Savings (millions of 2016 dollars)	$167	$320	$469	$616	$760	$903	$1,043	$1,182	$1,320	$1,457
Private Sector	$33	$64	$94	$123	$152	$181	$209	$236	$264	$291
Government Sector	$133	$256	$375	$493	$608	$722	$835	$946	$1,056	$1,166

Table 15. Reduced Demand for Utilities of Section 179D Tax Deduction: Extension and Expansion

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Utility Demand (millions of 2016 dollars)	($167)	($320)	($469)	($616)	($760)	($903)	($1,043)	($1,182)	($1,320)	($1,457)
Private Sector	($33)	($64)	($94)	($123)	($152)	($181)	($209)	($236)	($264)	($291)
Government Sector	($133)	($256)	($375)	($493)	($608)	($722)	($835)	($946)	($1,056)	($1,166)

Investment Offset

For this analysis, we assume that for each dollar spent in a given year on investment in order to achieve the energy efficiency requirements, an equal dollar of investment is removed from spending spread over the next ten years. Therefore it is assumed that the tax deduction incentivizes the timing of the investment, leading to more immediate investment instead of longer term investment that is spread over many years.

Table 16. Investment Offset of Section 179D Tax Deduction: Extension and Expansion

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Investment Offset (millions of 2016 dollars)	($322)	($646)	($993)	($1,361)	($1,751)	($2,163)	($2,597)	($3,053)	($3,532)	($4,034)
Private Sector	($64)	($129)	($199)	($272)	($350)	($433)	($519)	($611)	($706)	($807)
Government Sector	($257)	($517)	($794)	($1,089)	($1,401)	($1,730)	($2,077)	($2,442)	($2,825)	($3,227)

Economic Impact Results

REMI modeled the scenario related to the proposal to extend and expand the deduction for energy efficient building property over the ten-year time period 2017-2026 based on the revenue score provided by the Joint Committee on Taxation. Over the first ten years of the extension, the net leveraged investment, energy savings, and accelerated tax deduction combined yield a net average gain of 39,388 jobs per year nationwide (see Figure 7). The construction industry gains the majority of these jobs (just under 8,200), while Manufacturing, Trade, and Professional Services combined account for almost 11,000 jobs. This is a result of the direct investment in energy efficiency technology and associated building construction and/or retrofitting. The Utilities industry loses some jobs (-880) due to reduced demand for electricity as a result of the increased energy efficiency.

Figure 7. Extension and Expansion: Total and Average Jobs

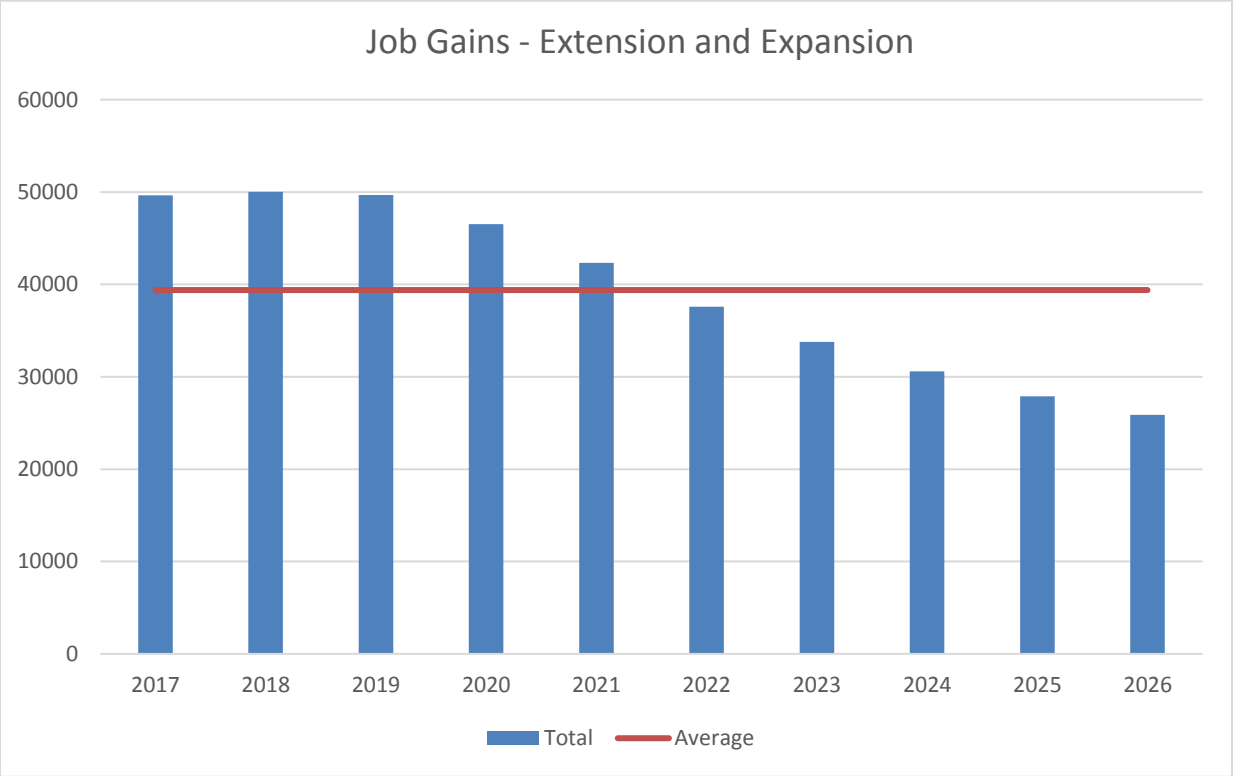
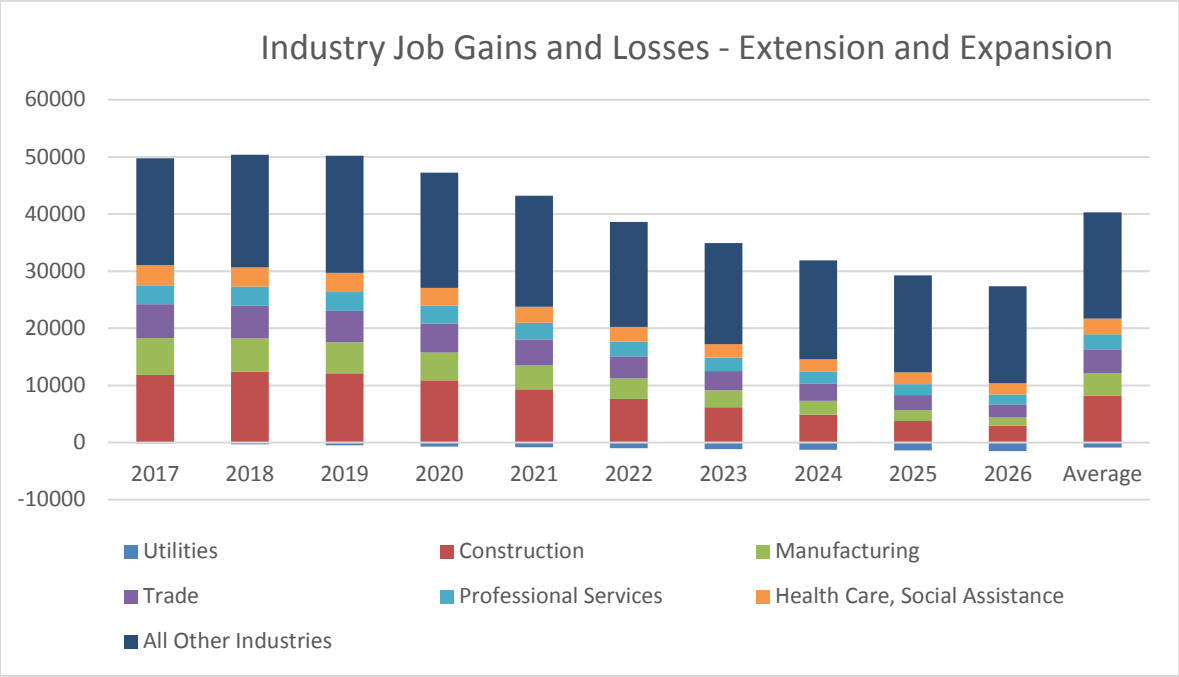
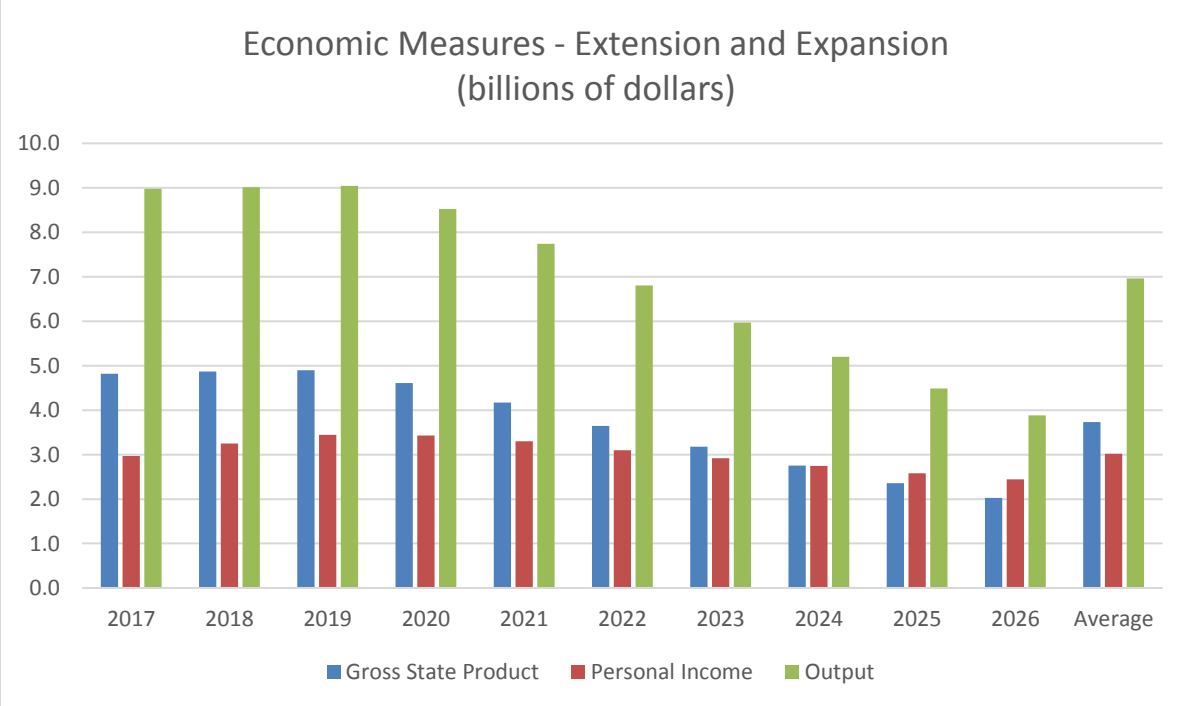


Figure 8. Extension and Expansion: Industry Jobs



In addition to the employment impact, Gross Domestic Product increased by an average of $3.7 billion nationwide. Similarly, personal income increased an average of $3 billion, while increased output averaged $7 billion.

Figure 9. Extension and Expansion: Economic Measures



Economic Impact Analysis: Extension of Current Law Section 179D

Overview

As a temporary tax provision, Section 179D has experienced numerous expirations and extensions since its enactment. This cycle frustrates the achievement of the policy goals for the incentive, since energy efficiency projects, like other construction projects, require considerable lead-time for planning and development. A long-term extension of Section 179D would provide certainty about the availability of the tax incentives, to support future hiring, manufacturing, and development decisions.

Methodology and Model Inputs

In order to analyze the potential economic impact of extending Section 179D as it exists under current law, REMI evaluated both the costs and benefits of the program in terms of the value of the tax deduction, the additional leveraged investment spending it directly generates, and the future energy savings that results from it. These factors were estimated for both the private and government sectors.

Value of Tax Deduction

The cost of the proposal to extend Section 179D for one year was estimated by the Joint Committee on Taxation to be $324 million over 10 years[16]. This analysis projects the economic impact of the first ten years of an extension based upon JCT's evaluation of this one-year extension.

Since the JCT reports in fiscal years, and the REMI model is based on calendar years, the revenue costs were converted to represent calendar years. The value of the tax deduction represented by the JCT's estimate of the budget effect was estimated based on the assumption of an effective corporate tax rate of 18.6% (the budget estimate was divided by the tax rate to yield an estimate of the tax deduction). Since the tax deduction is available for both private and government-owned buildings, but the participants of the current program are primarily government entities, it was split between the two sectors based on a breakdown of 15% private and 85% government.

Table 17. Estimated Budget Effect of Section 179D Tax Deduction: Extension of Current Law

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Based on JCT Revenue Estimates (Fiscal Year, millions of 2016 dollars)	($302)	($363)	($355)	($348)	($342)	($337)	($333)	($329)	($326)	($324)
Based on JCT Revenue Estimates (Calendar Year, millions of 2016 dollars)	($392)	($361)	($353)	($347)	($341)	($336)	($332)	($328)	($326)	($324)

[16] Estimated Budget Effects of Division Q of Amendment #2 to the Senate Amendment to H.R. 2029 (Rules Committee Print 114-40), The "Protecting Americans from Tax Hikes Act of 2015", Joint Committee on Taxation, December 16, 2015, JCX-143-15.

Table 18. Total Value of Section 179D Tax Deductions: Extension of Current Law

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Total Value of Tax Deductions (millions of 2016 dollars)	$2,109	$1,941	$1,899	$1,863	$1,832	$1,806	$1,785	$1,765	$1,750	$1,742
Private Sector (15%)	$316	$291	$285	$279	$275	$271	$268	$265	$263	$261
Government Sector (85%)	$1,793	$1,650	$1,614	$1,583	$1,557	$1,535	$1,517	$1,500	$1,488	$1,481

The value of these tax deductions is used to estimate associated investment and energy cost savings to private businesses and governments. Since Section 179D accelerates to the year placed in service the depreciation deduction for the cost of the energy efficient asset (up to the allowed amount), therefore just changing the timing of when the deduction may be taken, the impact on the federal budget (deficit) is not accounted for.

The full amount of the tax deduction earned by private commercial businesses each year is entered as a reduction in their cost of doing business.

Although governments do not file federal tax returns, and therefore cannot receive the tax deduction directly, they are allowed to pass the tax deduction on to the contractor responsible for designing their energy efficiency project. This amount is entered as a reduction in the cost of doing business for the professional, scientific, and technical services industry.

Table 19. Recipients of Benefit of Section 179D Tax Deduction: Extension of Current Law

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Recipient of Tax Deduction (millions of 2016 dollars)	$2,109	$1,941	$1,899	$1,863	$1,832	$1,806	$1,785	$1,765	$1,750	$1,742
Private Commercial Businesses	$316	$291	$285	$279	$275	$271	$268	$265	$263	$261
Professional Services	$1,793	$1,650	$1,614	$1,583	$1,557	$1,535	$1,517	$1,500	$1,488	$1,481

Leveraged Investment

Since the tax deduction is based on only a portion of the investment spending, it is assumed that each dollar of tax deduction is leveraged by a certain amount of investment spending. The tax incentive is calculated on a per square foot basis, and varies depending on the measured (and certified) improvement in energy efficiency. This leverage value was calculated from industry data provided to REMI by a third-party certifier, which showed an average of $3.12 of private investment for each $1 of federal tax deduction. This translates into an almost 17 to 1 ratio of investment to tax reduction. The incentive is meant to produce a rising share of energy efficient investment activity over a 5-10 year period, at which point the standard for receiving the incentive could be adjusted to account for the development of new technologies. For this reason, the amount of the leveraged investment is phased in over the ten year period of analysis, beginning at 50% in 2017, then incrementing 5% each year, reaching 95% in 2026.

The leveraged investment spending is split between labor (30%) and materials (70%) based on Garrett-Peltier, and the materials distributed to equipment type (75% HVAC, 25% Lighting) based on industry data provided to REMI by a third-party certifier.

Table 20. Leveraged Investment of Section 179D Tax Deduction: Extension of Current Law

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Leveraged Investment (millions of 2016 dollars)	$3,292	$3,333	$3,558	$3,781	$4,004	$4,230	$4,459	$4,684	$4,918	$5,167
Private Sector	$494	$500	$534	$567	$601	$635	$669	$703	$738	$775
A/C and Boiler equipment (53%)	$261	$264	$282	$299	$317	$335	$353	$371	$389	$409
Light fixtures, etc. (17%)	$85	$86	$92	$98	$103	$109	$115	$121	$127	$133
Labor (30%)	$148	$150	$160	$170	$180	$190	$201	$211	$221	$233
Government Sector	$2,799	$2,833	$3,024	$3,214	$3,404	$3,596	$3,790	$3,981	$4,180	$4,392
A/C and Boiler equipment (53%)	$1,477	$1,496	$1,596	$1,696	$1,797	$1,898	$2,001	$2,102	$2,207	$2,318
Light fixtures, etc. (17%)	$482	$488	$521	$553	$586	$619	$652	$685	$720	$756
Labor (30%)	$840	$850	$907	$964	$1,021	$1,079	$1,137	$1,194	$1,254	$1,318

Energy Savings

Industry data provided to REMI by a third-party certifier was used to calculate the average annual energy savings per dollar of tax deduction. This value was determined to be 8% (8 cents of future energy savings for every dollar of tax deduction). The total value of energy savings to the private sector was entered as a reduction in the cost of production, spread across all commercial industries in the model. A corresponding decrease in demand for electricity was also entered. For energy savings to government, an increase in government spending was entered due to the availability of more resources for other areas of the budget as a result of the lower energy costs. As with the private sector, a corresponding decrease in demand for electricity was entered.

Table 21. Energy Savings of Section 179D Tax Deduction: Extension of Current Law

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Energy Savings (millions of 2016 dollars)	$171	$328	$481	$632	$780	$926	$1,071	$1,214	$1,355	$1,496
Private Sector	$26	$49	$72	$95	$117	$139	$161	$182	$203	$224
Government Sector	$145	$279	$409	$537	$663	$787	$910	$1,032	$1,152	$1,272

Table 22. Reduced Demand for Utilities of Section 179D Tax Deduction: Extension of Current Law

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Utility Demand (millions of 2016 dollars)	($171)	($328)	($481)	($632)	($780)	($926)	($1,071)	($1,214)	($1,355)	($1,496)
Private Sector	($26)	($49)	($72)	($95)	($117)	($139)	($161)	($182)	($203)	($224)
Government Sector	($145)	($279)	($409)	($537)	($663)	($787)	($910)	($1,032)	($1,152)	($1,272)

Investment Offset

For this analysis, we assume that for each dollar spent in a given year on investment in order to achieve the energy efficiency requirements, an equal dollar of investment is removed from spending spread over the next ten years. Therefore it is assumed that the tax deduction incentivizes the timing of the investment, leading to more immediate investment instead of longer term investment that is spread over many years.

Table 23. Investment Offset of Section 179D Tax Deduction: Extension of Current Law

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Investment Offset (millions of 2016 dollars)	($329)	($663)	($1,018)	($1,396)	($1,797)	($2,220)	($2,666)	($3,134)	($3,626)	($4,143)
Private Sector	($49)	($99)	($153)	($209)	($270)	($333)	($400)	($470)	($544)	($621)
Government Sector	($280)	($563)	($866)	($1,187)	($1,527)	($1,887)	($2,266)	($2,664)	($3,082)	($3,521)

Economic Impact Results

REMI modeled the scenario related to a long-term extension of the temporary PATH Act extension of the deduction for energy efficient building property over the ten-year time period 2017-2026 based on the revenue score provided by the Joint Committee on Taxation. Over the first ten years of the extension, the net leveraged investment, energy savings, and accelerated tax deduction combined yield a net average gain of 40,749 jobs per year nationwide (see Figure 10). The construction industry gains the majority of these jobs (over 8,400), while Manufacturing, Trade, and Professional Services combined account for over 11,000 jobs. This is a result of the direct investment in energy efficiency technology and associated building construction and/or retrofitting. The Utilities industry loses some jobs (-900) due to reduced demand for electricity as a result of the increased energy efficiency.

Figure 10. Extension of Current Law: Total and Average Jobs

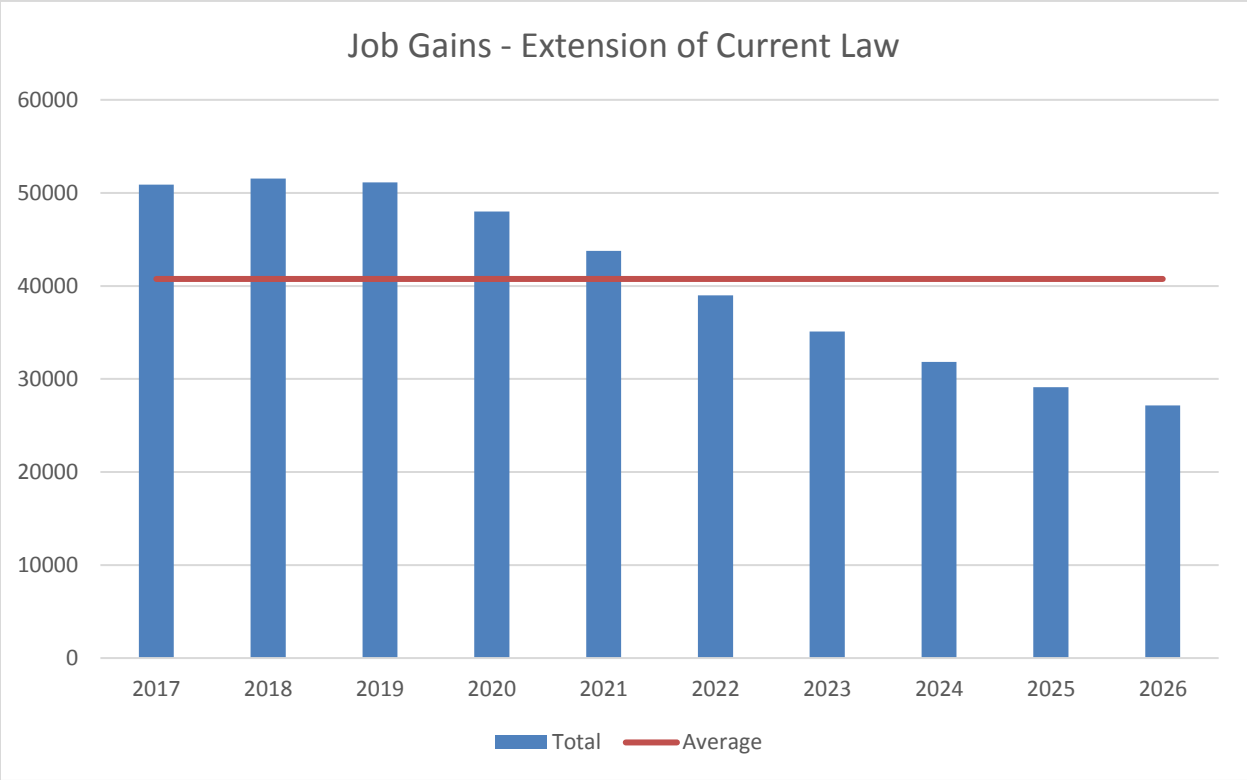
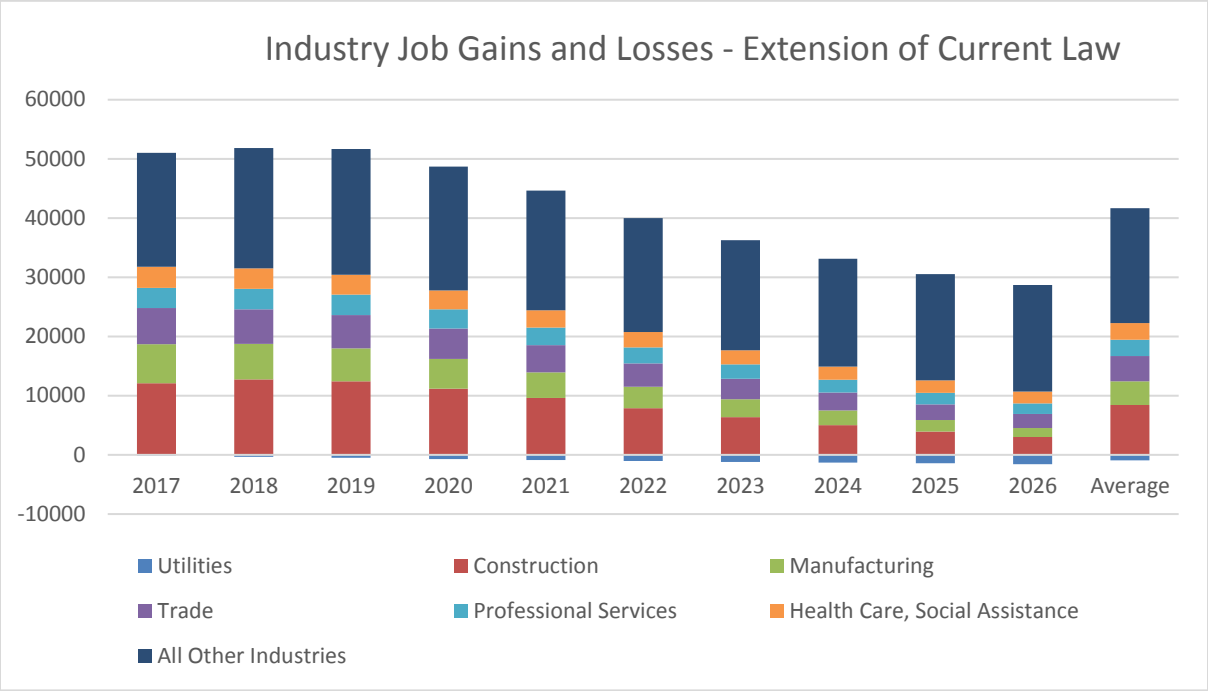
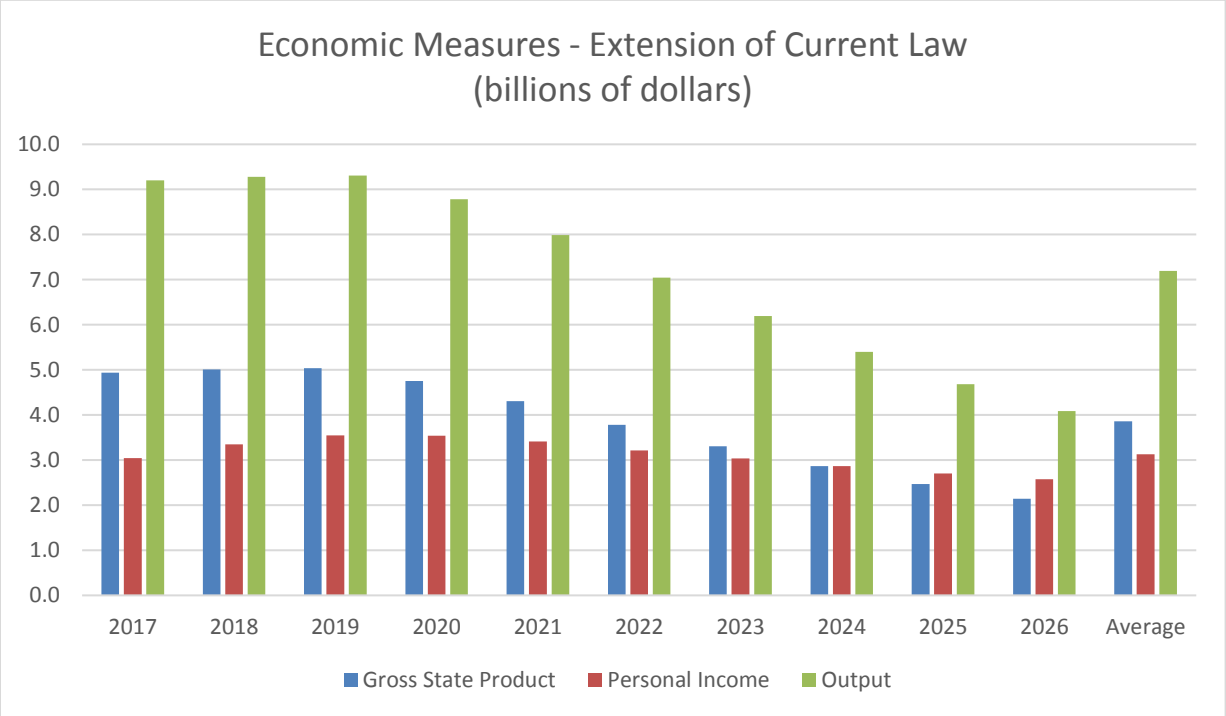


Figure 11. Extension of Current Law: Industry Jobs



In addition to the employment impact, Gross Domestic Product increased by an average of $3.9 billion nationwide. Similarly, personal income increased an average of $3.1 billion, while increased output averaged $7.2 billion.

Figure 12. Extension of Current Law: Economic Measures



Conclusion

Strengthening the Section 179D Energy Efficient Commercial Buildings Tax Deduction will create jobs and expand the nation's economy. Enhancing this incentive will not only help industries involved in designing, building, and operating commercial buildings, it will also benefit the broader economy.

Strengthening and modernizing Section 179D to optimize the opportunities it presents to commercial developers is estimated to lead to an average annual gain of 76,529 jobs, $7.4 billion in gross domestic product, and $5.7 billion in personal income for the first ten years after enactment.

An extension of current law plus expansion to include non-profits and tribal governments, while increasing the applicable energy efficiency standards, is estimated to lead to an average annual gain of 39,388 jobs, $3.7 billion in gross domestic product, and $3 billion in personal income for the first ten years after enactment.

An extension of current law is estimated to lead to an average annual gain of 40,749 jobs, $3.9 billion in gross domestic product, and $3.1 billion in personal income for the first ten years after enactment.

The Section 179D Energy Efficient Commercial Buildings Tax Deduction strengthens our nation's energy independence, reduces emissions, encourages innovation, and creates jobs. These benefits would be compounded by increasing the dollar value of the deduction in accordance with several Congressional and administration proposals.

Appendix 1: Overview of the REMI Model

PI+ is a structural economic forecasting and policy analysis model. It 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 1 and 2.

Figure 1: REMI Model Linkages

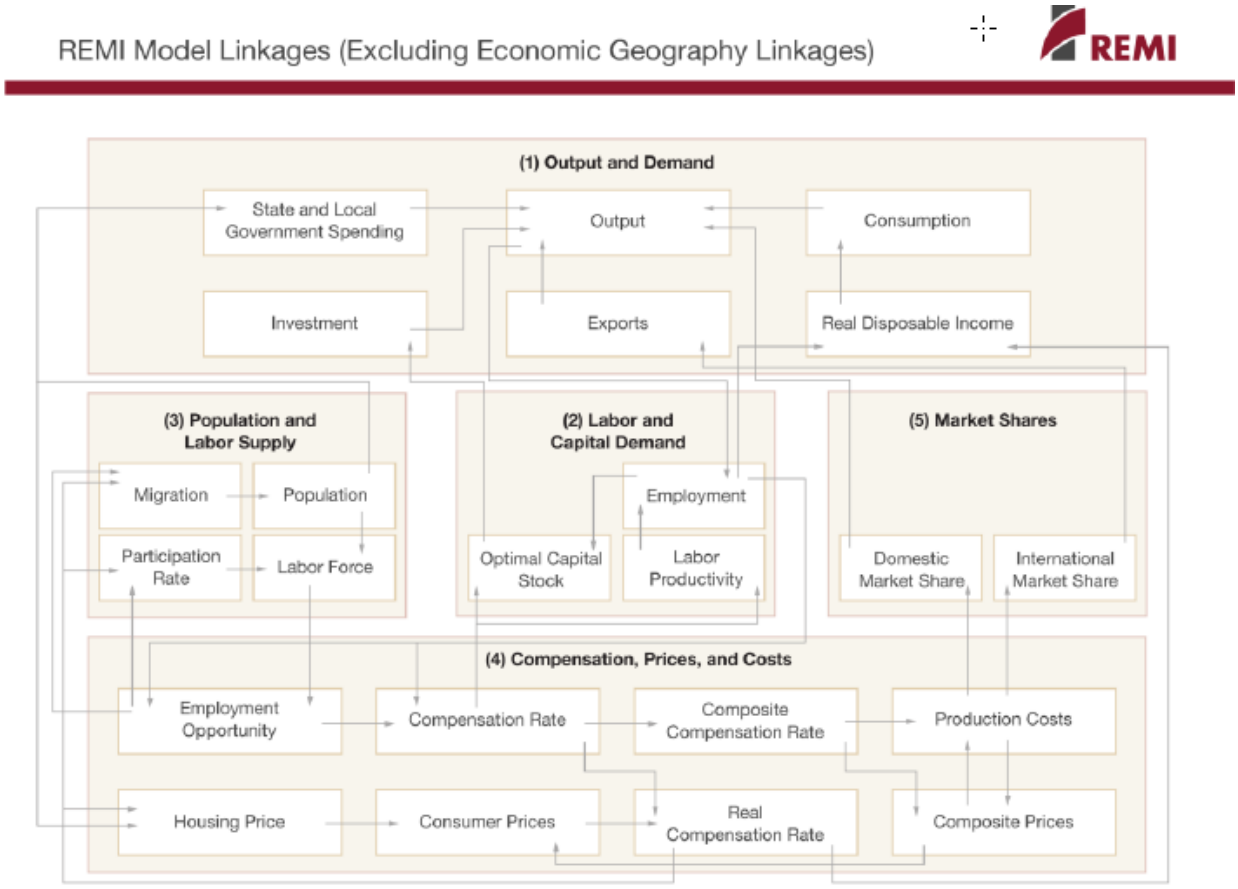
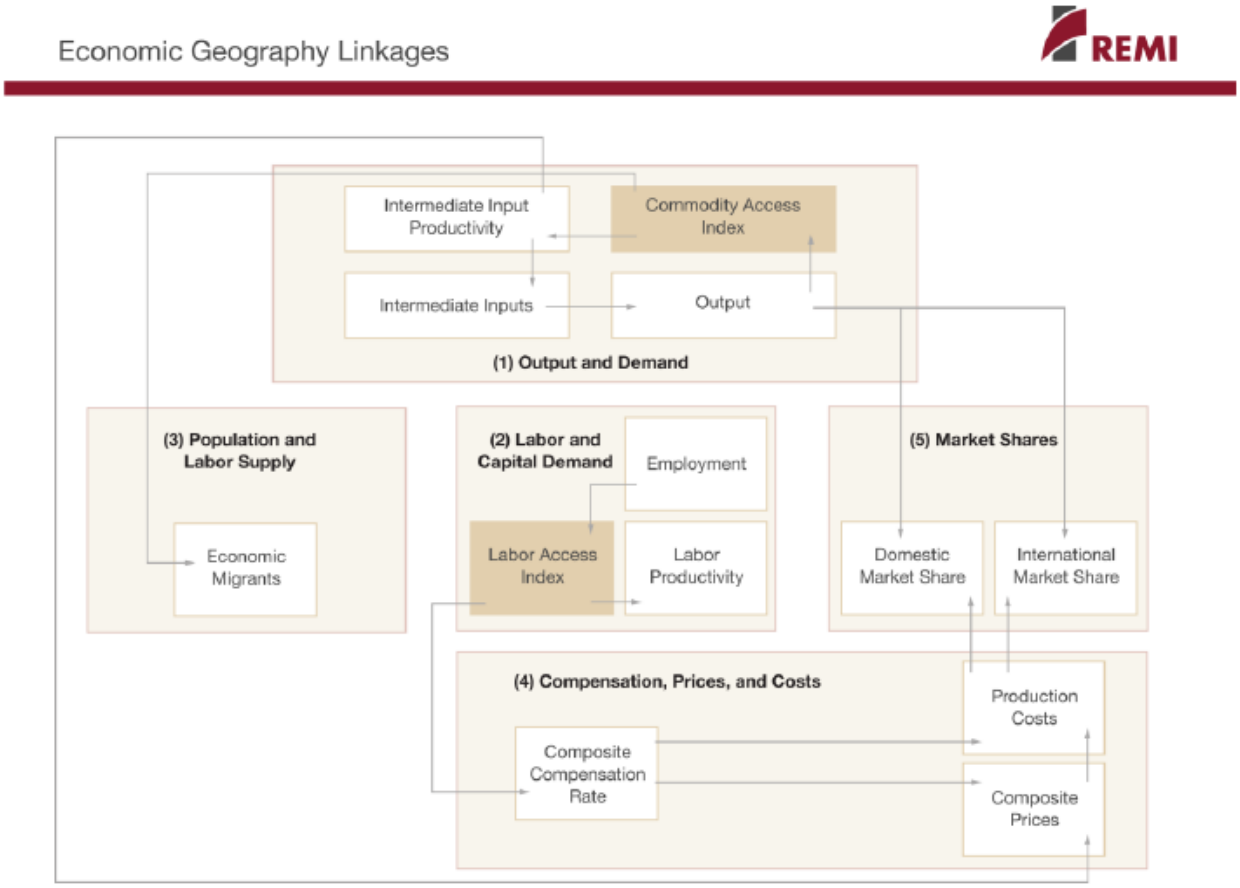


Figure 2: Economic Geography Linkages



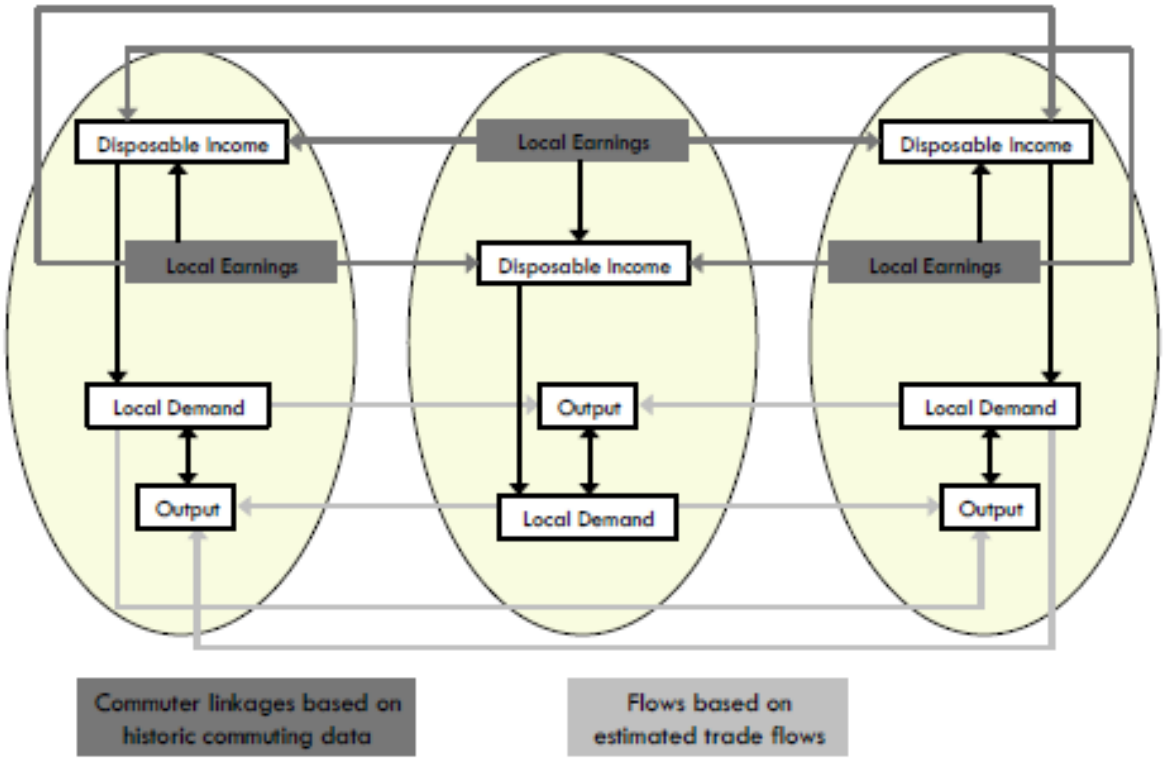
The Output and Demand block consists of output, demand, consumption, investment, government spending, exports, and imports, as well as feedback from output change due to the change in the productivity of intermediate inputs. The Labor and Capital Demand block includes labor intensity and productivity 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 3.

Figure 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 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 ethnic category, 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.

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