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Macroeconomic Impacts of Federal Regulation of the Manufacturing Sector

Commissioned by Manufacturers Alliance for Productivity and Innovation

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KEY POINTS

In the study "*Macroeconomic Impacts of Federal Regulation of the Manufacturing Sector*," commissioned by Manufacturers Alliance for Productivity and Innovation (MAPI), economists from NERA Economic Consulting examined qualitative and quantitative impacts of federal regulations on the U.S. economy as a whole and the manufacturing sector in particular. NERA applied its general equilibrium model of the U.S. economy (the N_{ew}ERA Model) to evaluate the macroeconomic consequences of major regulations based on cost estimates of federal regulations developed from the qualitative part of this study. The modeling framework captures the direct and indirect effects of increases in the cost of production in the manufacturing sector because the model accounts for interactions among all parts of the economy.

The study produced a number of key findings:

The number of major regulations has increased in recent years

The average number of major regulations promulgated per year has risen over the past three administrations. From 1993 to 2000, the average number of major regulations was 36. This figure increased to an average of 45 per year from 2001 to 2008. Under the current presidential administration, the average was 72 major regulations per year between 2009 and 2011.

This study's macroeconomic analysis shows that these regulations create real costs for business and slow the growth of the manufacturing sector. The cumulative burden of these regulations contributes significantly to long-term slowing of growth of the manufacturing sector. If helping the manufacturing sector escape its flat growth trap is an important priority of national economic policy, it is imperative that the pace of new regulations be controlled and the cumulative burden of existing regulations be reduced.

The increasing number of regulations has harmed the manufacturing sector's production

All subsectors of the manufacturing sector are impacted negatively by the myriad regulations; in particular, energy-intensive sectors are most affected. Output from the subsectors classified under the North American Industry Classification System (NAICS) 31, including food, beverage, and textile manufacturing, could be 2% to 5% lower over the next decade than it would be without the growing regulatory burden. Similarly, output from wood, paper, printing, petroleum, chemical, and plastic subsectors under NAICS 32 could be reduced by 2.5% to 6.5% from where the level of output would be without the growing regulatory burden. Output from NAICS 33 manufacturing subsectors, which include machinery and transportation equipment, could be

2.0% to 5.5% higher over the next decade without the growing regulatory burden.[2] Petroleum refineries, chemicals, transportation equipment, and other energy-intensive sectors are disproportionately affected.

The loss in manufacturing sector output has implications for the broader economy. Loss in income for manufacturing workers leads to overall lower aggregate consumption and lower savings in the economy, harming overall economic activity.

Environmental regulations are the key source of impact on the manufacturing sectors

This study shows that energy and environmental regulations continue to grow rapidly, and this growth has large consequences for energy markets and the cost of energy for the manufacturing sector. The rising cost of complying with more and more regulations significantly impacts the production costs in the energy-intensive sectors, leading to less demand for their output.

Cumulative costs of regulations are greater than the sum of individual regulations in isolation

The Office of Management and Budget (OMB) classifies 95% of all regulations as non-major (meaning they have an expected annual cost of less than $100 million). Although impacts of each regulation may be small when analyzed in isolation, the large number of such regulations could make the sum of their impacts comparable to those of major regulations.

Moreover, when policies are analyzed collectively or layered one on top of another, we find that costs increase more rapidly than the sum of the costs estimated in isolation. This super-additive result occurs because the regulations interact with each other and create additional distortions in the economy, leading to higher costs and impacts. The study shows non-additive negative consequences of layering an environmental regulation on top of a financial and an energy regulation. These interactive effects of increasing regulation imply that the total burden of major and non-major regulations could be considerably greater than the sum of the individual regulations. Unless a lower threshold for requiring cost estimates is set, the total cost of all regulation will continue to be underestimated.

The impact of regulations already in place is as important as the future growth in regulations

The study's authors infer from the sensitivity analysis that the impacts on the manufacturing sector caused by the cost of compliance with existing regulations are larger than the likely additional impacts of new regulations that may be added in the next decade. The magnitude of the current level of compliance cost (sunk cost) is the principal driver of the study's results. If the manufacturing sector is to make a comeback in the U.S., serious consideration should be

[2] The manufacturing sector, represented by NAICS 31-33, includes establishments engaged in the mechanical, physical, or chemical transformation of materials, substances, or components into new products (www.census.gov). The details of the subsectors within each of the NAICSs sectors are discussed in the study.

given to (1) revisiting and revising existing regulations, (2) slowing the growth of new regulations, and (3) ensuring any new regulations mesh as well as possible with existing regulations rather than being duplicative or unnecessary.

EXECUTIVE SUMMARY

While many have voiced concern over the number of federal regulations on the books and the rate at which the number of new regulations is growing, the feeling is particularly widespread in the business community, which directly bears the burden of increased regulation. In early 2011, President Obama called for "an unprecedented government-wide review of regulations already on the books so that we can improve or remove those that are out-of-date, unnecessary, excessively burdensome, or in conflict with other rules." The head of regulatory review at the Office of Management and Budget (OMB) stated, "A 21st-century regulatory system must promote economic growth, innovation and job creation while also protecting public health and welfare." [3]

Since OMB began compiling data on the cost of regulations in 1981, about 40,000 proposed and final regulations have been issued. Based on the data of cost and number of regulations, we estimate the current direct cost of compliance with "major" regulations (those with an estimated cost greater than $100 million) issued between 1993 and 2011 to be between $265 billion and $726 billion (in constant 2010 dollars) a year for the economy as a whole.

The Manufacturers Alliance for Productivity and Innovation (MAPI) shares the president's concern about the burden of the current regulatory system, and as such, commissioned NERA Economic Consulting to conduct an in-depth analysis to determine the cost of regulations to the U.S. economy in general and to the manufacturing sector in particular. Although the report's estimates do not factor in the benefits of regulations, they can be used to help identify the cost of regulations, areas where regulatory review may be best focused, and the impacts of allowing regulations to expand at their current rate.

Key Findings

- Growth in the cost of major regulation has far exceeded economic growth, especially manufacturing sector growth. From 1998 through the end of 2011, the cumulative inflation-adjusted cost of compliance with major regulations affecting the manufacturing sector grew by an annualized rate of 7.6%. Over this same period, U.S. inflation-adjusted GDP growth averaged 2.2% a year, and the annual growth in the physical volume of manufacturing sector output averaged a mere 0.4%.

- This study estimates that 2,183 unique regulations have been imposed on the manufacturing sector between 1981 and April 2012.

    - 41 major regulations and 375 non-major regulations were directly related to the NAICS 31 sector, which includes food, beverage, and textile manufacturing.

[3] Cass Sunstein, "21st-Century Regulation: An Update on the President's Reforms," The Wall Street Journal, May 25, 2011.

    - 65 major regulations and 755 non-major regulations were directly related to the NAICS 32 sector, which encompasses businesses involved in wood, paper, printing, petroleum products, chemicals, and plastics.

    - 185 major regulations and 1,423 non-major regulations were directly related to the NAICS 33 sector, which includes machinery and transportation equipment.

- Regulations impose costs across the entire manufacturing sector. Major regulations could reduce manufacturing output by 2.3% to 6.0% on average over the next decade.

    - NAICS 31 sectoral output could be 2.0% to 5.0% less on average over the next decade than it would be without the estimated regulatory burden.

    - NAICS 32 sectoral output could be 2.5% to 6.5% less on average over the next decade than it would be without the estimated regulatory burden.

    - NAICS 33 sectoral output could be 2.0% to 5.5% less on average over the next decade than it would be without the estimated regulatory burden.

- Energy-intensive sectors are affected most. Chemicals and petroleum products sectoral output could fall by about 9.0% to 10% per year on average over the next decade.

- Major regulations also shape the total value of shipments from the manufacturing sector. Manufacturing sector output could be reduced by $200 billion to $500 billion in constant 2010 dollars in 2012.

- In 2012, major regulations could be causing a loss in shipment value of the manufacturing sector as a whole equal to 85% of the 2010 pre-tax profits of the sector.

- Exports from the manufacturing sector are being held down by the regulatory burden. Exports in 2012 could be 6.5% to 17% lower than they would be without the estimated regulatory burden.

- The Environmental Protection Agency (EPA) imposes the largest number of regulations on the manufacturing sector with respect to number of regulations (972 regulations in total, including 122 major regulations), followed by the Departments of Transportation (880 regulations in total, including 69 major regulations), Labor (214 regulations in total, including 27 major regulations), and Energy (106 regulations in total, including 17 major regulations).

- The EPA also imposes the largest regulatory burden on the manufacturing sector with respect to cost of major regulations ($117 billion in constant 2010 dollars), followed by the Departments of Transportation ($25 billion in constant 2010 dollars), Health and Human Services ($10 billion in constant 2010 dollars), and Homeland Security ($7 billion in constant 2010 dollars).

- Overall economy-wide labor compensation could be between 1.4% and 5.0% smaller in 2012 than it would be without the estimated regulatory burden.

- Expected U.S. gross domestic product (GDP) loss in 2012 attributable to the cumulative burden of regulation ranges from $240 billion to $630 billion in constant 2010 dollars.

- An average U.S. household's loss in purchasing power in 2012 could range from $1,800 to $5,000 (in constant 2010 dollars).

Construction of the Database of Regulations and Types of Regulation Analyzed That Affect the Manufacturing Sector

We used data from OMB to create a database of regulations issued between1981 and April 2012 and associated OMB cost estimates and those found in other reports that have analyzed selected regulations. We used these data to describe the types of regulation that affect the manufacturing sector and the rate of growth in regulatory burden both in number of regulations in effect and their cumulative cost. In order to understand how the regulatory burden on the manufacturing sector affects the economy as a whole, we incorporated these direct costs into the N_{ew}ERA model to estimate how GDP, labor compensation, manufacturing output, and household purchasing power are influenced by the growing regulatory burden.

We used two methods of estimating the cumulative cost of major regulations. In one method, we aggregated the annual cost of the limited number of major regulations for which we have cost estimates in the OMB database from 1993 through 2011. In the alternative method, we calculated the average cost per major regulation for each year using all major regulations from 1993 through 2011 in the OMB dataset and extrapolated it by multiplying by the total number of major regulations for each year as indicated in the Office of Information and Regulatory Affairs (OIRA) database. Both cumulative cost estimates were used as inputs for sunk costs in the scenarios analyzed in the N_{ew}ERA model.

The analysis in this report focuses on five types of major regulations that have the most significant impacts on the manufacturing sector:

- ***Financial regulations***, including: internal controls over financial reporting (Section 404 of Sarbanes-Oxley); swap end-user rules (Commodity Futures Trading Commission); conflict mineral disclosure rules (SEC); and Proxy Access Rules (SEC).

- ***Labor regulations***, including: workplace safety (Occupational Safety and Health Administration; unionization regulations; the Fair Labor Standards Act; unemployment compensation and notice of large layoffs; anti-discrimination regulations; and the Patient Protection and Affordable Care Act.

- ***Energy regulations***, including: energy efficiency standards for durable goods and equipment; energy efficiency standards for buildings; alternative fuel mandates for fleets; and renewable fuels standards, including ethanol requirements.

- ***Environmental regulations***, including: National Ambient Air Quality Standards for Particulate Matter; National Ambient Air Quality Standards for Ozone; National Ambient Air Quality Standards for Sulfur Dioxide; National Ambient Air Quality Standard for Lead; National Emission Standards for Hazardous Air Pollutants; Cross State Air Pollution Rule (CSAPR); Clean Air Mercury Rule; Greenhouse Gas Reporting Rule; and New Source Performance Standards.

- ***Transportation regulations***, including: Fuel Economy Standards for Light Trucks and Passenger Automobiles; Fuel Economy Standards for Off-Road Engines; and Regulation of Fuels and Fuel Additives.

Why the Regulatory Burden is Most Likely Underestimated

On balance, the limited number of cost estimates available from OMB and other studies compared to the number of regulations that have been issued makes it nearly certain that this study underestimates the overall burden of regulation on the U.S. economy. To obtain an accurate estimate of the cost of all regulations would require considerably greater resources to be devoted to regulatory review by OMB and the requirements for cost-benefit analysis would have to be extended to all agencies.

In addition, the following qualifications apply:

- The costs of state and local regulations are not included in the analysis.

- Because of a lack of data, the costs of non-major regulations are not estimated, but comparing the number of non-major to major regulations suggests that the aggregate burden of non-major regulations could well be as large as the cost of major regulations.

- Costs estimates are not generally available for regulations issued by independent agencies not subject to review, though recent regulations issued by the SEC and other agencies and boards to implement the Dodd-Frank bill are thought to be particularly burdensome.

- The N_{ew}ERA economic model assumes full employment and a fixed supply of labor. Thus, potential impacts of labor market regulations such as the employment compensation system and the minimum wage on unemployment are not addressed.

- The N_{ew}ERA model's assumption of perfect foresight also means that it leaves out any consideration of how uncertainty about future growth in regulations induces businesses to hold back on investment.

- The analysis does not address the benefits of regulation included in regulatory analyses. These benefits are generally in willingness to pay measures for non-marketed goods such as air quality and safety that do not show up in the measures of national income such as GDP and disposable personal income.

I. INTRODUCTION

A. Objectives of the Study

NERA Economic Consulting was asked by the Manufacturers Alliance for Productivity and Innovation (MAPI) to conduct a comprehensive assessment of the impact of federal regulations on the manufacturing sector. Operations and profits of the sector are significantly affected by federal regulations, such as rules on occupational safety and environmental matters to those related to tax compliance and securities. Three specific objectives of the study are to:

1. Develop a method for quantitative and qualitative analysis of the impacts of federal regulations on the manufacturing sector as a whole.

2. Develop a method to compare the cost of regulations on different major industries within the manufacturing sector with the goal of highlighting major industries that are highly regulated.

3. Enumerate the array of regulations affecting manufacturing firms and quantify the estimated cost of compliance.

B. How the Study Was Conducted

1. Qualitative Analysis of the Burden of Regulations

In this phase, NERA made use of publicly available information, NERA's industry expertise, and MAPI members' industry knowledge to enumerate the array of major federal regulations affecting manufacturing firms and qualitatively describe the burden of these regulations to the manufacturing sector and to the overall economy. This qualitative description includes an analysis of the number of regulations issued over time and by the main agencies, and the cumulative costs imposed by federal regulations as assessed from public information only.

2. Quantitative Analysis of the Cost of Regulations

NERA developed several alternative calculations of the direct cost of regulation, including one based on responses to a survey of chief executives of manufacturing companies. These were used as inputs to NERA's N_{ew}ERA model of the U.S. economy in order to derive impacts on macroeconomic variables such as GDP, labor compensation, and household purchasing power and on the manufacturing sector as a whole and its key sub-sectors.

C. Organization of the Report

The next section provides a brief history of regulation in the post-war U.S. economy, a review of efforts in the executive branch to understand and manage the cost of regulation, and a description of how the data relied on in this study about the cost of regulation were developed.

The following section describes in more detail our methodology for estimating the cost of regulation and for modeling its macroeconomic impacts.

The next two sections explain our qualitative findings about the type, number, and agencies responsible, and then our quantitative analysis of their direct costs and macroeconomic impacts. The final section provides some concluding reflections about regulations.

II. REGULATORY ECONOMICS

"…[R]egulation is government prescription of terms and conditions of private transactions (usually in the form of rules written and enforced by specialized administrative agencies) aimed at achieving some public result."[4] Since in the United States there has been a general understanding that markets and free enterprise have worked well to sustain steady growth in economic wellbeing, some form of market failure usually provides the rationale for such intervention. Regulations of monopolies and ensuring consumers have adequate information are also often cited as grounds. Over time, more and more controls have arisen to deal with environmental problems such as pollution that stem from the lack of effective markets to achieve the most economically efficient outcomes.

A. Trends in Regulation

Through the last 40 years, the scope and nature of U.S. regulation has been greatly altered. Government has asserted control over many new aspects of U.S. life but has relinquished control over a few others. Throughout this period, some scholars and policy makers have labored on an agenda for regulatory reform. That agenda has evolved, but it remains broadly focused on two themes. The first is to confine regulation to instances of clear market failure. The second is to use either quasi-market mechanisms or cost-benefit analysis to boost regulation's benefits and to shrink its costs. These efforts have yielded mixed results.

In many ways, the modern era of regulation began with the 1970s. In those years, government control over the economy grew dramatically, yet this same decade also saw progress toward selective deregulation.

During the 1970s, government expanded the scope and stringency of many controls. Management of air and water pollution became a major focus of public policy. Government also controlled the price of crude oil, and it sought to steer the economic rents thus created to favored regions and uses. CAFE standards dictated fleet average fuel mileage of new cars. To manage these expanded functions, unified bureaucracies like the National Highway Traffic Safety Administration (NHTSA) and the Environmental Protection Agency (EPA) were created.

[4] Christopher DeMuth, "What is Regulation?" in *What Role for Government?*, Richard J. Zeckhauser and Derek Leebaert, eds. (Durham, N.C.: Duke University Press, 1983), pp. 262-278, available at www.christopherdemuth.com/what-is-regulation.html.

Paradoxically, the same decade saw a drive toward deregulation. In telecommunications, new long distance carriers showed that competition would lower costs, create new services, and advance technology. In the face of multiple rail bankruptcies, the Interstate Commerce Commission (ICC) continued to block the spread of trucking and bus services. In so doing, it showed the system of transportation regulation was neither able to protect the railroads nor willing to adjust to their decline; both Congress and the White House moved to curb its powers. Likewise, intrastate airlines proved that competition could lower rates. Therefore, the waste caused by the Civil Aeronautics Board's (CAB) rate and entry controls and the oligopolistic competition that they induced could be avoided.[5] Political support for the CAB rapidly waned. Natural gas shortages fostered demand for ending wellhead price controls, and the first steps were taken toward this end. Most strikingly, long gasoline lines spoke loudly in favor of crude price deregulation. President Carter moved haltingly to begin the process of ending oil price controls.

Beyond selectively pruning back clearly outmoded systems of regulations, government began to seek to improve outcomes from those that it kept. President Carter signed the Paperwork Reduction Act, which established the institutional framework for Ronald Reagan's even stronger efforts to subject regulations to a cost-benefit test. Those procedures have continued, albeit in somewhat milder forms, by all of Reagan's successors.[6]

In the 1980s, the mixed trends continued. For instance, crude oil price controls were eliminated on an accelerated schedule, and the process of phasing out controls on wellhead prices of natural gas endured. Both the Reagan and the first Bush administrations were strong proponents of using cost-benefit analysis in regulatory decision making. A new market-based system was used to phase out the use of lead as a gasoline additive,[7] and surface transportation controls were further weakened. Yet the Reagan administration also accepted a new airbag regulation. Outside of crude oil, no major regulatory system was abolished.

These trends continued into the 1990s. The shift to more market-based environmental regulation was a strong trend. Title IV of the Clean Air Act was enacted in 1990 to curb acid rain, a provision perceived to be a great success of market-based regulation. Indeed, when the Clinton administration succeeded that of George H. W. Bush, it seized upon cap-and-trade as its preferred policy tool for controlling greenhouse gas emissions. In negotiating what became the Kyoto Protocol (and against prolonged resistance from the EU), Clinton insisted on a cap-and-trade approach. Many states moved toward deregulation of electricity rates in the 1990s, although the record of this process was mixed.

In the first decade of the 21st century events fostered another surge in which controls expanded in scope and increased in severity. Corporate accounting scandals in 2001 and 2002 led to the

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[5] Robert W. Hahn and John A. Hird. 1991. "The Benefits and Costs of Regulation: Review and Synthesis." Yale Journal on Regulation 8: 233-78.

[6] Christopher C. DeMuth, "OIRA at Thirty," 63 Administrative Law Review 3:101 (2011).

[7] Christopher DeMuth, Robert W. Hahn, Robert W. Crandall, and Robert E. Litan An Agenda for Federal Regulatory Reform, AEI Press 1997 (P. 4)

Sarbanes-Oxley Act. Oil prices rose sharply from 2004 through 2007, and in response, Congress, with support from President Bush, enacted the Energy Policy Act of 2005 and the Energy Independence and Security Act of 2007, expanding regulatory authorities. The Bush Medicare prescription drug plan became yet another stimulant to the growth of regulation. In 2008, financial markets seized up; a severe recession ensued, and President Obama won enactment of the Dodd Frank Act in 2010.

In some other regards, though, the George W. Bush administration tried to advance deregulation and regulatory reform. During these years, the Department of Labor pushed for reforms to OSHA, wage-and-hour, and labor union rules. (The Obama administration quickly rescinded the new requirements on unions.) The Bush administration sought to permit power plants and refineries to make substantial renovations without triggering costly "New Source" pollution standards, reform that would have enhanced productivity and reduced pollution. It also proposed a new regime of marketable permits for power plant emissions in a plan intended to make pollution controls more cost-effective. It attempted to do this by using the market to guide investments to where they could achieve a given amount of abatement for the least cost. Ultimately, these plans came to naught.

B. The Regulatory Reform Agenda

While the scope and scale of regulation ebbed and flowed through these 40 years, a fairly stable concept of regulatory reform persisted as did support for it. Both executive branch policy makers and members of Congress backed this effort. The Nixon, Ford, and Carter administrations all pursued transportation deregulation, and in Congress, Senator Ted Kennedy backed it as well.

Among economists, the consensus was still broader and stronger. Even libertarians such as Friedrich von Hayek accepted in principle a public sector role in curtailing clear market failures (e.g., pollution).[8] Across a wide spectrum of views, economists supported the use of cost-benefit analysis and market-based instruments. For example, Nixon advisor Hendrik Houthakker and Milton Friedman preferred pollution taxes to command and control, as did Carter advisor Charles Schulze and Kennedy advisor Walter Heller.

The reform agenda by no means amounts to a stalking horse for naïve laissez faire economics. At the same time, though, regulatory reformers have compiled a powerful critique of U.S. regulatory praxis as it currently stands. At least four themes figure prominently in this critique.

First, regulators lack the information required to predict the effects of their actions. While regulation seeks to control behavior on one margin, the regulated may react on other margins as well[9] (e.g., minimum wage laws can lower demand for low-skilled workers, standards for

[8] Friedrich A. von Hayek. The Constitution of Liberty: The Definitive Edition. Chicago: University of Chicago Press, 2011. pp. 467-468.

[9] Christopher DeMuth, "Contemporary Conservatism and Government Regulation" in Crisis of Conservatism? The Republican Party, the Conservative Movement and American Politics after Bush, Joel D. Aberbach and Gillian Peele (eds) New York: Oxford University Press, 2011.

employer-supported health insurance can lead firms to drop coverage). As Nobel laureate Ron Coase showed, the intended beneficiaries of regulation can also respond to it in ways that subvert the regulators' goals. Further, one system of controls may well affect the performance of other mandates. All in all, such challenges confront even the best-informed regulators with a near certainty of surprises, and likelihood that at least some of them will be unpleasant.

Second, the governance of regulation is problematic, and neither the costs of regulation nor its benefits are transparent. With outcomes so opaque, the task of comparing the effectiveness of rival approaches is daunting.[10] Thus, policy makers can claim credit for measures that purport to solve problems on which they have little or even a perverse effect. Neither budgetary review nor competition for a fixed amount of resources (that has at times forced trade-offs in the fiscal process) disciplines total costs or forces trade-offs among rival approaches in regulation.

Third, regulation is especially prone to use by rent seeking interest groups. As Mancur Olson pointed out, small interest groups find it less costly than their larger counterparts to organize for collective action. Hence, compact interests can often cooperate to promote schemes designed to transfer income from larger, less organized groups to themselves.[11] Such schemes usually operate under the guise of high sounding causes and principles. Regulatory systems' opaque costs and benefits make them ideal vehicles for such exercises.

Fourth, regulations are often hurried into place without proper scrutiny, and once adopted, they may be nearly impossible to abolish. Timur Kuran and Cass Sunstein have noted that the news media and the public draw overly broad inferences from unconfirmed reports and isolated statements by authorities, and normal social dynamics can amplify the effect of a few such claims or statements. This pattern was evident in the anti-terrorist measures adopted in the wake of the TWA 800 crash, the Alar pesticide scare, and Love Canal and the creation of Superfund. In at least two of these cases as well as in many similar situations, organized interest groups sought to manipulate opinion to promote stringent new regulations. Lacking systems for rigorous cost-benefit analysis, peer-review, or a regulatory "circuit-breaker" to delay the hasty actions, deeply flawed policies were put into effect. Once these measures were in place, the absence of institutions for challenging the rationale for them and the many veto-gates of the U.S. government preserved them.[12]

C. Regulatory Review

Starting in the Carter administration, a process was established to attempt to address these issues by providing for cost-benefit analysis and central review of new regulations. The charter of the Office of Management and Budget ("OMB,") an agency within the Executive Office of the President, is to "serve the President of the United States in implementing his vision across the

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[10] Douglass C. North, "A Transaction Cost Theory of Politics." Journal of Theoretical Politics, 1990: 355-367.

[11] Mancur Olson. The Logic of Collective Action: Public Goods and the Theory of Groups. Revised Edition Cambridge: Harvard University Press, 1971.

[12] Timur Kuran and Cass R. Sunstein. "Availability Cascades and Risk Regulation." Stanford Law Review, Vol. 51, No. 4 (Apr., 1999), 683-768.

Executive Branch."[13] OMB was given responsibility to review agencies' draft proposed and final regulatory actions. The Office of Information and Regulatory Affairs ("OIRA"), was established in the 1980 Paperwork Reduction Act, and is part of OMB.[14] OIRA reviews collections of information from the public under the Paperwork Reduction Act, reviews draft proposed and final regulations under Executive Order 12866 and develops and oversees the implementation of government-wide policies in the areas of information policy, privacy, and statistical policy. OIRA also oversees agency implementation of the Information Quality Act, including the peer review practices of agencies. OMB and OIRA provide the most comprehensive data available on regulation government-wide and on its costs. Their authority does not extend, however, to independent agencies such as the Securities and Exchange Commission, thus some regulatory actions with profound effects have escaped cost-benefit analysis completely.

The staffing and authority of OIRA has waxed and waned in different administrations. Many of the staff who led the effort to ensure high standards of economic analysis of regulation have left the office.

Most recently, under Administrator Cass Sunstein OIRA has led a review of existing regulations to identify those that are "…already on the books so that we can improve or remove those that are out-of-date, unnecessary, excessively burdensome or in conflict with other rules."[15] However, this review has not produced any additional public information on the costs of regulation, and has resulted in rescinding just clearly obsolete regulations.

III. NERA METHODOLOGY

A. Overview of the Qualitative Approach

In this study, NERA provides a qualitative description of the impact of federal regulations on the manufacturing sector and more broadly on the overall economy. NERA focuses on five main areas of regulation: environmental, energy, transportation, labor, and financial. These regulations over the past decade have placed the greatest burden on the operation of businesses, especially those in the manufacturing sector.

Some of the most onerous regulations imposed on the manufacturing sector over the last decade involve those affecting the manufacturing sector's energy use and emissions from its facilities. Some regulations such as new source review have essentially prevented some companies from retrofitting their facilities to improve energy efficiency. Still other regulations, such as Corporate Average Fuel Economy (CAFE) or appliance efficiency standards, force manufacturers to produce goods that meet specific performance standards.

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[13] Extracted from http://www.whitehouse.gov/omb/organization_mission/

[14] Extracted from http://www.reginfo.gov/public/jsp/Utilities/faq.jsp in response to the question "What is OIRA?

[15] Cass Sunstein, 21st-Century Regulation: An Update on the President's Reforms, The Wall Street Journal, May 25, 2011.

Transportation regulations reach almost every sector of the economy via the cost of moving goods, and especially affect the manufacturing sector. The manufacturing sector must move its goods in the form of intermediate inputs between manufacturing facilities or in the form of final goods from manufacturing facilities to the final consumer. Recent fuel regulations have likely increased the cost of transportation fuels. One of the potentially most expensive regulations currently in place is the Renewable Fuel Standard (RFS2), which could greatly increase the price of diesel fuel and therefore raise the cost of transporting goods via trucks.

The past decade has seen some very significant regulations of the financial and securities industries. In the face of many high profile cases involving corporate fraud, the U.S. Congress passed Sarbanes-Oxley, which has had far-reaching impacts on all sectors of the economy. In response to the financial collapse of 2007, Congress passed Dodd-Frank, which affects the oversight and supervision of financial institutions. The regulations will introduce more stringent regulatory capital requirements and hence increase the cost to the manufacturing sector of raising capital and maintaining or expanding operations.

The impacts of labor department regulations on the persistently high unemployment rate for low-skilled, poorly educated workers serves as an example of how such regulations impact the manufacturing industry. Several factors have been suggested as contributing to the rising cost of employing unskilled workers. For instance, the federal minimum wage has been increased three times since July 2007. The Department of Labor's Wage and Hour Division has announced a crackdown in the enforcement of overtime pay and minimum wage requirements under the Obama administration through self-initiated investigations of employers. Research suggests that a contributor to the problem is employer uncertainty as to what the actual costs of employees may be. Although the minimum wage is clearly stated, there are some exceptions available to employers. The conditions under which these exceptions apply are far from clear, leaving employers subject to the possibility that they will be required to pay minimum wage to employees who they anticipated would be less costly.

In order to reach the goal of analyzing impacts of these regulations, NERA constructed a set of federal regulations in the United States based on different public sources of information.[16] This set contains major and non-major as well as final and proposed regulations. A regulation is generally defined as economically significant or major "if OIRA determines that it is likely to have an annual effect on the economy of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or tribal governments or communities."[17]

The set is composed of two parallel databases; one database contains a list of all federal regulations for which there is some publicly available information (OIRA database), and the other includes a list of all federal regulations for which there is some publicly available cost

[16] A complete discussion of all sources of information used and how this set of federal regulations was constructed is provided in Appendix A.

[17] Extracted from http://www.reginfo.gov/public/jsp/Utilities/faq.jsp in response to the question "What does it mean when a regulation is determined to be "economically significant?".

estimate information (OMB database). The OIRA database contains a total of 41,697 regulations from 1981 through April 2012. The OMB database spans a total of 479 regulations from October 1, 1992 through April 2012. Whenever we refer to 2012 in the qualitative analysis sections of this study we are only looking at data for one quarter of 2012. Most of the 479 regulations included at the OMB database are major regulations.

NERA selected regulations that affect the manufacturing sector from the set described above using key-words that describe manufacturing's subsectors. In addition, NERA used two other screening procedures to select main regulations affecting the manufacturing sector (the NERA Experts Survey and CEO Survey). More broadly, this set of regulations was also used to describe the burden on the overall economy in terms of the number of regulations issued over time and by the main agencies, and the cumulative costs imposed.

NERA relied on four screening procedures to select the main regulations used as inputs to the NERA macroeconomic model and to enrich the qualitative description. Three of these processes were cited above as being used in the analysis of the impact of regulations on the manufacturing sector: (1) screening of the set of regulations according to manufacturing sector keywords; (2) the NERA Experts Survey, i.e., a survey realized among NERA experts on the five main areas of concern; and (3) the CEO Survey, a survey given to MAPI members that also focused on the five main areas. The fourth screening procedure, sorting of the major regulations by cost, i.e., screening all the major regulations with costs above the average, was used to identify the main major regulations affecting the overall economy. These major regulations screened by cost were relevant not only to complement the discussion of the impact of regulations on the overall economy but also to hand to NERA experts to give them perspective on the overall costs of regulations outside their area of expertise.[18] The set of regulations was used as the input for these four screening procedures.

These screening processes complemented and verified each other. For instance, both the NERA Experts Survey and the CEO Survey were used to screen the main regulations and verify the relevant regulations to the manufacturing sector were represented. At the same time, both surveys were used to complement any relevant information that was missing from the original database.

Finally, it should be noted that this study focuses on federal regulations in the United States. It leaves aside state and other sub-national regulations.

1. Screening Procedure to Select Main Regulations Affecting the Manufacturing Sector

NERA relied on four screening procedures to select the main regulations used as inputs to the NERA macroeconomic model and to qualitatively describe the results. Three of these processes are used in the analysis of the impact of regulations on the manufacturing sector: screening rules according to manufacturing sector keywords, the NERA Experts Survey, and the CEO Survey.

[18] A list of the regulations screened by cost is provided in Appendix B.

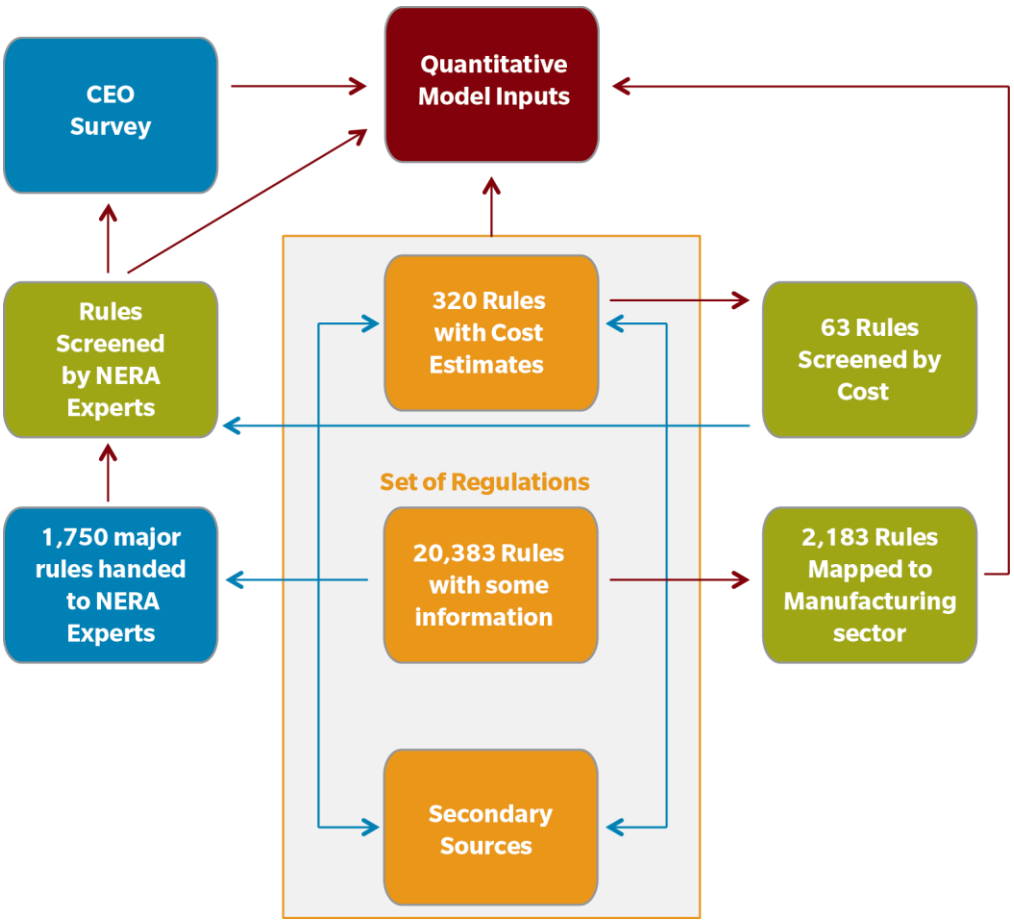
In addition to developing qualitative and quantitative descriptions of the direct burdens of regulations, the information on costs was used to create four independent estimates of the macroeconomic impacts using the N_{ew}ERA model. The four estimates are based on different methods of filling gaps in the availability of information from the indicated sources.

Two broad approaches were taken in this effort; the first involved intensive analysis of the regulations most burdensome to manufacturing. In this approach, from a total of 479 regulations for which cost estimates exist, we screened 63 major regulations that presented costs above the average. Next, we examined relevant agencies for the five main categories of regulations—financial, labor, transportation, energy, and environmental—and selected all the regulations issued by these agencies. We ended up with 1,750 major regulations that have been issued by relevant agencies, and handed them to NERA experts, together with the list of 63 major regulations screened by cost, all for further screening. These regulations reviewed by NERA experts were categorized further into broad areas and listed in a survey distributed to MAPI members for a third round of screening and to obtain information on their costs as perceived by the regulated firms. The regulations that came out of this third round of screening and associated cost estimates were used as inputs to the N_{ew}ERA model.

The second approach was to compile an estimate of the burden of all regulations, major and non-major, relevant to manufacturing in as complete a manner as possible. In this approach, the full dataset of 20,383 unique regulations was screened using manufacturing sector keywords. Of this group, 2,183 unique regulations were identified as relevant to the manufacturing sector. Information on these regulations was used to describe the burden on the manufacturing sector in qualitative terms and to guide the choice of a second set of regulations and associated cost estimates used as inputs in the N_{ew}ERA model.

The procedure used to create four alternative estimates of regulatory burden using the N_{ew}ERA model is described later**. Figure 1** illustrates how the different screening processes complement and verify each other.

Figure 1: Overview of the Screening Process



a. Screening of Publicly Available Data According to Manufacturing Sector Keywords

Because none of the available data sources consistently report the sectors that were or would be mostly affected by the regulations, we developed a sample approach to map both major and non-major regulations from our two main databases—OIRA and OMB—to the manufacturing sector and its subsectors.[19] We focused on three manufacturing subsectors using the North American Industry Classification System ("NAICS"): NAICS 31, NAICS 32, and NAICS 33. [20]

[19] An explanation of the OIRA and OMB databases is provided in Appendix A.

[20] NAICS subsector code 31 represents the following manufacturing subsectors: Food manufacturing; Beverage and Tobacco manufacturing; Textile Mills; Textile Product Mills; Clothing manufacturing; and Leather and Allied Product manufacturing. NAICS subsector code 32 represents: Wood Product manufacturing; Paper manufacturing; Printing and Related Support Activities; Petroleum and Coal Product manufacturing; Chemical manufacturing; Plastics and Rubber Products manufacturing; and Non-Metallic Mineral Product manufacturing.

The sampling approach consisted of screening both major and non-major regulations using manufacturing sector keywords.[21] There were 144 keywords related to NAICS Sector 31, 149 keywords related to NAICS Sector 32, and 264 keywords related to NAICS Sector 33.[22] A total of 2,183 unique regulations were screened from our reduced OIRA dataset, which contained 20,383 regulations.[23] **Table 1** describes how the major and non-major regulations were mapped to each individual NAICS subsector and to the manufacturing sector as a whole. NAICS Sector 33 had the highest number of regulations mapped, followed by NAICS Sector 32.

Table 1: Major and Non-Major Manufacturing Rules by NAICS Sub-Sector, 1981 - 2012

	Major (a)	Non-Major (b)	Total (a) + (b) (c)
NAICS Sector 31	41	375	**416**
NAICS Sector 32	65	755	**820**
NAICS Sector 33	185	1,423	**1,608**
Total Unique Regulations:	**235**	**1,948**	**2,183**

Notes: Rules may be classified in more than one NAICS sub-sector; hence, regulation counts by sub-sector do not sum to the count of total unique regulations shown. The count of regulations for 2012 contains only those passed through April.

A total of 145 unique regulations were screened from the 320 regulations for which we have quantitative cost estimates from the OMB dataset.

Table 2 describes how regulations were mapped to each individual NAICS sub-sector.

Table 2: Regulations with Quantitative Cost Information by Manufacturing Sub-Sector, 1993 - 2011

NAICS subsector code 33 represents the following: Primary Metal manufacturing; Fabricated Metal Product manufacturing; Machinery manufacturing; Computer and Electronic Product manufacturing; Electrical Equipment, Appliance, and Component manufacturing; Transportation Equipment manufacturing; Furniture and Related Product manufacturing; and Miscellaneous manufacturing.

[21] The keywords were selected according to (A) the name of relevant sectors such as paper, refining, chemicals, fertilizer, and steel bar; (B) potential regulated subject matter such as pollutant names (SO_2, NOx, hazardous air pollutants) and equipment names (boiler, cracking units, flare).

[22] Note that the same regulation can be classified in more than one NAICS subsector.

[23] An explanation of the OIRA reduced dataset is provided in Appendix A.

Sub-Sector	Number of Regulations Passed
NAICS Sector 31	33
NAICS Sector 32	67
NAICS Sector 33	82
Unique Regulations:	**145**

Note: Rules may be classified in more than one NAICS sub-sector; hence, regulation counts by sub-sector do not sum to the count of total unique regulations shown.

b. NERA Experts Survey

For the five main categories of regulations—financial, labor, transportation, energy, and environmental—NERA delivered to its internal experts a complete list of major and non-major regulations. These lists were composed using all of the major and non-major regulations identified in the OIRA dataset for each of the relevant agencies in the five categories and complemented and verified with data from secondary sources.[24] NERA also gave each expert the list of 63 major regulations screened by cost in order to give them some guidance in their review as well as perspective on how prominent the costs of regulations are outside their area of expertise. NERA experts screened 1,750 major regulations.

We asked each expert to identify the regulations he or she believed would have a relevant impact on the manufacturing sector. As we were also aware that none of the data sources available contain a complete list of all federal regulations, we asked our experts to supplement the list with any regulations they were aware of in their area of expertise that were missing.

NERA experts identified the most important rules (or areas of concern) that directly or indirectly impact the manufacturing sector. A complete list of the regulations screened by NERA experts is provided in Appendix C; these regulations were further mapped into broader categories, described in Section IV. These categories were used as the basis for our next screening process, the CEO Survey.

[24] The relevant agencies identified from the OIRA dataset, by category, are (A) Department of Labor, Equal Employment Opportunity Commission, and Pension Benefit Guaranty Corporation for labor regulations; (B) Department of Transportation for transportation regulations; (C) Department of Energy, and some selected rules from EPA for energy regulations; (D) EPA, Council on Environmental Quality, Emergency Oil and Gas Guaranteed Loan Board, and Emergency Steel Guaranteed Loan Board for environmental regulations; (E) Department of Treasury, and any other agencies that issued rules related to the Dodd-Frank Act for financial regulations. The OIRA list of regulations was complemented and verified by the information available at the following secondary sources: BRT, GAO, SEC, FDIC, FTC, and FRS.

c. CEO Survey

As the third round and last step in the screening process, NERA—in conjunction with MAPI—created a survey that MAPI distributed to CEOs of top manufacturing companies in the United States (MAPI members).[25] We received 25 responses.[26]

Using the broader categories of regulations identified in the NERA Experts Survey, the CEOs were asked to indicate from a list of environmental, energy, transportation, financial, and labor regulations their ranking (from 0 to 3) of the impact of such federal regulations on their companies' pre-tax profits:

> "a. 0 for no impact
>
> b. 1 for small impact (< 1% of pre-tax profits)
>
> c. 2 for moderate impact (2%-5% of pre-tax profits))
>
> d. 3 for significant impact (5% or more of pre-tax profits)"

The CEOs were also asked to list any other specific regulations that are particularly burdensome for their business that were not listed in the survey.[27]

Finally, the CEOs were asked to indicate their ranking of the effects of current environmental, energy, transportation, financial, and labor regulations on their decisions on locations or expansion in the United States. As a follow-up question, they were asked whether any proposed regulation would likely affect their decisions on locations or expansion in the United States (a yes/no question), and if yes, what was the nature of the regulation.

The results of the survey are summarized in Section IV.

2. Screening Procedure to Select Main Regulations Affecting the Overall Economy

The fourth screening procedure, sorting of the major regulations by cost, was used to identify the main major regulations affecting the overall economy. These regulations were handed to NERA experts to give them perspective on the overall costs of major regulations outside of their area of expertise.

We combined information from the OMB Reports to Congress from 2000 through 2012, which contain cost estimates for regulations from October 1, 1992 through September 30, 2011, and

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[25] The respondents' lines of business include construction equipment, lead acid batteries, water treatment infrastructure, power tools, motor vehicle parts, and welding equipment, among others.

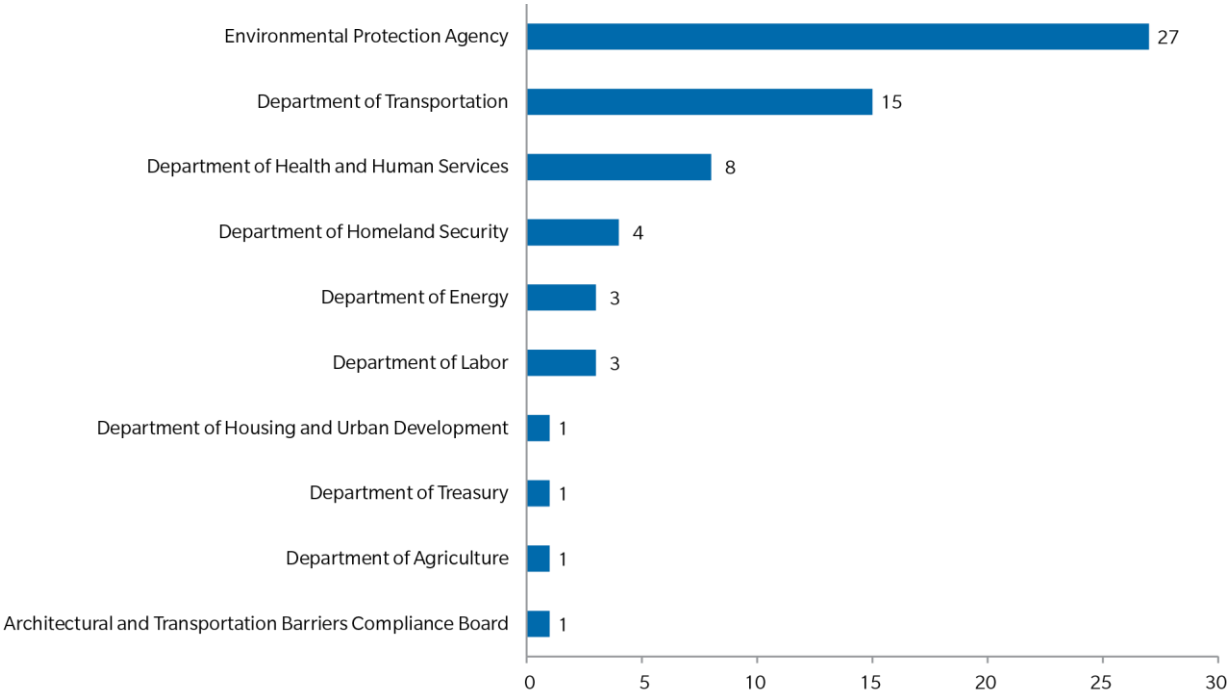
[26] We did not make any attempt to analyze potential sample selection bias in the CEO Survey.

[27] A list of the additional regulations identified by survey respondents as particularly burdensome is provided in Section IV.

from the OIRA and GAO websites for cost estimates for regulations from October 1, 2011 through April 2012, to construct a dataset with 479 regulations. Out of these 479 regulations, 320 have quantitative cost estimates.[28] After annualizing the cost estimates, which were reported in net present value (NPV), we selected for more detailed analysis all the major regulations that have an annual (or annualized) cost estimate above the average cost. We identified 63 such regulations.

The agencies with the highest number of regulations with costs above the average annual cost are the EPA and Department of Transportation. The distribution of these 63 regulations screened as the regulations with costs above the average are described in **Figure 2** below:

Figure 2: Distribution of 63 Screened Rules by Agency



Note: Light-Duty Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards [75 FR 25323] was issued jointly in 2010 by the Environmental Protection Agency and the Department of Transportation. For this reason, the count of rules shown above sums to 64.

The two regulations with the highest cost estimates are "National Ambient Air Quality Standards (NAAQS): Particulate Matter" and "National Ambient Air Quality Standards (NAAQS): Ozone" both issued by the EPA and finalized in 1998.[29]

[28] As explained previously, we decided to ignore transfer estimates because they are not likely to have a measurable impact on the manufacturing sector.

[29] A complete list of the 63 regulations screened as having annual (or annualized cost) estimates above the average cost is provided in Appendix B.

B. Overview of the Quantitative Approach

1. The N_{ew}ERA Model

To conduct this study, we used NERA's NewERA integrated model, which consists of a top-down, general equilibrium Macro model of the U.S. economy and a detailed bottom-up model of the North American electricity sector. The N_{ew}ERA model is used to project impacts of command and control regulations and market based policies on the economy as a whole and at a sectoral level. Different types of regulations could impact a sector in a variety of ways. If a regulation leads to an increase in the cost of a factor of production then the regulation would have a direct effect of raising the cost of production. A policy that mandates a sector to invest in new capital expenditure would lead to an increase in its production cost through higher cost of capital. Cost of production of a sector (e.g., the iron and steel sector) would increase indirectly if policies in other sectors (e.g., the electric sector) lead to an increase in its factors of production (e.g. electricity prices). When evaluating policies that have significant impacts on the entire economy, one needs to use a model that captures the effects as they ripple through all sectors of the economy and the associated feedback effects. The N_{ew}ERA modeling framework takes into account interactions between all parts of the economy and policy consequences as transmitted throughout the economy as sectors respond to policies. The model's flexibility allows it to incorporate many different types of policies, such as those affecting energy, environmental, financial, labor, and tax matters.

a. U.S. General Equilibrium Model (Macro Model)

The Macro model is a forward-looking dynamic computable general equilibrium model of the United States. The model simulates all economic interactions in the U.S. economy, including those among industries, households, and the government. Industries and households maximize profits and utility assuming perfect foresight. The theoretical construct behind the model is based on the circular flow of goods, services, and payments in the economy (every economic transaction has a buyer and a seller whereby goods/service go from a seller to a buyer and payment goes from the buyer to the seller). The model includes a representative household, which characterizes the behavior of an average consumer, and 27 industrial sectors, which represent the production sectors of the economy. In the model, government collects initial labor and capital tax revenues and returns it back to the consumers on a lump-sum basis. [30]

Households provide labor and capital to businesses, taxes to the government, and savings to financial markets, while also consuming goods and services and receiving government subsidies. Industries produce goods and services, pay taxes to the government, and use labor and capital. Industries are both consumers and producers of capital for investment in the rest of the economy. Within the circular flow, equilibrium is found whereby demand for goods and services is equal to

[30] However, tax revenues collected through an equivalent ad valorem tax under the alternative scenarios are spent in funding wasteful activities. The tax revenues are not returned to the government that could have been used to support government expenditures on goods and services and thus avoid raising labor and capital tax rates to balance the government's budget.

their supply, and investments are optimized for the long term. Thus, supply equals demand in all markets.

The model finds equilibrium by assuming perfect foresight and ensuring goods and services markets balances, production meets the zero profit condition, consumers maintain income balance conditions, there is no change in monetary policy, and there is full employment within the U.S. economy.

The N_{ew}ERA model is based on a unique set of databases that we constructed by combining economic data from the IMPLAN 2008[31] database and energy data from EIA's AEO 2011. The IMPLAN 2008 database provides Social Accounting Matrices for all states for the year 2008. These matrices have inter-industry goods and services transaction data; we merge the economic data with energy supply, demand, and prices for 2008 from EIA. In addition, we include tax rates in the dataset from NBER's TAXSIM model. By merging economic data from IMPLAN, energy data from EIA, and tax rates from NBER, we build a balanced energy-economy dataset.

Macro-economic (GDP), energy supply, energy demand, and energy price forecasts come from EIA's AEO 2011. Labor productivity, labor growth and population forecasts from the Census Bureau are used to forecast labor endowments along the baseline and ultimately employment by industry.

The macroeconomic model allows for full interaction among all parts of the economy, but the aggregate representation of the economy leads to one production function rather than multiple production functions to represent many alternative technologies for each sector that is modeled. We cover this deficiency by modeling the electric sector in detail (described in the next section), enabling us to model environmental regulations that impact the electric sector and ultimately the manufacturing sector through higher electricity prices.

b. Electricity Model (Ele Model)

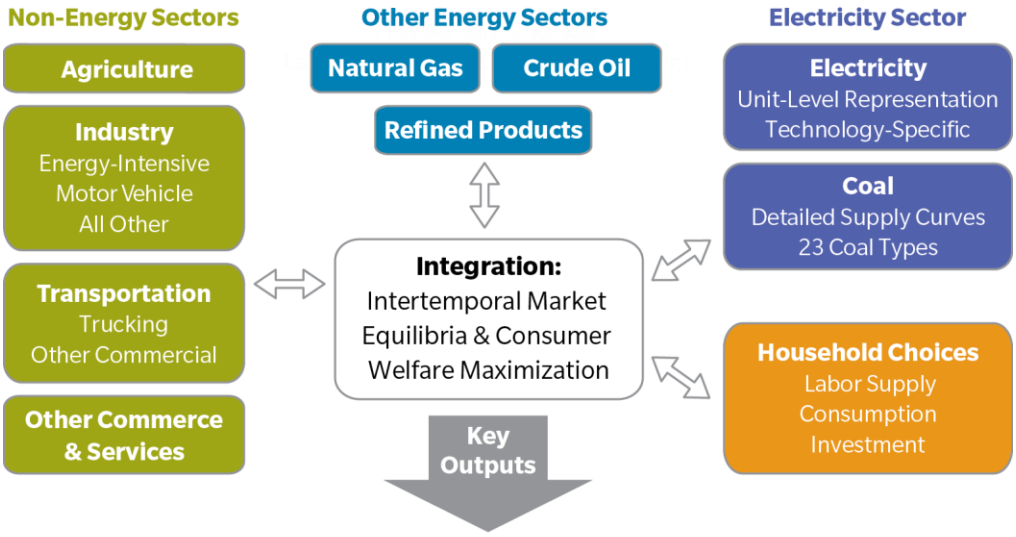
The bottom-up electricity sector model simulates the electricity markets in the United States and parts of Canada. The model includes more than 17,000 electric generating units and capacity planning, and dispatch decisions are represented simultaneously. The model dispatches electricity to load duration curves. A long-term solution typically includes 10 or more years out through 2050 (each year is not evaluated, but rather representative years). The model determines investments to undertake and unit dispatch by solving a dynamic, non-linear program with an objective function that minimizes the present value of total incremental system costs, while complying with all constraints, such as demand, peak demand, emissions limits and transmission limits, and other environmental and electric specific policy mandates.

The integrated nature of the NewERA model enables it to provide impacts on the electricity price consistent with a realistic electric system representation; while being able to compute macro-economic impacts.

[31] See www.implan.com.

We solve the bottom-up and the top-down models iteratively using a decomposition method. The top-down macroeconomic model solves for equilibrium prices, while the bottom-up model solves for equilibrium quantities. The solution process is iterated until prices and quantities converge. The integrated approach, illustrated in **Figure 3**, complements the weaknesses of each of the models and at the same time provides a consistent equilibrium framework.

Figure 3: NewERA Modeling Framework



Macroeconomic (National/Regional)	**Primary Energy** (National/Regional)	**Electricity** (National/Regional/Generating Unit)
Welfare	Demand	Prices
GDP, consumption, investment	Prices	Builds, retrofits, retirements
Output by sector	Production	Load and Dispatch

2. Sectoral Scope of the Model

In order to capture manufacturing at a subsector level and to have large heterogeneity in the factors of production, we modeled the manufacturing sector in detail. We created 27 industrial sectors, of which five are energy-related sectors and 22 are non-energy sectors. Industrial sectors in the N_{ew}ERA model are aggregated up from the IMPLAN database, which includes 440 sectors. Of the 22 non-energy sectors that we modeled, six are non-manufacturing sectors and the other 16 represent manufacturing subsectors. The subsectors within manufacturing are created in the model based on three North American Industry Classification System (NAICS) entities.[32] The manufacturing sector as a whole is represented by industrial entities contained in

[32] "The North American Industry Classification System (NAICS) is the standard used by Federal statistical agencies in classifying business establishments for the purpose of collecting, analyzing, and publishing statistical data related to the U.S. business economy." http://www.census.gov/eos/www/naics.

NAICS 31, NAICS 32, and NAICS 33. These three NAICS sectors consist of all manufacturing establishments engaged in the mechanical, physical, or chemical transformation of materials, substances, or components into new products.

The 16 manufacturing sectors are a mix of non-energy-intensive and energy-intensive. We constructed these 16 sectors to be consistent with the entities included in NAICS 31 through NAICS 33 and the Energy Information Administration's (EIA) Annual Energy Outlook (AEO)'s definition of the manufacturing sector. These 16 subsectors are also the same sectors that are the focus of the Manufacturing Energy Consumption Survey (MECS) conducted by EIA.[33] Appendix E provides a list of the manufacturing subsectors, sectoral share of value of shipments, and a short description of each subsector.

IV. QUALITATIVE ANALYSIS OF THE BURDEN OF REGULATIONS

A. Burden on the Manufacturing Sector

1. Burden Expressed as the Number of Regulations Over Time and Across the Main Agencies

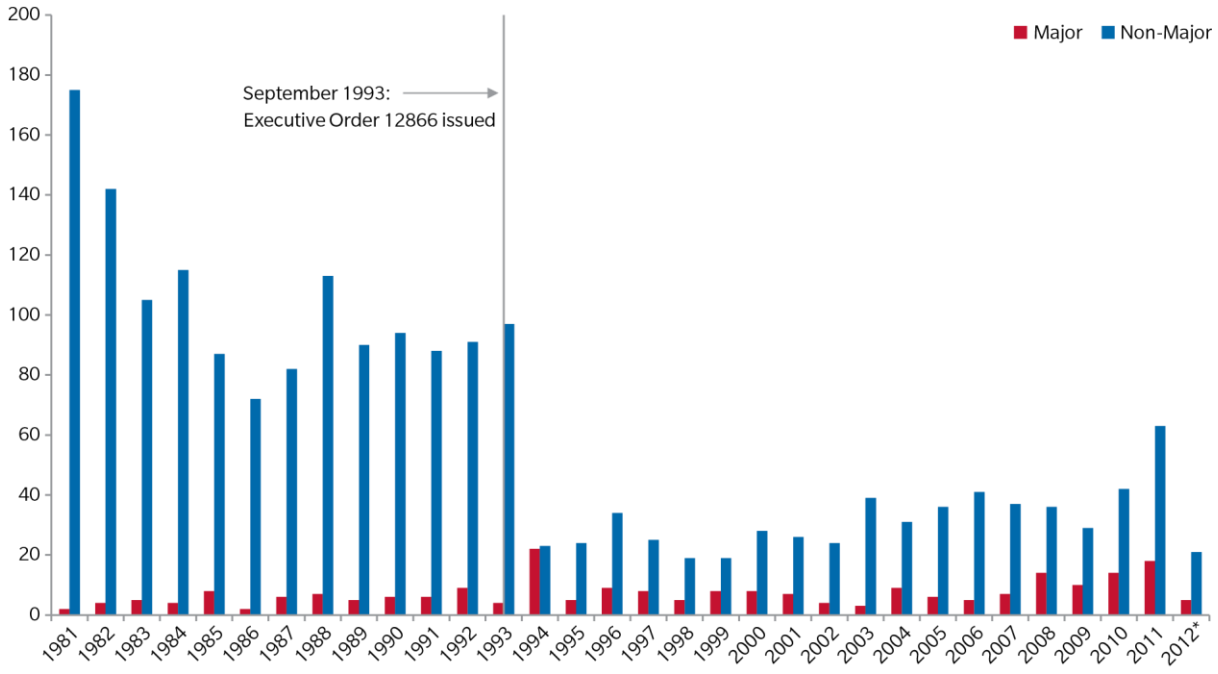
Using the 2,183 regulations that are uniquely identified and mapped to the manufacturing sector, and includes both major and non-major regulations from 1981 through April 2012, we can observe in

Figure 4 how the number of regulations affecting the manufacturing sector evolves over time. The annual number of economically significant regulations affecting the manufacturing sector has grown by approximately 80% since 2009 after maintaining a relatively stable level between 1995 and 2007, and the number of non-major regulations has been generally growing since 2004 with a clear acceleration after 2009. While the figure shows a dramatic drop in the number of non-major regulations after 1993, this is an illusion because in September 1993, President Clinton issued Executive Order 12866, which modified the OIRA regulatory review process. In particular, EO 12866 focused OIRA's review on major or "significant" regulations,[34] (i.e., those having an annual impact of $100 million or more on the economy), a measure that greatly reduced the agency's review of non-significant regulations.

[33] "The Manufacturing Energy Consumption Survey provides statistics on the consumption of electricity and other types of fuel. It also provides data on the capability of manufacturers to substitute alternative fuels for those actually consumed, end uses, the extent to which energy-related technologies are being used by manufacturers and other related topics." http://www.census.gov/econ/overview/ma0400.html.

[34] Section 6(a) of Executive Order 12866 is as follows: "(A) Each agency shall provide OIRA…with a list of its planned regulatory actions, indicating those which the agency believes are significant regulatory actions within the meaning of this Executive order. Absent a material change in the development of the planned regulatory action, those not designated as significant will not be subject to review under this section…" (Federal Register, Vol. 58, No. 190, October 4, 1993).

Figure 4: Major and Non-Major Manufacturing Regulations by Year, 1981-2012



Note: President Bill Clinton issued Executive Order 12866 in September 1993, greatly reducing the scope of OIRA regulatory review.
*The count of regulations in 2012 is shown only through April.

Source: OIRA dataset; NERA analysis.

Looking at the cumulative number of regulations from 1981 through April 2012 in

Figure 5, we observe that there is indeed a significant burden of regulations on the manufacturing sector simply from the accumulation of past major and non-major regulations. Over this period, there were about 2,180 major and non-major regulations in total.[35] As we saw in **Table 1**, NAICS 33 is the sector with the highest number of major and non-major regulations followed by NAICS 32.

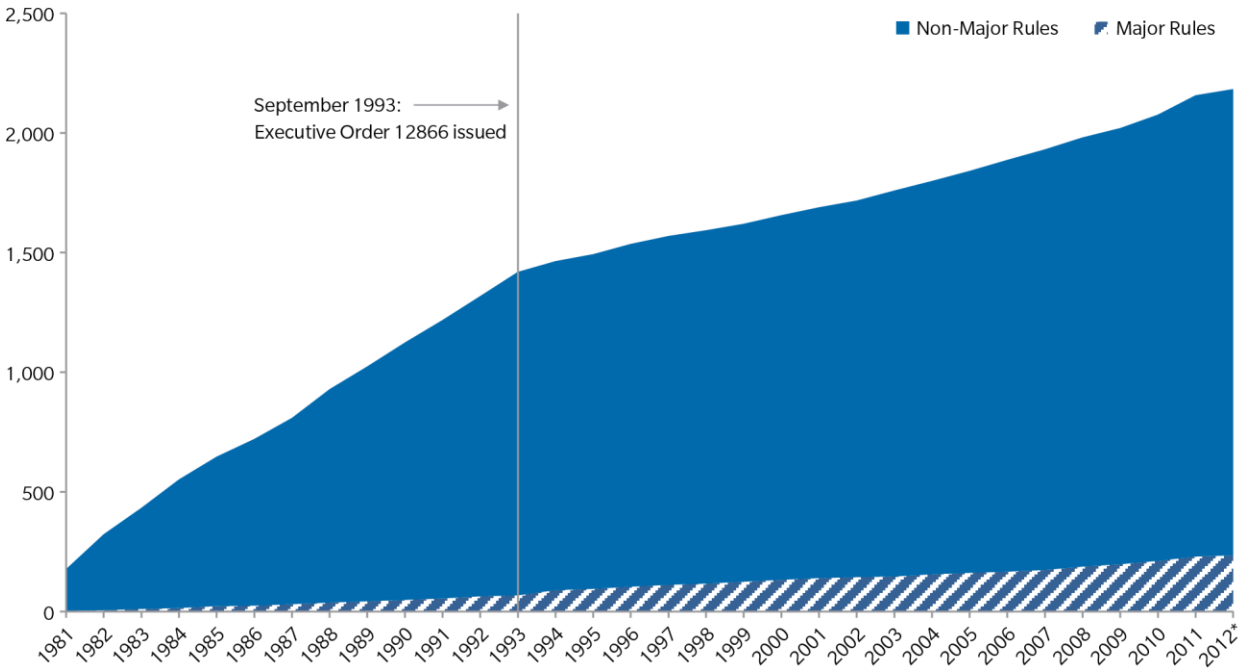
Figure 5 also highlights the potential aggregate impact of non-major regulations for which cost estimates are not available. While there is a considerable amount of information available on the costs and benefits of major regulations, little to none is available for non-major regulations. Although these non-quantified costs of each individual non-major regulation may be small, the accumulated volume could be substantial and be a greater burden on the sector than measured costs. Finally, comparing

Figure 4 and

[35] Most of the regulations totaled in **Figure 5** are final regulations.

Figure 5 reveals that the stock of regulations is very large compared to the flow of regulations.

Figure 5: Cumulative Major and Non-Major Manufacturing Regulations by Year, 1981-2012



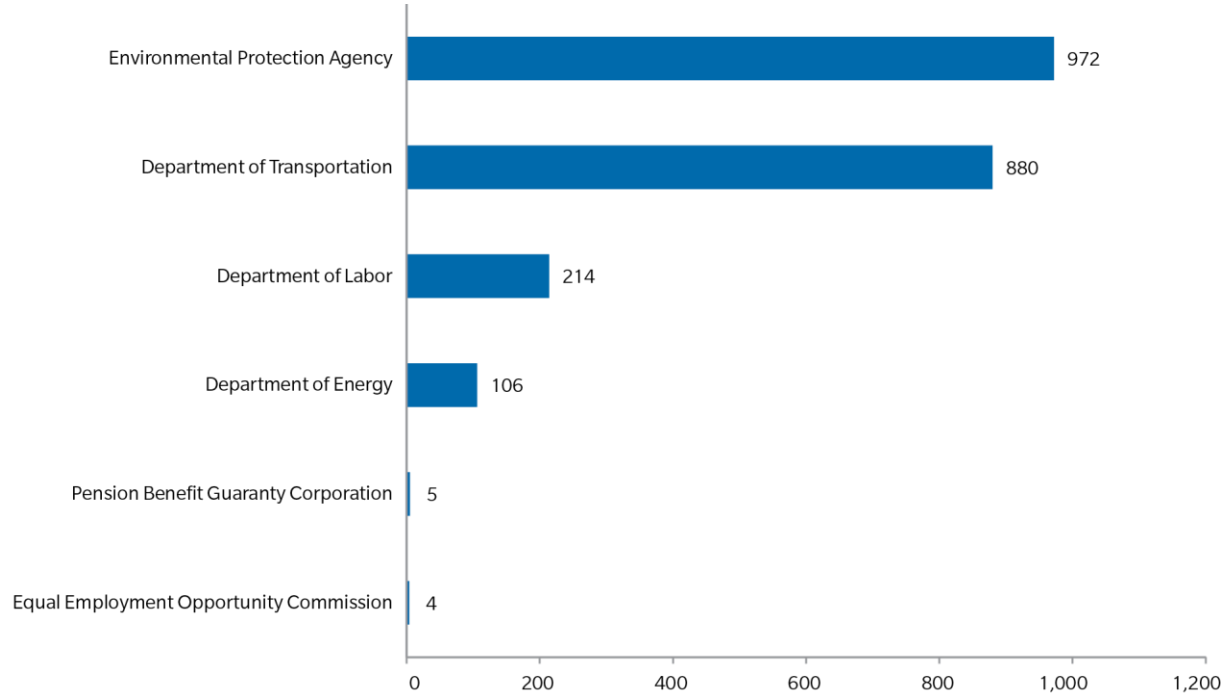
Note: President Bill Clinton issued Executive Order 12866 in September 1993, greatly reducing the scope of OIRA regulatory review.
*The count of regulations in 2012 is shown only through April.

Source: OIRA dataset; NERA analysis.

Applying the keyword screen, we were able to identify the agencies issuing the most regulations likely to affect the manufacturing sector. Since 1981, the EPA and Department of Transportation, followed (relatively far behind) by the Department of Labor and the Department of Energy, have passed far more regulations—major as well as total—than have other agencies.

Figure 6 and **Figure 7** show these rankings. As we discuss later, these are also the agencies with the highest total cost estimates from 1993 through 2011 from the OMB Reports to Congress.

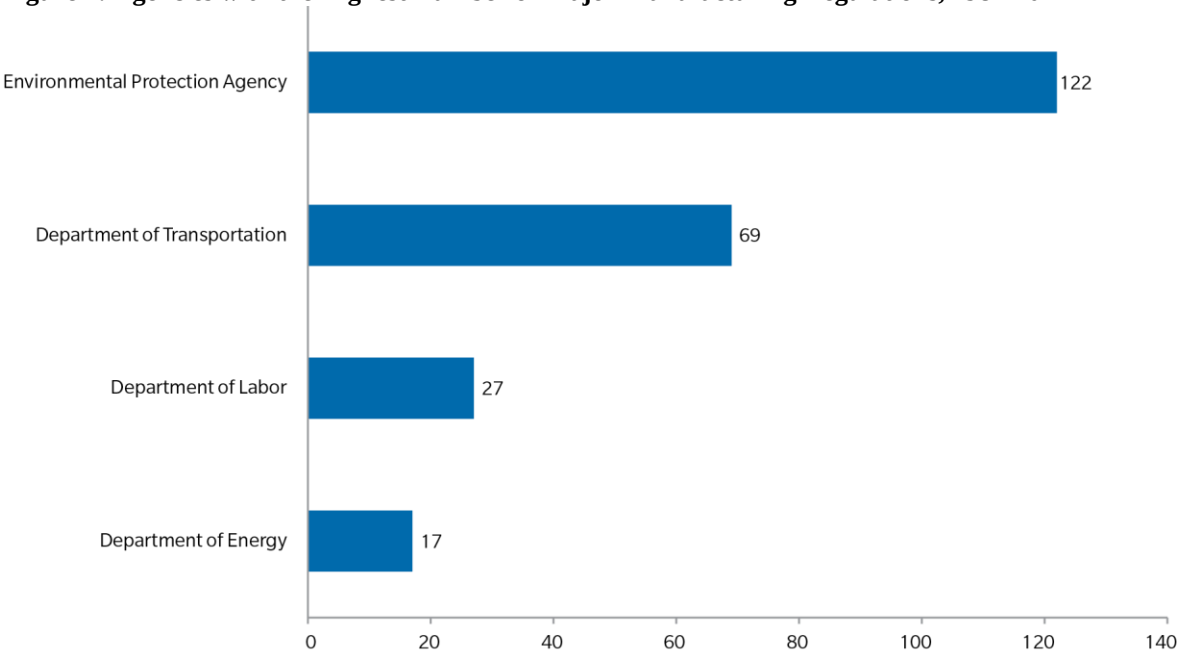
Figure 6: Agencies with the Highest Number of Total Manufacturing Regulations, 1981-2012



Note: The count of regulations in 2012 contains only those passed through April.

Source: OIRA dataset; NERA analysis.

Figure 7: Agencies with the Highest Number of Major Manufacturing Regulations, 1981-2012



Note: The count of regulations in 2012 contains only those passed through April.

Source: OIRA dataset; NERA analysis.

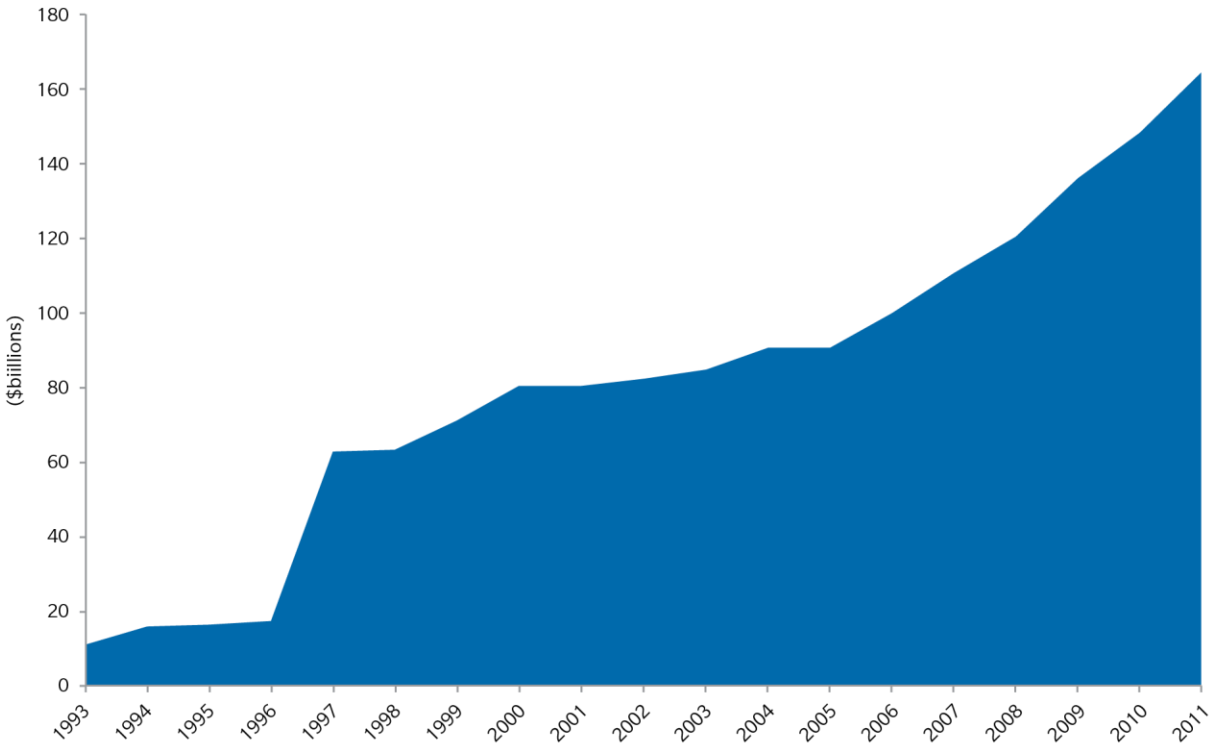
2. Cumulative Estimated Cost Imposed by Regulations Over Time to the Manufacturing Sector

Using the OMB Reports to Congress from 2000 through 2012—which contain cost estimates for regulations from October 1, 1992 through September 30, 2011—and the OIRA and GAO websites – to complement the previous data with cost estimates for regulations from October 1, 2011 through April 2012 - we constructed a dataset with 479 regulations. Out of these 479 regulations, 320 have quantitative cost estimates. OMB does not make a distinction between major and non-major regulations in the tables we extracted our data from. That said, after further inspection, we concluded that the majority of the regulations reported were major regulations with a very small fraction of non-major regulations. For this reason, in what follows, we do not make a distinction between major and non-major regulations although we are aware that most of our data (more than 90%) is composed of major regulations. In this way, our estimates of the cumulative cost of regulations underestimate the true cost of regulations. Also, most of the figures reported by OMB are in 2001 dollar values. We converted all the cost estimates to 2010 dollar values using the GDP deflator.[36]

Using the 145 unique regulations that were mapped to the manufacturing sector - by screening the 320 regulations we have cost estimates for using manufacturing sector key-words - we can observe at **Figure 8** that from 1993 through 2011 the annual direct cost of major regulations affecting the manufacturing sector alone grew to over $164 billion. An alternative approach would be to calculate the average cost per regulation for each year using all regulations affecting the manufacturing sector from 1993 through 2011 in the OMB dataset and extrapolate it by multiplying by the total number of regulations affecting the manufacturing sector for each year as indicated in the OIRA database. Using this second approach, the cumulative cost of regulations from 1993 through 2011 affecting the manufacturing sector increases to more than $225 billion. This increase in cumulative cost, compared to the first approach, is due to the significantly higher number of regulations considered for each year.

[36] For some earlier years it is unclear in which year cost estimates were evaluated by the agencies and reported by OMB. We had to make some assumptions in order to convert the figures to 2010 dollar values.

Figure 8: Cumulative Inflation-Adjusted Cost of Manufacturing-Related Major Regulations in Billions of Constant 2010 Dollars, 1993-2011

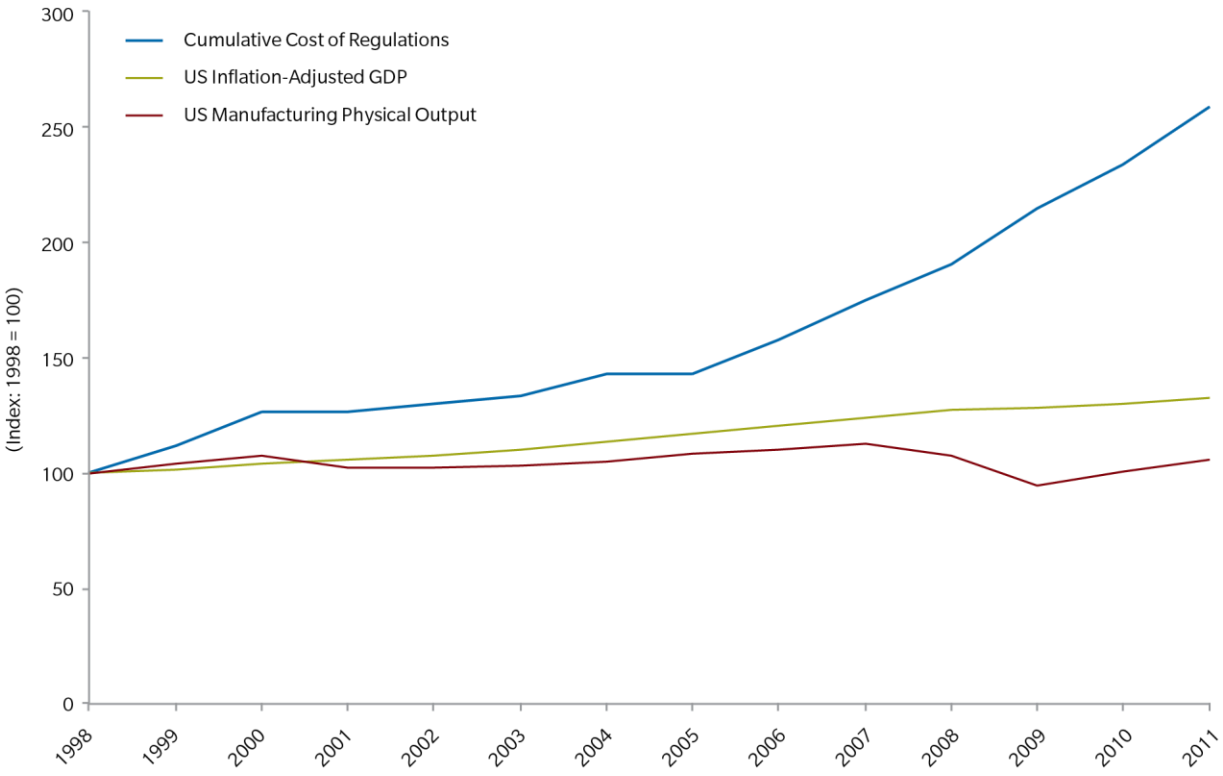


Note: Rules with net present value cost estimates have been annualized assuming a 7% discount rate and 20-year regulatory lifetime.

Sources: OMB dataset; NERA analysis.

Comparing the rate of growth in the cost of major regulations affecting the manufacturing sector to the U.S. GDP growth rate and the manufacturing output growth rate (
Figure 9) shows that growth in the cost of major regulations affecting the manufacturing sector has far exceeded overall economic growth and growth in the manufacturing sector. Since 1998, the cumulative inflation-adjusted cost of regulations affecting the manufacturing sector has grown by an annualized rate of 7.6%. Over this same period, U.S. inflation-adjusted GDP has grown by 2.2% and the physical volume of output of the manufacturing sector has grown by mere 0.4%.

Figure 9: Cumulative Inflation-Adjusted Cost of Manufacturing-Related Major Regulations versus Annual Growth of Inflation-Adjusted U.S. GDP and Manufacturing Physical Output, 1998-2011



Note: Rules with net present value cost estimates have been annualized assuming a 7% discount rate and 20-year regulatory lifetime.

Sources: OMB dataset; U.S. Department of Commerce: Bureau of Economic Analysis (via Federal Reserve Bank of St. Louis) and U.S. Department of Labor: Bureau of Labor Statistics (via Federal Reserve Bank of St. Louis; NERA analysis.

The cumulative cost of all regulations affecting the manufacturing sector is about 1.4% of the cumulative value of shipments for the manufacturing sector from 1993 through 2011 (

Table 3).

Finally, looking at the ranking of the agencies in terms of total estimated costs of major regulations affecting the manufacturing sector from 1993 through 2011 **(Figure 10)**,[37] the Environmental Protection Agency ranks as the top agency with total cost estimate of $117 billion. This cost figure far exceeds the cost of all other agencies. Financial regulations are underrepresented as OMB's dataset omits information on most of the relevant financial agencies with the exception of the Department of Treasury.

[37] Note that these totals represent only rules with cost estimates from the OMB Reports to Congress. To the extent these reports do not contain cost estimates for all regulations over the 1993 though 2012 time period, the totals shown below understate the total cost of all regulations.

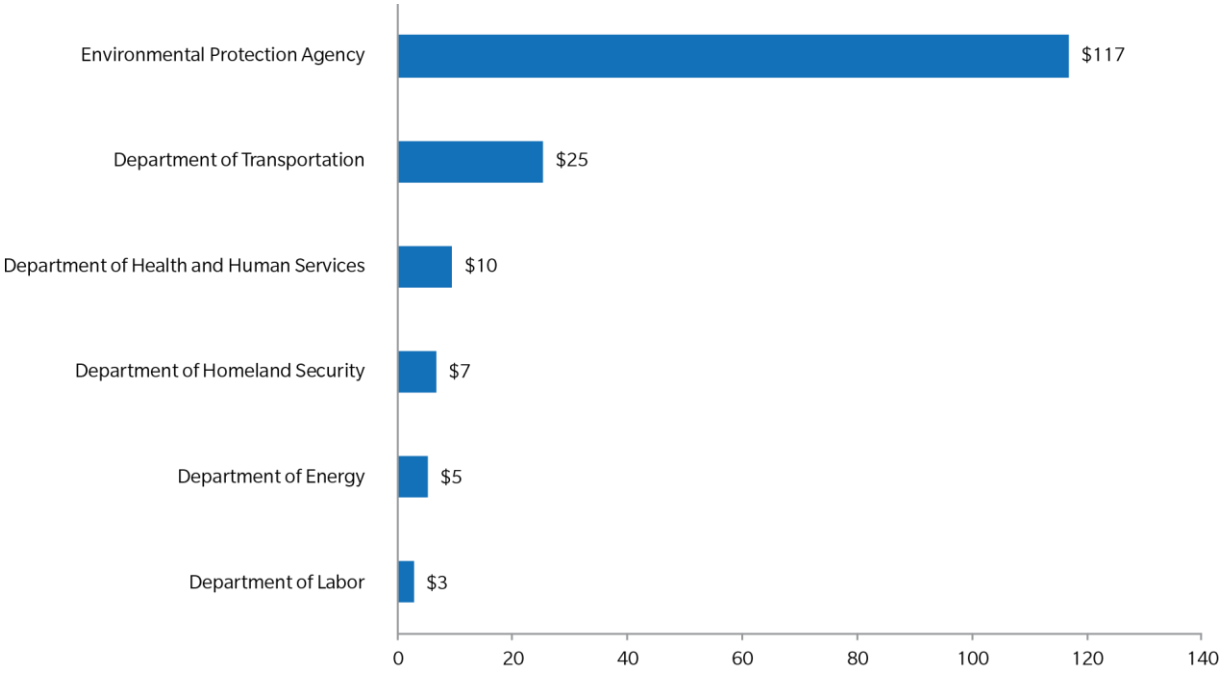
Table 3: Total Estimated Cost of All Regulations as Share of Value of Manufacturing Shipments in Billions of Constant 2010 Dollars, 1993-2011

Number of Regulations Passed	Estimated Cost of Regulations	Value of Shipments	Total Cost of Regulations as Share of Value of Shipments
1,110	$1,353	$94,641	1.4%

Notes: The number of regulations passed includes both the major and non-major manufacturing regulations identifed by NERA's keyword screen. The cost of regulations has been estimated by scaling the count of manufacturing-related regulations with quantitative cost information available by the total count of regulations over the time period.

Source: Historical Data from U.S. Census Bureau, downloaded from https://www.census.gov/manufacturing/m3/historical_data/index.html, accessed on August 13, 2012.

Figure 10: Top Agencies in Terms of Total Cost of Manufacturing-Related Regulations, in Billions of Constant 2010 Dollars, 1993-2011



Note: Rules with net present value cost estimates have been annualized assuming a 7% discount rate and a 20-year regulatory lifetime.

Sources: OMB dataset; NERA analysis.

3. Main Regulations Affecting the Manufacturing Sector

a. As Selected by the NERA Experts Survey

First, regarding financial regulations, NERA experts identified four main categories of regulations:

- *Internal controls over financial reporting (Section 404 of Sarbanes Oxley)*: Most of the costs associated with implementing these rules are felt during the first year of compliance and in preparing for the first year. While many of these costs can be regarded as sunk, there are significant ongoing compliance costs and potential liabilities.

- *Swap end-user rules (CFTC)*: Many manufacturing firms use commodity swaps (or other swaps) to manage fluctuations in inputs such as energy. Under Dodd-Frank, without exemptions, some manufacturers using swaps could be classified as "major swap participants" and be subject to costly compliance rules. Although much effort has been expended to carve out end user exemptions, many issues, including definitions, remain unresolved.

- *Conflict mineral disclosure rules (SEC)*: These rules, currently being discussed, have the potential of adding considerable cost to the entire manufacturing supply chain.

- *Proxy Access Rules (SEC)*: This is a perennial issue and the SEC's last attempt at taking it on was struck down by the DC Circuit on the grounds that the SEC did not adequately consider the economic impact of the rule.

Second, regarding labor regulations, NERA experts identified five main categories of regulations:

- *Workplace safety*: The Occupational Safety and Health Administration (OSHA) imposes significant regulations on workplace safety. Although such regulations are often cited as providing significant benefits to workers, employers frequently assert that the same benefits could be achieved with less burdensome forms of regulation. Employers are frequently cited for OSHA violations, suggesting that the rules are not easy to comply with and possibly financially burdensome. The *Hazard Communication* rule (RIN 1218-AC20) is among recent major rules tightening standards, as are several recent rules (both major and non-major) dealing with respiratory protection.

- *Regulation of Unions*: Rule-making by the NLRB that increases unionization or enhances union bargaining power may increase the cost of labor. A recent NLRB rule required employers to post notices explaining workers' rights to form a union. That rule has been overturned by a federal judge, but may be appealed. Another important NLRB action was a change in union election procedures designed to shorten the period of time between the filing of an election petition and the holding of the election, also recently overturned. A third rule broadened the scope of reportable employer activities in communicating with its employees in a union organizing effort (RIN 1245-AA03).

- *The Fair Labor Standards Act ("FLSA")*: The FLSA mandates the payment of a federal minimum wage and payment for overtime hours worked for employees not deemed to be particularly exempt from the Act. The minimum wage has risen from $5.85 in July 2008 to its current rate of $7.25 per hour. Enforcement of overtime pay requirements has also been stepped up, with more enforcement actions by the Department of Labor, as well as increases in civil litigation claiming violations of the FLSA. These regulations directly increase the cost of labor.

- *Unemployment compensation and notice of layoffs:* Federal regulations require employers to contribute to coverage for unemployment compensation. The Emergency Unemployment Compensation program has been in place since 2008, substantially increasing the period for which laid-off workers remain eligible for benefits. Another required benefit is advance notice of large plant closings or layoffs under the Worker Adjustment and Retraining Notification Act (WARN). The WARN Act is not a new regulation, but may be of particular concern given widespread layoffs in manufacturing and expected future layoffs associated with upcoming defense budget cuts.

- *Anti-discrimination regulations*: Although most employers actively seek a diverse workforce, compliance with federal anti-discrimination protections can impose substantial reporting burdens and subject employers to the prospect of protracted federal agency inquiries. The recent Office of Federal Contract Compliance Programs (OFCCP) proposed rule would strengthen the affirmative action requirements established in Section 503 of the Rehabilitation Act of 1973 by obligating federal contractors and subcontractors to ensure equal employment opportunities for qualified workers with disabilities and set a hiring goal of 7 percent of the workforce (RIN 1250-AA02).

- *Compliance with the Patient Protection and Affordable Care Act*: Some employers have expressed concern about the possibility of increased health care costs as PPACA is implemented.

Third, regarding energy regulations, NERA experts identified four main categories of regulations:

- *Energy efficiency standards for durable goods and equipment*.

- *Energy efficiency standards for buildings*.

- *Alternative fuel mandates for fleets*.

- *Renewable fuels standards including ethanol requirements*.

In general, the major energy regulations refer to energy efficiency improvements. Energy efficiency standards impose costs on the manufacturing sector to producers or users. In most cases these regulations will have an indirect impact on manufacturing costs by increasing the costs of inputs.

Fourth, regarding environmental regulations, NERA experts identified nine main categories of regulations:

- *National Ambient Air Quality Standards for Particulate Matter.*
- *National Ambient Air Quality Standards for Ozone.*
- *National Ambient Air Quality Standards for Sulfur Dioxide.*
- *National Ambient Air Quality Standard for Lead.*
- *National Emission Standards for Hazardous Air Pollutants (NESHAP).*
- *Cross State Air Pollution Rule (CSAPR).*
- *Clean Air Mercury Rule.*
- *Greenhouse Gas Reporting Rule.*
- *New Source Performance Standards (NSPS).*

Major environmental regulations include pollution controls on utilities and the petroleum and refining sectors. These regulations can have large indirect effects on the manufacturing sector through increases in fuel and energy costs.

Finally, regarding transportation regulations, NERA experts identified three main categories of regulations:

- *Fuel Economy Standards for Light Trucks and Passenger Automobiles.*
- *Fuel Economy Standards for Off-Road Engines.*
- *Regulation of Fuels and Fuel Additives.*

Major transportation regulations relate to standards for fuel consumption and alternative transportation fuels mandate. Again these regulations can impose costs on the manufacturing sector as a producer or as a user of regulated products. In most cases these regulations will have an indirect impact on manufacturing costs by increasing the costs of inputs.

b. As Selected by the CEO Survey

First and foremost, the respondents believe the regulations listed in the survey have some impact on their business. If we cluster the responses for small, moderate and significant impact together and focus on the distinction between "none" or "some" impact, we observe that for four out of the five categories listed more than 50% of the answers were that the regulations have "some"

impact on the companies' pre-tax profits. Only 35% of the total responses believed that there would be no impact from the listed regulations (**Table 4**).

Second, the respondents seemed to focus more on the direct impact of regulations on their business than indirect impacts. This is a natural response as businesses are able to relate to direct input costs of their industry much better than costs associated with those that are indirect. We reach this conclusion because the categories of regulations that have a more direct impact on companies' pre-tax profits – labor and financial – are classified as having "some" impact more frequently than the other three categories, even though OMB cost estimates for energy, environmental, and transportation regulations are considerably larger. For this reason, we use the CEO Survey in our quantitative modeling as the basis for an estimate of the direct cost of regulations. Labor regulations seem to be of special concern to the respondents with 32% of the answers classifying labor as having a moderate or significant impact on their company's pre-tax profits.

Table 4: Impact of Federal Regulations on Companies' Pre-Tax Profits by Category of Regulation Based on Responses of MAPI Members to the NERA-MAPI CEO Survey

Impact Rating Assigned	Energy		Environment		Financial		Labor		Transportation		Total	
	Count	Share of Count	Count	Share of Count	Count	Share of Count	Count	Share of Count	Count	Share of Count	Count	Share of Count
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)		
None	34	41%	70	41%	22	30%	15	15%	24	52%	**165**	**35%**
Small[2]	37	44%	79	46%	41	57%	52	52%	14	30%	**223**	**47%**
Moderate[3]	7	8%	18	11%	9	13%	21	21%	4	9%	**59**	**13%**
Significant[4]	6	7%	4	2%	0	0%	10	10%	4	9%	**24**	**5%**
Total:	**84**	**100%**	**171**	**100%**	**72**	**100%**	**98**	**100%**	**46**	**100%**	**471**	**100%**

Notes: Not all respondents in each category of regulation assigned a rating to all regulations listed in the survey.

[1] Regulations included in the survey were selected by NERA. In some cases the regulation listed on the survey referred to a category of regulations (e.g., "regulations on workplace safety").

[2] A small impact is defined as an impact of less than 1% of the total value of pre-tax profits.

[3] A moderate impact is defined as an impact of between 2% and 5% of the total value of pre-tax profits.

[4] A significant impact is defined as an impact of greater than 5% of the total value of pre-tax profits.

Source: NERA-MAPI CEO Survey.

The respondents also cited other regulations that were particularly burdensome to them that were not listed in the survey. Some interesting regulations cited were healthcare reform for labor, Clean Water Act and REACH for environment, and Dodd-Frank for finance, among others (**Table 5**).

Table 5: Additional Regulations Identified by Survey Respondents as "Particularly Burdensome" by Survey Respondents

Energy	Boiler MACT
	As a manfacturer of heat exchangers, energy regulations drive a good portion of our business and growth.
	We have a large product portfolio centered around energy efficiency, for buildings, homes and for industrial plants.
	The regulations will impact our customers and in turn will impact our company, the extent that the pass through will impact us is not clearly understood right now.
	The lack of a comprehensive energy policy out of Washington creates enormous uncertainty when deciding where to expand and build new facilities in the US.
	LACK OF APPROVAL FOR DOMESTIC EXPLORATION AND PRODUCTION I.E. KEYSTONE XL PIPELINE
	Uncertainty in renewable energy policies directly impacts our customers and as a result, creates uncertainty for our businesses.
Environment	Clean Water Act, REACH, ROHS, RCRA
	EPCRA regulations are overly complex and burdensome.
	RCRA Corrective Actions
	RCRA
	REACH Dodd Frank
	This is not an EPA issue, but watch out for environmental regulation of the materials content of products. If the US (or certain states) adopt one of these laws, and does not harmonize it with RoHS in Europe, then it will be extremely burdensome.
	DOT, RCRA
	Managing Environmental Regulations in the various European countries has been a challenge.
	TSCA
	DOT enforcement can be heavy handed for detailed administrative rules. CERCLA remediation re-openers such as vapor intrusion and trying continuing investigations for additional sources. Multiple enforcement and regulation (Federal and state) for the same activity specifically for post closure financial assurance and monitoring.
	Clean Water Act, REACH, ROHS, RCRA

Financial	Dodd-Frank Tax regulation rule changes. Also, there is a great deal of uncertainty now about the impacts of healthcare legislation. Potentially - proposed standard regarding lease accounting PCAOB regulations on external auditors, causing increased audit requirements and fees charged to companies. Tax code complexities - small impact. International Financial Reporting Standards - small impact. PBGC regulations, and proposed regulations which overzealous staffers try to impose as if they were real. EPA regulations and overzealous staffers SOX - nearly a complete waste of time. PCAOB - Overzealous PCAOB regulators/auditors are putting unnecessary pressure on our independent auditors and second guessing them left and right. This rolls downhill. FASB/SEC - enough with the ridiculous new rules, which many CPAs barely understand much less the general public, and enough dancing with IFRS/IASD already. Financial statements have "advanced" to be nearly unintelligible to the average reader. FCPA - Reasonable and appropriate, but costs money to train people and monitor. Tax laws - Should be simplified and or corporate income taxes eliminated. Tax planning and compliance is very expensive an getting worse. This includes state and local taxes too. XBRL filing requirements - costly and questionable user value
Labor	Dodd Frank disclosure rules for conflict minerals labor Healthcare reform Just a note regarding the second item. While the new rules themselves have a small impact, the impact could be larger if they lead to increased unionization. At this point we do not believe that they will, thus the small impact response. Biggest concern right now is regulations related to unionizing, though its already noted above. Family Medical Leave Act and state requirements; Mandatory sick pay in certain states FLSA provisions for overtime equalization wihtin 2 weeks is not practical. Longer periods are preferred by employees and management, as it allows for greater flexibility and empowerment for employees to manage their overtime and time off options. It also allows for greater business sense for managing and reconciling work flow for and with employees. State of Illinois unemployment and worker's compensation regulations. Also, the Boeing plant in South Carolina is a perfect example of our concerns. Our ability to make business decisions about the location of our operations, without interference by the NLRB or other government entity. FMLA

Transportation	HOS State by state permiting system for heavy haul More trends than anything else. For example, the average age of a truck driver is 58 years old with few younger folks considering this profession. When these drivers begin to retire, we will see significant capacity issues and therefore higher transportation costs and service failures. Drivers today are less likely to want to be gone from home for more than a few days at a time. Trucking companies struggle with putting programs in place that assure drivers they will get back home in a reasonable time frame. Additionally it is estimated that between 40 – 50% of transportation related personnel cannot pass a drug test. This aggravates the issue of finding qualified drivers. Obviously, fuel is a big issue for everyone. Although a shipper cannot control the cost of fuel, it should still be managed. HOURS OF SERVICE DELIVERY DELAYS CSA - CREATES DRIVER SHORTAGES Mexican trucking access to US would be a benefit providing the Mexican carrier equipment and drivers meet US standards.

Finally, when asked about the impact of federal regulations on companies' location or expansion decisions most of the respondents believed the regulations listed on the survey have some impact. If we cluster the responses for small, moderate, and significant together and focus on the distinction between "none" or "some" impact, we observe that for all five categories listed, more than 70% of the answers were that regulations have "some" impact on companies' location or expansion decisions. Only 23% of the total respondents believed there would be no impact (**Table 6)**. Financial and energy regulations are classified as having "some" impact more frequently than the other three categories.

Table 6: Impact of Federal Regulations on Companies' Location or Expansion Decisions by Category of Regulation Based on Responses of MAPI Members to NERA-MAPI CEO Survey

Impact Rating Assigned	Energy		Environment		Financial		Labor		Transportation		Total	
	Count	Share of Count	Count	Share of Count	Count	Share of Count	Count	Share of Count	Count	Share of Count	Count	Share of Count
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)		
None	4	19%	5	26%	5	28%	4	20%	4	25%	**22**	**23%**
Small	10	48%	8	42%	8	44%	6	30%	9	57%	**41**	**44%**
Moderate	6	29%	2	11%	2	11%	6	30%	3	18%	**19**	**20%**
Significant	1	4%	4	21%	3	17%	4	20%	0	0%	**12**	**13%**
Total:	**21**	**100%**	**19**	**100%**	**18**	**100%**	**20**	**100%**	**16**	**100%**	**94**	**100%**

Source:NERA-MAPI CEO Survey.

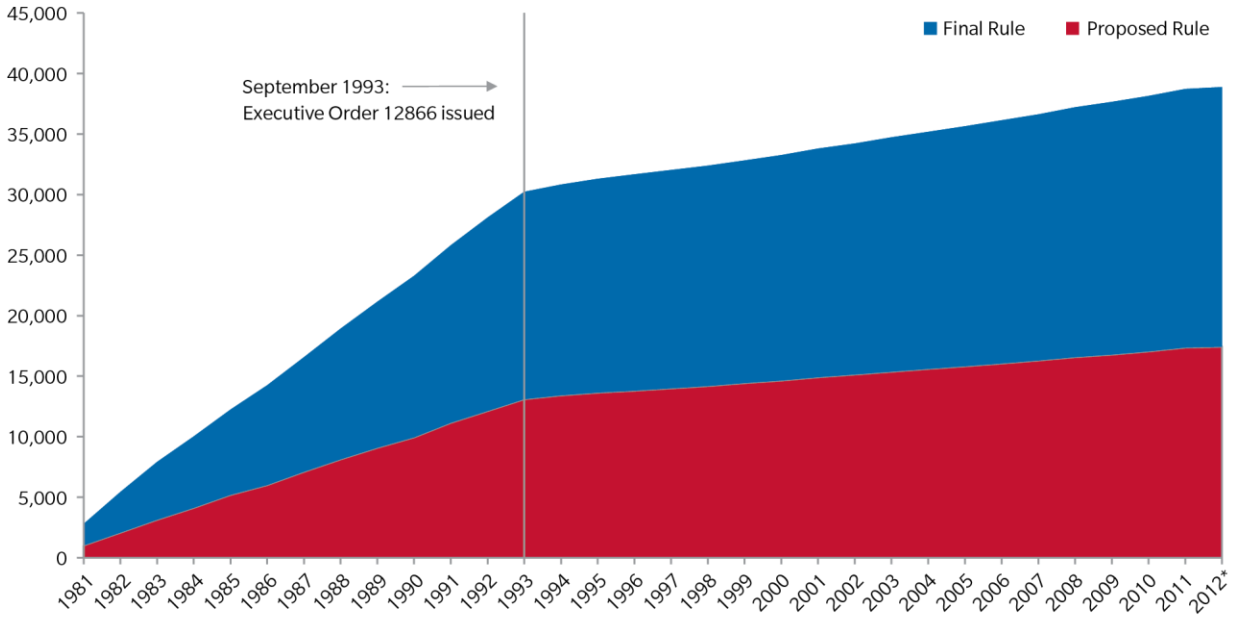
B. Burden on the Overall Economy

The previous sections described the impact of regulations on the manufacturing sector. In these next sections, we determine more broadly the qualitative impacts of regulations on the overall economy.

1. Burden Expressed as the Cumulative Number of Regulations and Across the Main Agencies

Using the entire OIRA dataset,
Figure 11 shows that the burden on the overall economy from final and proposed regulations has grown over time. Even if some of these regulations do not create a direct cost in terms of mandated pollution control investment and increased costs of manufacturing, the considerable number of past and new rules imposes, at a minimum, a cost in labor required for understanding regulations and reporting compliance internally and externally. During this period, there were about 40,000 proposed and final regulations.

Figure 11: Cumulative Number of Proposed and Final Regulations by Year, 1981-2012

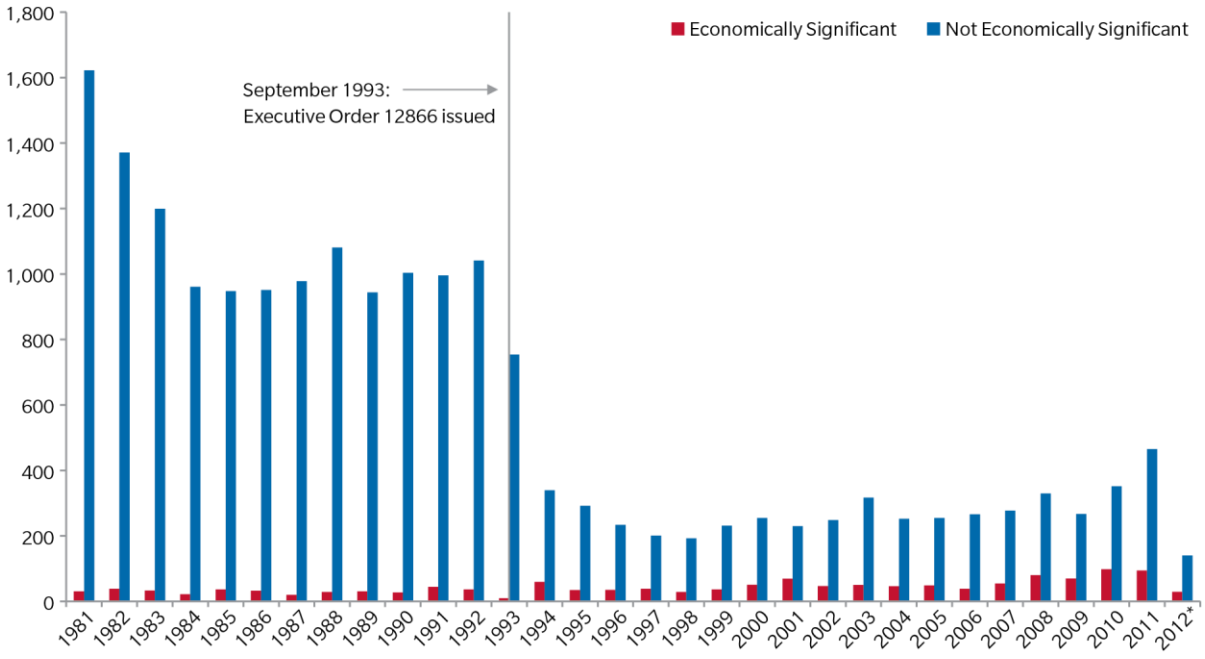


Notes: In addition to Proposed and Final Rules, there are 2,819 additional rules at various stages (e.g., "Prerule" and "Notice") in the OIRA dataset that bring the total regulation count (at all stages) to 41,697.
* President Bill Clinton issued Executive Order 12866 in September 1993, greatly reducing the scope of OIRA regulatory review.
** The count of regulations in 2012 is shown only through April.

Source: OIRA dataset.

Looking closer at the history of the annual number of major and non-major regulations, we observe in **Figure 12** that although the number of economically significant regulations remains more or less steady over time, the number of non-significant regulations appears to drop dramatically after 1993, as expected in large part from the change in OIRA reporting requirements under the 1993 Executive Order.

Figure 12: Regulations by Year by Economic Significance Classification, 1981-2012



Notes: President Bill Clinton issued Executive Order 12866 in September 1993, greatly reducing the scope of OIRA regulatory review.
*The count of regulations in 2012 is shown only through April.

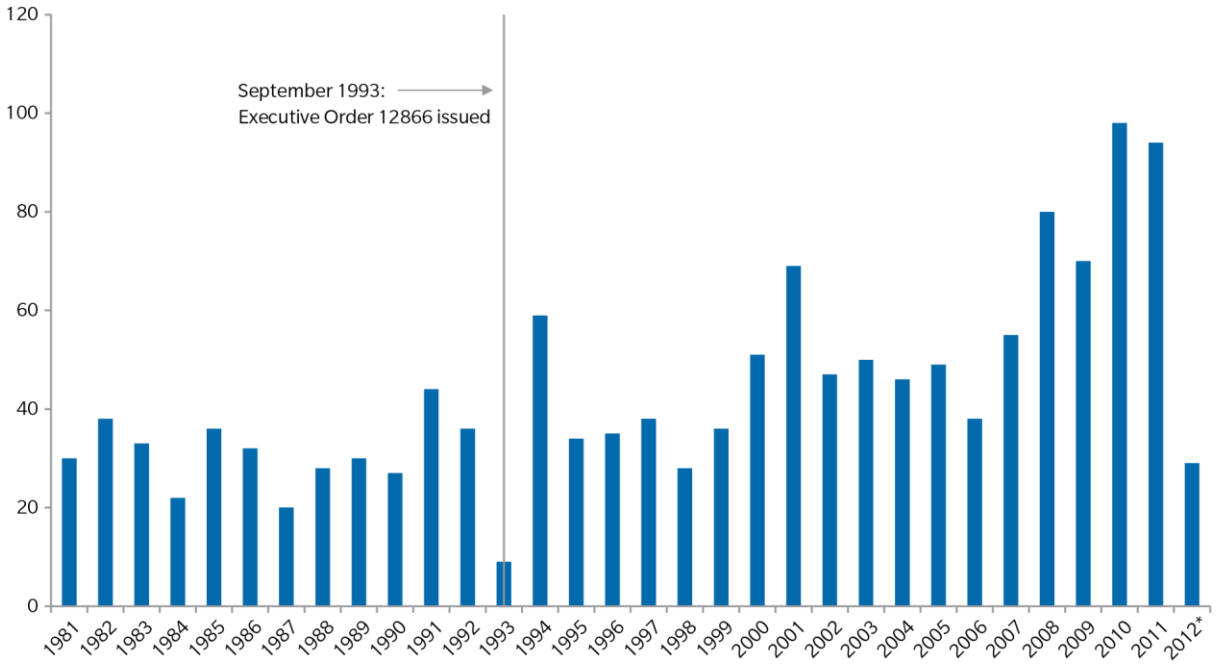
Source: OIRA dataset.

The average number of major regulations promulgated per year has risen over the past three administrations **(**

Figure 13). From 1993-2000, the average was 36. This figure increased to an average of 45 per year from 2001 to 2008. Under the current presidential administration, the average was 72 major regulations per year between 2009 and 2011.

Figure 12 also highlights the important and potentially underestimated effect of non-major regulations on the overall economy. Although these non-quantified costs may be small for each regulation, given the large number of non-major regulations, the cumulative total of these costs could significantly affect the overall cost of regulations to the economy.

Figure 13: Economically Significant Regulations by Year, 1981-2012



Note: President Bill Clinton issued Executive Order 12866 in September 1993, greatly reducing the scope of OIRA regulatory review.
*The count of regulations in 2012 is shown only through April.

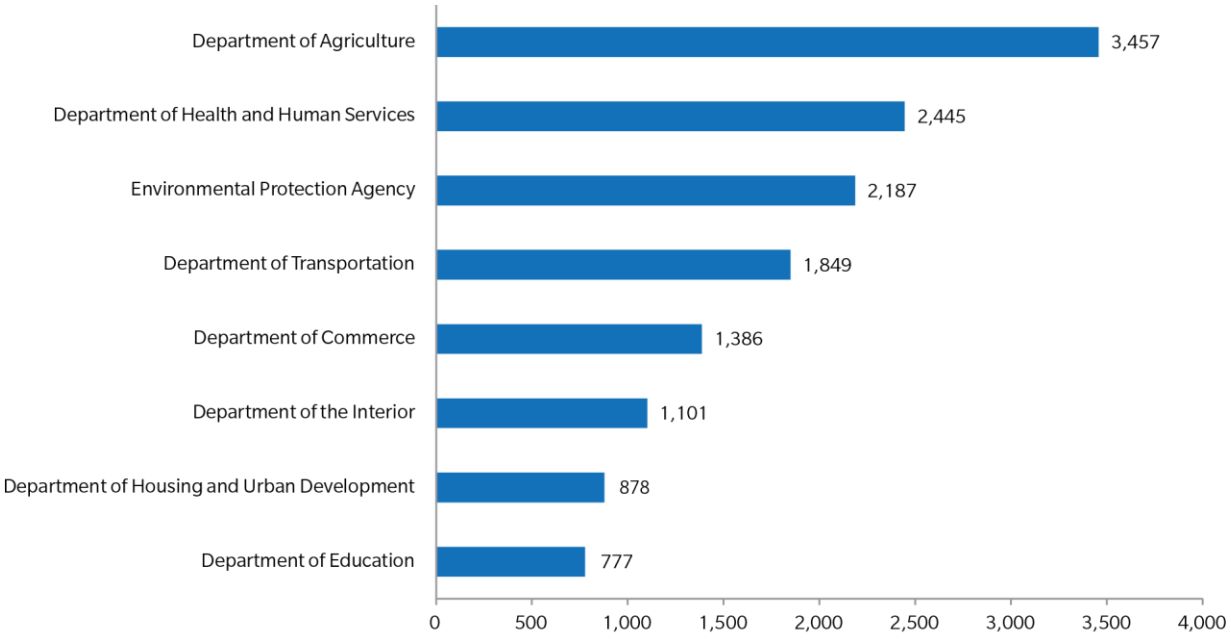
Source: OIRA dataset.

In the OIRA database each regulation should be uniquely identified by a RIN—Regulation Identifier Number; however, there are RINs in the OIRA database with more than one observation. After removing duplicates and filtering for "sunsetted" regulations, the database reduces to 20,262 regulations, about 49% of the original total. To this reduced dataset we added 121 major regulations issued by independent agencies from 2001 through 2011, resulting in a dataset with 20,383 regulations. This is the dataset we used to map to the manufacturing sector earlier and also what was used for the remaining of the analysis in this section.[38]

Using this reduced dataset, **Figure 14** below describes the agencies that issued the highest number of regulations over time. The Department of Agriculture tops the list with 3,457 regulations followed by the Department of Health and Human Services and the EPA. The Departments of Labor and Energy are not even among the top eight agencies. If we focus only on the number of economically significant regulations, the EPA again has the third highest number of economically significant regulations. The Departments of Labor and Energy show up as the fifth and eighth place agencies. Note that the number of financial regulations is underrepresented because the OIRA database does not contain most of the relevant financial agencies (though it does include the Department of Treasury).

[38] The cumulative number of proposed and final regulations over time using this reduced dataset is provided in Appendix D.

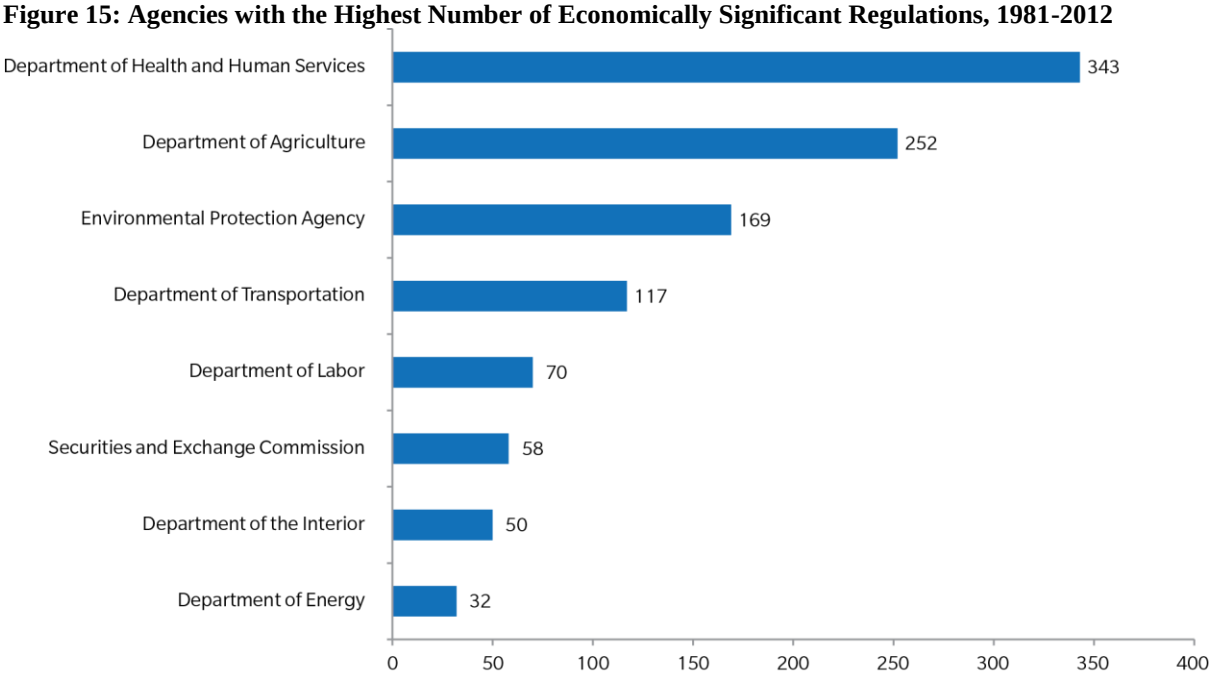
Figure 14: Agencies with the Highest Number of Total Regulations, 1981-2012



Note: The count of regulations in 2012 contains only those passed through April.

Source: OIRA dataset.

Figure 15: Agencies with the Highest Number of Economically Significant Regulations, 1981-2012



Note: The count of regulations in 2012 contains only those passed through April.

Source: OIRA dataset.

2. Cumulative Estimated Cost Imposed by Regulations Over Time

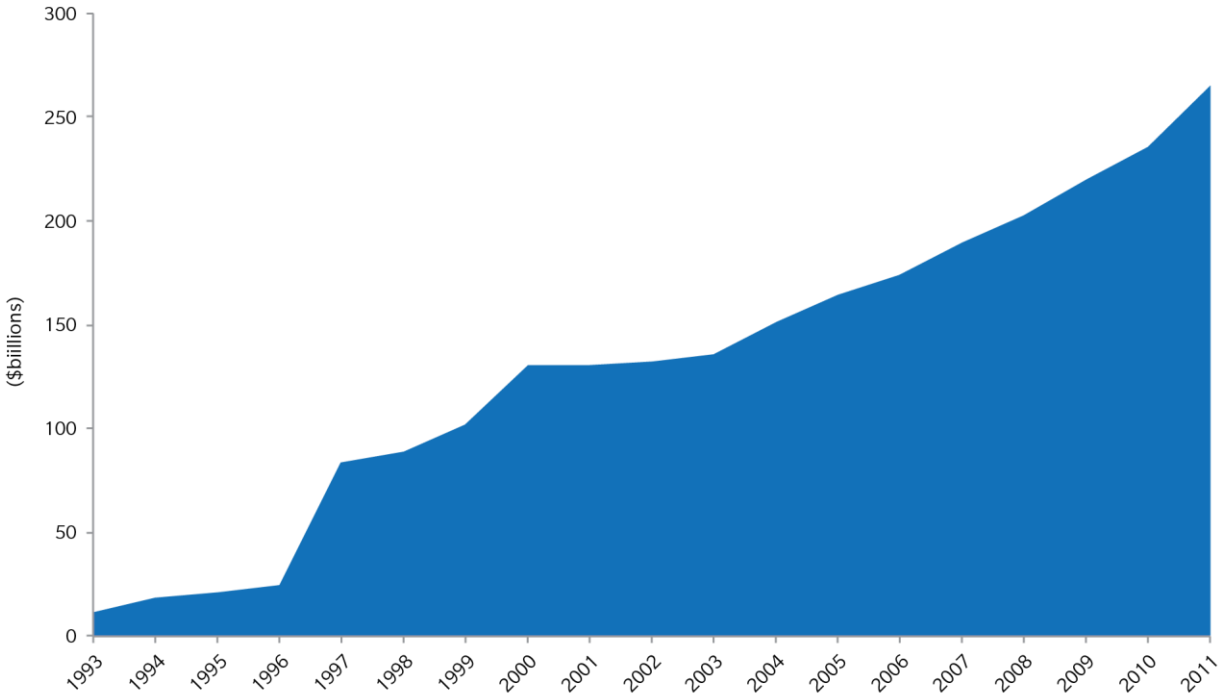
In this section, we perform an analysis similar to that performed for the manufacturing sector, but we focus more broadly on the cumulative cost imposed by regulations over time on the overall economy. We use all the 320 regulations from the OMB Reports to Congress for which we have quantitative cost estimates, instead of only the 145 unique regulations mapped to the manufacturing sector. Again, most of these 320 regulations are major regulations and there is very little information about non-major regulations.

Figure 16 shows that from 1993 through 2011 the annual direct cost of major regulations alone grew to more than $265 billion for the overall economy. To calculate this cumulative estimated cost for regulations, we only aggregated the annual cost of all regulations (most major) for which we have cost estimates from the OMB database. An alternative approach would be to calculate the average cost per regulation for each year using all regulations from 1993 through 2011 in the OMB dataset and extrapolate it by multiplying by the total number of regulations for each year as indicated in the OIRA database. Using this second approach, the cumulative estimated cost of regulations to the overall economy from 1993 through 2011 increases to approximately $726 billion. Again, this increase in the cumulative estimated cost, compared to the first approach, is caused by the significantly higher number of regulations considered for each year. Both cumulative cost estimates were used as inputs for sunk costs in the scenarios analyzed in the N_{ew}ERA model.

A third alternative method of estimating the cumulative cost of regulation would be to start with the estimate of $265 billion taken from the OMB dataset and add an estimate of the cost of non-major regulations. Non-major regulations are those with annual cost of less than $100 million. Based on the 5,756 non-major regulations issued from 1993 to 2011, the total estimated cost of non-major regulations would equal that of major regulations if their average cost was approximately $40 million per regulation.[39] This is close to the average cost of the non-major regulations for which cost estimates were available. Given this unknown impact of non-major regulations and the large number of major regulations for which there are no cost estimates available, we have opted to stick with the range of $265 billion to $726 billion for the direct annual cost of regulation in 2011.

[39] Cost per non-major regulation is computed based on limited information on the cost of non-major regulations from the OMB Reports to the Congress.

Figure 16: Cumulative Cost of Regulations Over Time, in Billions of Constant 2010 Dollars. 1993-2011

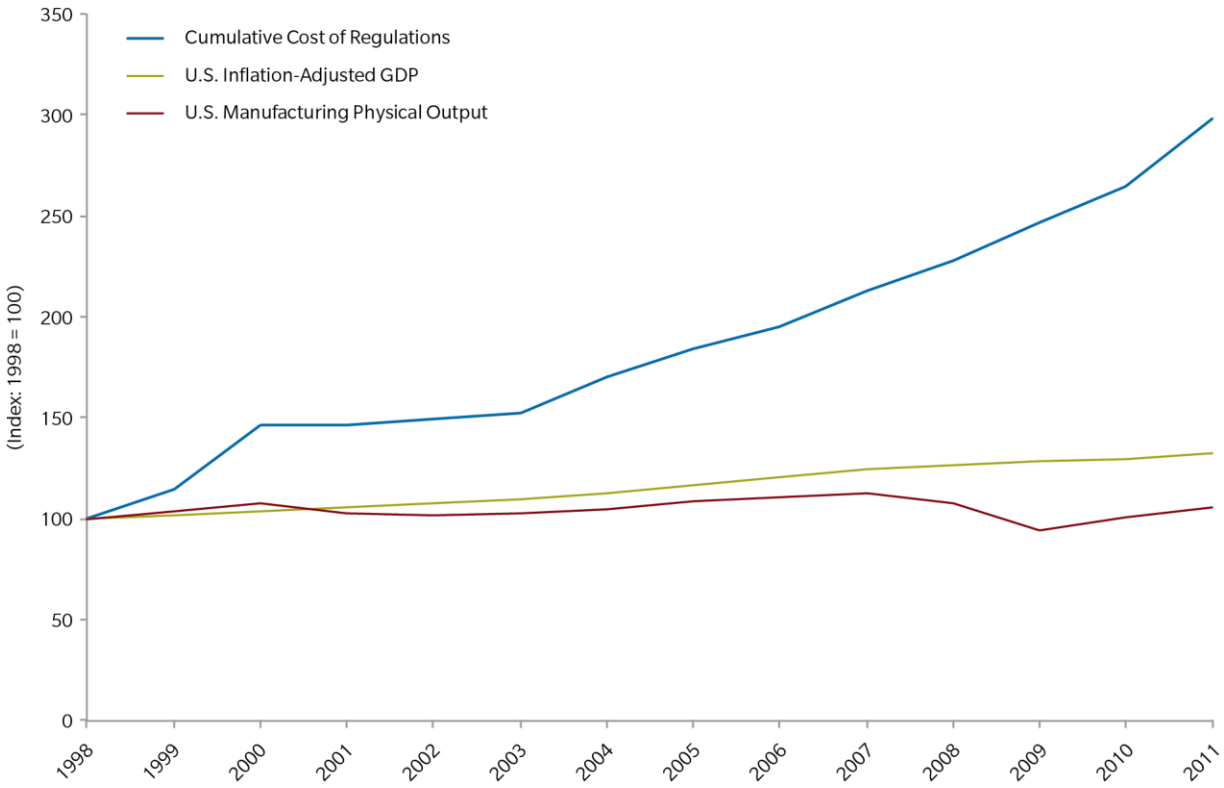


Note: Rules with net present value cost estimates have been annualized assuming a 7% discount rate and 20-year regulatory lifetime.

Source: OMB dataset; NERA analysis.

Comparing the rate of growth in the estimated cost of major regulations to the U.S. GDP growth rate and the manufacturing output growth rate shows that growth in the cost of major regulations has far exceeded growth in these other two measures **(Figure 17**). Since 1998, the cumulative inflation-adjusted cost of major regulations has grown by an annualized rate of 8.8%. Over this same period, U.S. inflation-adjusted GDP has grown by 2.2% and the physical volume of output of the manufacturing sector has grown by 0.4%.

Figure 17: Cumulative Inflation-Adjusted Cost of Major Regulations Versus Annual Growth of Inflation-Adjusted U.S. GDP and Manufacturing Physical Output, 1998-2011



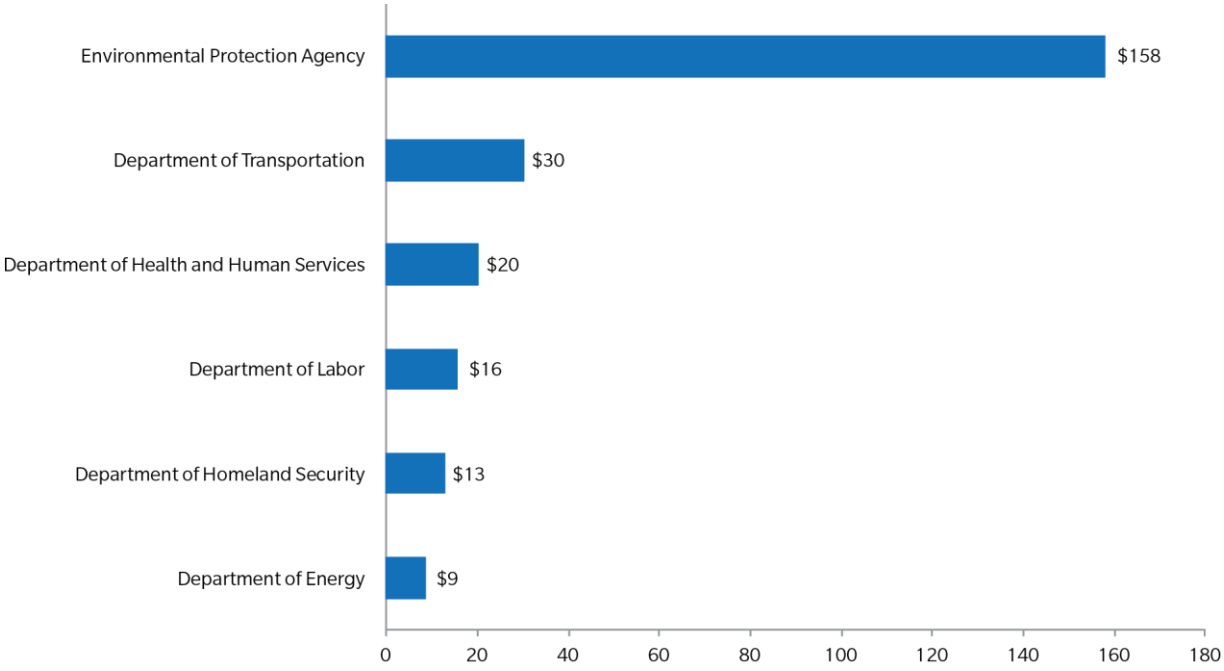
Note: Rules with net present value cost estimates have been annualized assuming a 7% discount rate and 20-year regulatory lifetime.

Sources: OMB dataset; NERA analysis; U.S. Department of Commerce: Bureau of Economic Analysis (via Federal Reserve Bank of St. Louis) and U.S. Department of Labor: Bureau of Labor Statistics (via Federal Reserve Bank of St. Louis).

Finally, looking at the ranking of the agencies in terms of total estimated costs from 1993 through 2012, [40] the EPA ranks as the top agency with a total cost estimate of $158 billion **(Figure 18**). This far exceeds the cost of all other agencies. Although the EPA has the third-highest total number of regulations and total number of economically significant regulations, the cost impact of its regulations is far higher than average. When considering total costs, the Department of Transportation moves up to the second position; the Department of Labor advances to the fourth position; and the Department of Energy moves up to the sixth position. Department of Health and Human Services and Department of Agriculture both move down. Again, financial regulations are underrepresented as OMB's dataset does not contain information on most of the relevant financial agencies with the exception of the Department of Treasury.

[40] Note that these totals represent only rules with cost estimates from the OMB Reports to Congress. To the extent these reports do not contain cost estimates for all regulations over the 1993 though 2012 time period, the totals shown below are understated.

Figure 18: Top Agencies in Terms of Total Cost of Regulations, 1993-2011, in Billions of Constant 2010 Dollars



Note: Rules with net present value cost estimates have been annualized assuming a 7% discount rate and a 20-year regulatory lifetime.

Source: OMB dataset; NERA analysis.

V. MACROECONOMIC IMPACT OF MAJOR REGULATIONS ON THE MANUFACTURING SECTOR

To analyze the implications of federal regulations on the economy in general and the manufacturing sector in particular, we developed a set of three core cost scenarios. The first scenario, COST, was constructed from the actual cost numbers compiled from the OMB Reports from 1993 through the end of 2011. The second scenario, COSTREG, combines the costs of regulations revealed from the CEO Survey and three key individual regulations identified by our industry experts. The final scenario, COSTPLUS, is based on our estimate of the cost of all major regulations. In addition to these core scenarios representing our central cases, we ran two additional cases, DIRECT and INDIRECT, that illustrate cost impacts and implications of layering regulations on top of existing regulations. The cost of regulation associated with the DIRECT scenario is based on the CEO Survey, while the INDIRECT scenario cost is implicitly determined with the model by simulating actual regulations. We also provided two sensitivities on the growth of cost in regulations for each of the COST and COSTPLUS scenarios to test the robustness of our results. We discuss the design elements of these scenarios in detail below.

For all scenarios, we represented the costs of the regulations by varying implied input tax rates in the model. We estimated ad valorem tax rates using different cost estimates from different sources, namely the OMB cost estimates and CEO Survey feedback from MAPI members. These sources provided partial coverage of the full set of major and non-major regulations on

manufacturing, so the different cost scenarios are likely to be underestimates of the true impacts. Comparing them to each other helps in understanding which types of regulations are likely to be the most burdensome and in assessing the relative likelihood of the different estimates.

From the point of view of a firm that is subjected to burdensome regulations, paying a tax has the same effect on the bottom line as expending the same amount of money on labor or capital required to comply with regulations. In both cases, there is an expenditure that does not contribute to additional salable output. Taxes are just easier to identify than costs of additional labor and capital needed to comply with regulations. From a macroeconomic point of view, however, taxes and regulations are very different, in that taxes can be recycled through the economy but labor and capital devoted to compliance provides no such revenues or financial benefit.[41] To make the ad valorem taxes have the same macroeconomic effect as the regulations that they are designed to represent, we assigned the tax revenue to a "regulatory agent" in the model who buys that amount of labor and capital services so that they are not usable elsewhere in the economy for production of goods and services.

In the N_{ew}ERA model, the estimated ad-valorem tax rates were applied to the following inputs: energy, transportation services, labor, capital, and intermediate goods. On one hand, taxes on transportation services, labor, capital, and intermediate goods were applied at the same rate for all production sectors. Energy taxes, on the other hand, were applied based on sectoral energy, intensity. That is, energy intensive sectors face higher energy tax rates than sectors with lower energy intensity. Application of taxes on goods and services consumed by industry and households increases the cost of production of goods and services in the economy, which will ripple through the economy, leading to a loss in production of manufacturing goods and lower overall level of consumption. The extent of the effects will depend on the estimated tax increase and intensity on taxed inputs. Parts of the manufacturing sector that are highly energy-intensive would be most impacted by energy taxes coming from energy and environmental regulations, while sectors that are labor intensive would be most affected by labor regulations.

Below are discussions on three core scenarios and sensitivities that we used to provide a range of impacts on the economy and the manufacturing sector.

1. Scenario Based on Cost Estimates From OMB Reports to Congress (COST)

The COST scenario was based on cost estimates compiled from the OMB Reports to Congress from 1993 through 2011. Over this period, the linear growth rate of the cost of regulations was 7%. Using this linear growth rate, we projected the cost of regulations from 2012 through 2021. We then estimated equivalent ad valorem tax rates that would generate tax revenues equal to our estimated cost of regulations.

To compute ad-valorem tax rates on inputs, we shared out these cost estimates by the baseline value of energy, capital, labor, and transportation services input values. Labor, capital, and

[41] Lawrence H. Goulder and Ian W. H. Parry, "Instrument Choice in Environmental Policy," *Review of Environmental Economics and Policy* 2(2), 2008, pp. 159-161.

transportation taxes were computed in aggregate and applied uniformly across all manufacturing sectors. Energy taxes were computed based on energy uses or energy intensities of the manufacturing sectors. High energy consumption sectors, e.g., petroleum refining and chemicals, would face higher tax rates, while a low energy consuming sector, e.g., food manufacturing, would face a lower energy tax rate.

To test the robustness of the impacts, we assumed two different growth rates to project the cost of regulations for COST_LOW and COST_HIGH sensitivity cases for the COST scenario. These sensitivity cases provided a bound on the range of potential growth in the cost of new regulations over the next decade. In the absence of quality data, we were left with performing this sensitivity analysis. We present the COST scenario as a mid-range estimate based on an implied average annual growth rate of 7%. For COST_LOW, we assumed the cost of regulations to increase at an implied annual rate of 1.8%, while for COST_HIGH, the implied annual growth was assumed to be 14.2%. The tax rates computed for the COST scenarios and the two sensitivity cases are provided in Appendix-E.

2. Combination Scenario (COSTREG)

Regulations when analyzed in isolation may have small impacts; however, regulations are analyzed collectively or layered one on top of another in practice. Interaction of regulations creates additional distortions in the economy leading to higher costs. It would also lead to non-additive consequences. To analyze the interaction effects of regulations, we designed this scenario.

The COSTREG scenario combines the cost of regulations revealed from the CEO Survey and three key individual regulations. The main motivation for combining two different feedbacks was to highlight the interaction effects of regulations. DIRECT was based on the qualitative analysis of the CEO Survey and the need to include key regulations that would indirectly impact the manufacturing sectors. We believe the CEO Survey response took into account the direct effects that might impact the manufacturing sector only, while the NERA experts strongly felt that there was a need to model some key regulations individually to better represent the costs of regulations that would indirectly affect the manufacturing sectors. The COSTREG scenario was constructed by combining the DIRECT scenario tax rates with INDIRECT scenario regulations.

a. CEO Survey Based Sub Scenario (DIRECT)

We used the CEO Survey responses shown in **Figure 4** to estimate a cost metric. The responses from the CEO Survey varied from no impact to an impact of greater than $29.25 billion for the energy, environmental, financial, labor, and transportation categories. We created cost distribution from the feedback for each of the categories and then computed mean cost per year. The mean cost (average cost per year) for the environmental category was estimated to be $16.8 billion. Plotting similar distributions, we estimated the annual average cost of regulations for energy, finance, labor, and transportation to be $26.6, $11.3, $35.5, and $21.4 billion, respectively. How we used the CEO Survey data to estimate the cost is discussed in Appendix F.

b. NERA Expert Inputs Based Sub Scenario (INDIRECT)

NERA experts identified the following three major regulations that might have significant impact on the overall economy and an indirect impact on the manufacturing sector:

- Mercury and Air Toxics Standards (MATS) rule
- Fuel Economy Standard for Light-Duty Vehicle (LDV)
- Mandatory Audit Firm Rotation (MFR)

MATS rules finalize standards to reduce air pollution from coal- and oil-fired power plants under new source performance standards and the toxics program of the 1990 Clean Air Act amendments. These rules set technology-based emissions limitation standards for mercury and other toxic air pollutants by using best available technology. Since the N_{ew}ERA model has a detailed electric sector, we were able to implement this rule as stated. The main consequence of this rule is that the electric sector has to make large investments in pollution abatement control technologies. This additional capital requirement has implications beyond the electric sector; for example, the additional demand for capital increases the cost of capital and crowds out investment in other economic activities that would have taken place, including those in manufacturing. Our model was able to simulate these dynamics and the implication on the manufacturing sector. Details of how N_{ew}ERA models MATS can be found in Smith et al. 2012.[42]

The federal government continues to tighten fuel economy standards for different classes of vehicles. We only modeled the Light-Duty Vehicle fuel economy standard that purports to increase the standard for the vehicle fleet to 35 miles per gallon (MPG) in 2020, rising to 45 MPG by 2027.[43] The tightening of the fuel economy standard for personal vehicles would lead to rationing of gasoline and an increase in pump prices. Higher gasoline prices would have indirect effects on the manufacturing sector and direct and indirect impacts on consumers.

Mandatory audit firm rotation (MFR) is not a full-fledged regulation, as it is still at a concept stage.[44] We modeled this mandate, however, to characterize a representative financial

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[42] Dr. Anne E. Smith, Dr. Paul Bernstein, Scott Bloomberg, Sebastian Mankowski, and Dr. Sugandha D. Tuladhar, *An Economic Impact Analysis of EPA's Mercury and Air Toxics Standards Rule*, 1 March 2012, NERA Publications.

[43] Consistent with the National Highway Traffic Safety Administration's (NHTSA) statutory authority, NHTSA and U.S. Environmental Protection Agency (EPA) is proposing CAFE standard is projected to require on, an average industry fleet-wide basis for cars and trucks combined, 40.1 miles per gallon (mpg) on model year 2021, and 49.6 mpg in model year 2025. www.nhtsa.gov.

[44] Center for Audit Quality, December 14, 2011, cited "Since we currently do not operate in an environment of mandatory firm rotation, obtaining an accurate picture of potential costs to relevant parties in the United States is obviously challenging. The Concept Release cites the 2003 Government Accountability Office's 'Required Study on the Potential Effects of Mandatory Audit Firm Rotation' which estimates that under an MFR environment, initial year costs associated with the provision of audit services could increase by at least 20

regulation. MFR requires corporate firms to rotate audit firms after several years. Although the intention of the regulation is to ensure the integrity of the auditing process, this would be burdensome to corporations as well as audit firms. Firms would have to educate the audit firms over a period of time and at the same time audit firms would have to spend resource to learn a new firm's business and financial practices. This practice will require resources and hence place real burden on industries.

Appendix-E shows the computed ad-valorem taxes that are applied to the manufacturing sector inputs for all scenarios and other cases.

3. Scenario Based on Cost Estimates of All Major Regulations (COSTPLUS)

The COST scenario includes regulations that are only reflected in the OMB Reports which includes only limited number of major regulations. To account for all major regulations, we design the COSTPLUS scenario, however, it is difficult to estimate the total cost of compliance of all historical regulations. Each and every regulation is unique from the point of view of the regulation's life, extent and scope of application, and timing of compliance period. Without performing a true bottom-up analysis of all regulations, which in itself is difficult to conduct, it would be challenging to come up with a "good" cost estimate of all regulations. Given the limitation of the data and data discrepancies between the total number of major rules and the number of rules with cost estimates in our database, we adopted an approach described in Section IV to extrapolate the cost for all major regulations. To account for this possible discrepancy, we modeled this scenario.[45]

As with the COST cases, we produced results for two sensitivity cases (COSTPLUS_LOW and COSTPLUS_HIGH) based on two different cost of regulation growth rate assumptions. We applied the same approach as discussed above to compute the tax rates and applied it across all economic sectors of the economy, including households. The tax rates for the COSTPLUS scenario and the two sensitivity cases are shown in Appendix-E.

B. Results

1. Impacts on the Manufacturing Sector

All of the manufacturing sectors have net negative impacts, but sectoral level impacts vary across sectors. The responded at the sectoral level depends upon the stringency of the regulations and the effects on the inputs to production. In general, environmental regulations have impacts on the manufacturing sector by impacting energy prices, while labor regulations

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percent for the audit firms, and audit selection costs and audit support costs could increase by at least 17 percent for public companies."

[45] Between 1993 and 2011, there were 118 major rules from EPA based on the OIRA database; however, we were only able to get cost estimates, based on the OMB Reports to Congress, for 61 rules. It is unclear why OMB Reports did not cite cost estimates for the 57 missing rules. One possible reason could be that there were rules with duplicate cost estimates. At the other extreme, one can also assume that the rules might have been missed.

tend to impact labor inputs. Input intensities are different in each of the manufacturing sectors, hence the impacts. We present results for all 16 manufacturing sectors classified within NAICS 31, NAICS 32, and NAICS 33.[46]

In general, COSTPLUS shows the greatest negative impacts at the sectoral level and the other two scenarios (COST and COSTREG) show relatively smaller impacts. It is noteworthy that the impacts on the manufacturing sectors of the COSTREG scenario are greater than those of the COST scenario, suggesting that the environmental, energy, and financial regulations that we modeled have indirect impact on the manufacturing sectors.

a. Regulations Reduce Manufacturing Output

All subsectors of the manufacturing sector are impacted negatively (**Figure 19**). In the COSTPLUS scenario sectoral output for NAICS 31 on average reduces by about 5%, NAICS 32 declines by 6.5%, and NAICS 33 reduces by 5.4%. Under NAICS 31, output from both FOO and OMA sectors reduces by about 5%. Petroleum products (OIL) and chemicals (CHM) sectors are the hardest hit sectors. OIL and CHM reduces by about 10% and 9%, respectively under the COSTPLUS scenario. Within NAICS 33, the transportation equipment manufacturing subsector (TRQ) takes the largest hit in output, with output reducing by about 9%.

In the COST scenario, reduction in sectoral output ranges from 2% to 4%. At the sectoral level, as with the COSTPLUS scenario, the impacts on petroleum products, chemicals, and transportation equipment manufacturing subsectors are impacted the greatest. Under this scenario the impacts are relatively smaller than the other two scenarios because the estimated cost of regulations and hence equivalent ad-valorem tax rates are relatively lower.

Sectors that are highly energy intensive (e.g., refinery-OIL, aluminum sector-ALU, chemicals-CHM, and transportation equipment-TRQ) are impacted more than sectors that are less energy intensive (e.g., food beverage and tobacco products-FOO, machinery-MAC, and wood products-WOO). This is to be expected since a large part of the effects of regulations comes from energy and environmental regulations, which have direct impact in raising the cost of energy.

In the COSTREG scenario, however, higher impacts result because of an increase in labor and capital inputs that are reflected from the CEO Survey along with an increase in energy prices as a result of environmental and energy regulations. Under COSTREG, sectors that are labor- and energy-intensive are particularly impacted. For the OIL and TRQ sectors that are labor- and energy-intensive, output reduces much more under the COSTREG scenario than under COSTPLUS. Petroleum refining (OIL), an energy-intensive industry, is impacted more by COSTREG in which environmental regulations are key than in the COSTPLUS scenario.

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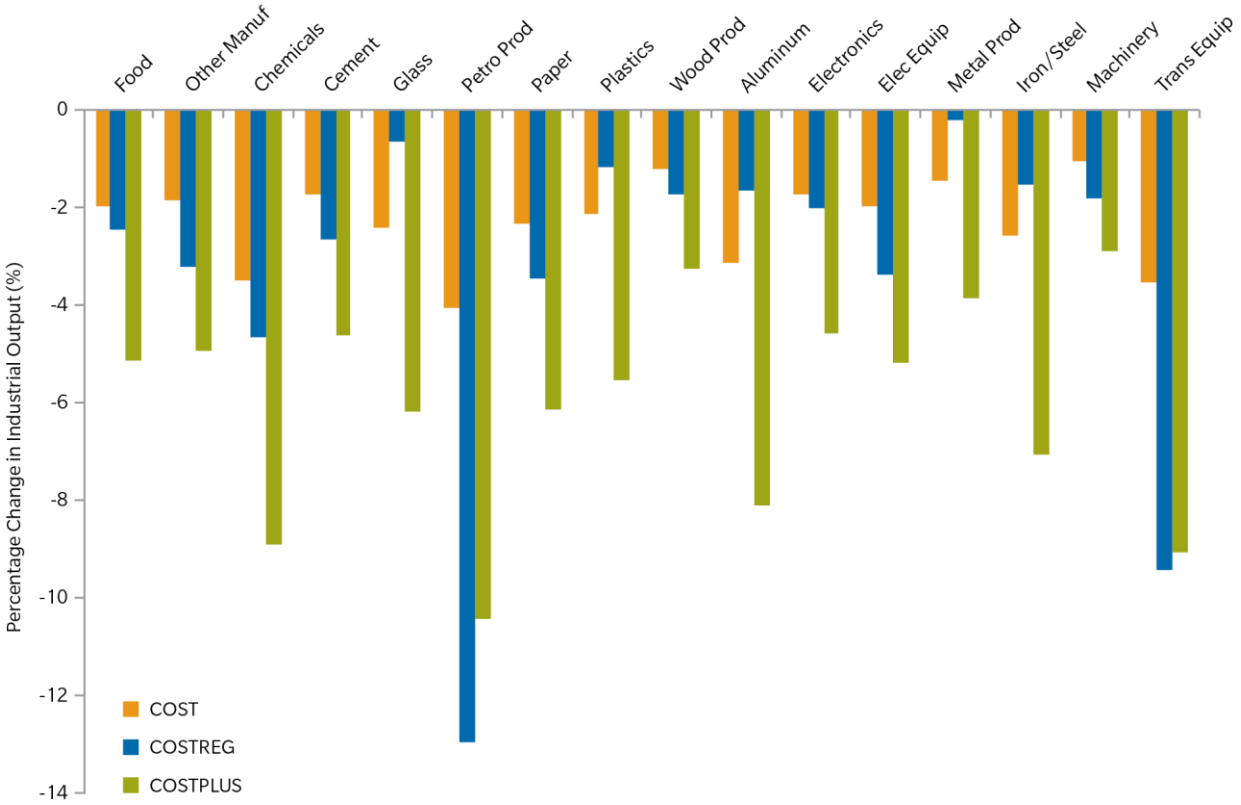
[46] We repeat the mapping here again prior to discussing the manufacturing sector results. NAICS 31 includes food products (FOO) and balance of manufacturing (OMA) sectors. NAICS 32 includes chemicals (CHM), glass and glass products (GLS), petroleum products (OIL), paper and allied products (PAP), plastics and rubber products (PLA), and wood products (WOO). NAICS 33 includes aluminum (ALU), computer and electronic products (CMP), electrical equipment (ELQ), fabricated metal products (FAB), iron and steel (I_S), machinery (MAC), and transportation equipment (TRQ).

In aggregate, this results in a net negative potential impact across all sectors. The principal reason for the decrease is that the manufacturing sector faces higher input costs. This increase in energy costs leads to some fuel shifting towards relatively cheaper fuel and a reduction in output. Across all scenarios, the petroleum products sector and energy intensive manufacturing sectors experience the most significant potential impacts. Overall manufacturing sectoral output is reduced by 2% to 4% annually under the COST scenario and about 5% to 12% annually under the COSTPLUS scenario.

Figure 19: Annual Average Percentage Change in Physical Output of the Manufacturing Subsectors (Averaged Over 2012-2021, in %)

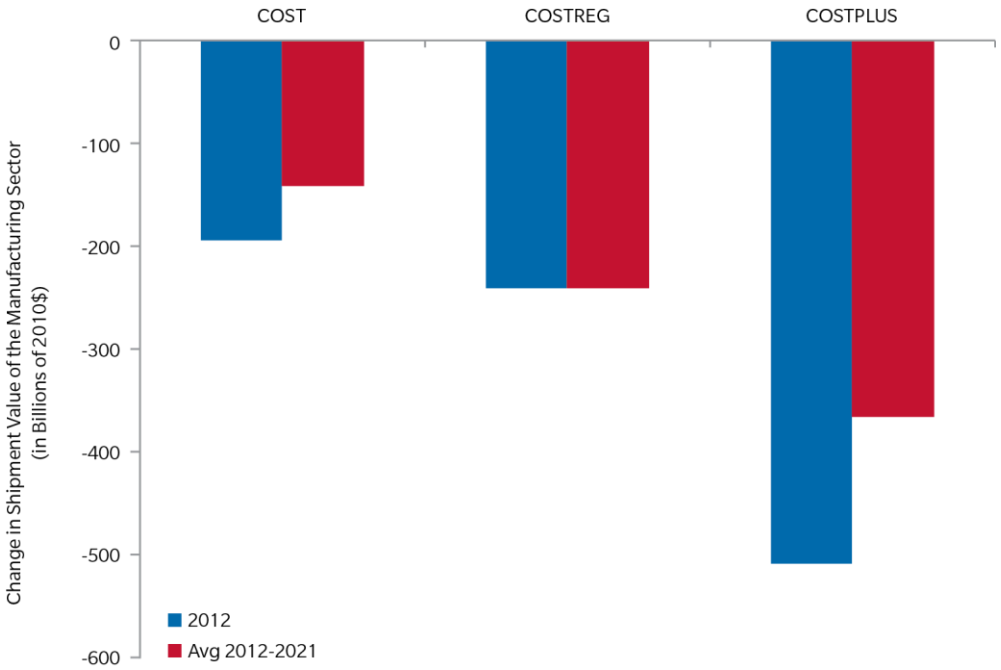


b. Manufacturing Sector Shipment Value Drops Significantly

Reduction in output in the manufacturing sector results in lower sales revenue for the sectors. The manufacturing sector as a whole could see a loss of shipment value of about $200 billion in constant 2010 dollars in 2012 even under the most optimistic COST scenario (**Figure 20**). Under the COSTPLUS scenario in 2012, the shipment value of the manufacturing sector as a whole is $500 billion less in constant 2010 dollars than it would be without the estimated regulatory burden. This loss in shipment value for manufacturing is about 34% (for the COST scenario) and 85% (for the COSTPLUS scenario) of the 2010 pre-tax profit of the manufacturing

sector as a whole.[47] The COST and COSTPLUS scenarios have lower average annual loss of shipment values. The losses for these scenarios decline over time because our estimates for the energy, environmental, labor, and capital tax rates decline over time, however, the losses under COSTREG increase overtime as the stringency of the energy and environmental regulations increases. Such large losses for the manufacturing sector could have serious consequences on growth, unemployment, and innovation within the manufacturing sector.

Figure 20: Annual Average Change in Shipment Value for the Manufacturing Sector as a Whole (2012 and Averaged Over 2012-2021, in Billions of Constant 2010 Dollars)

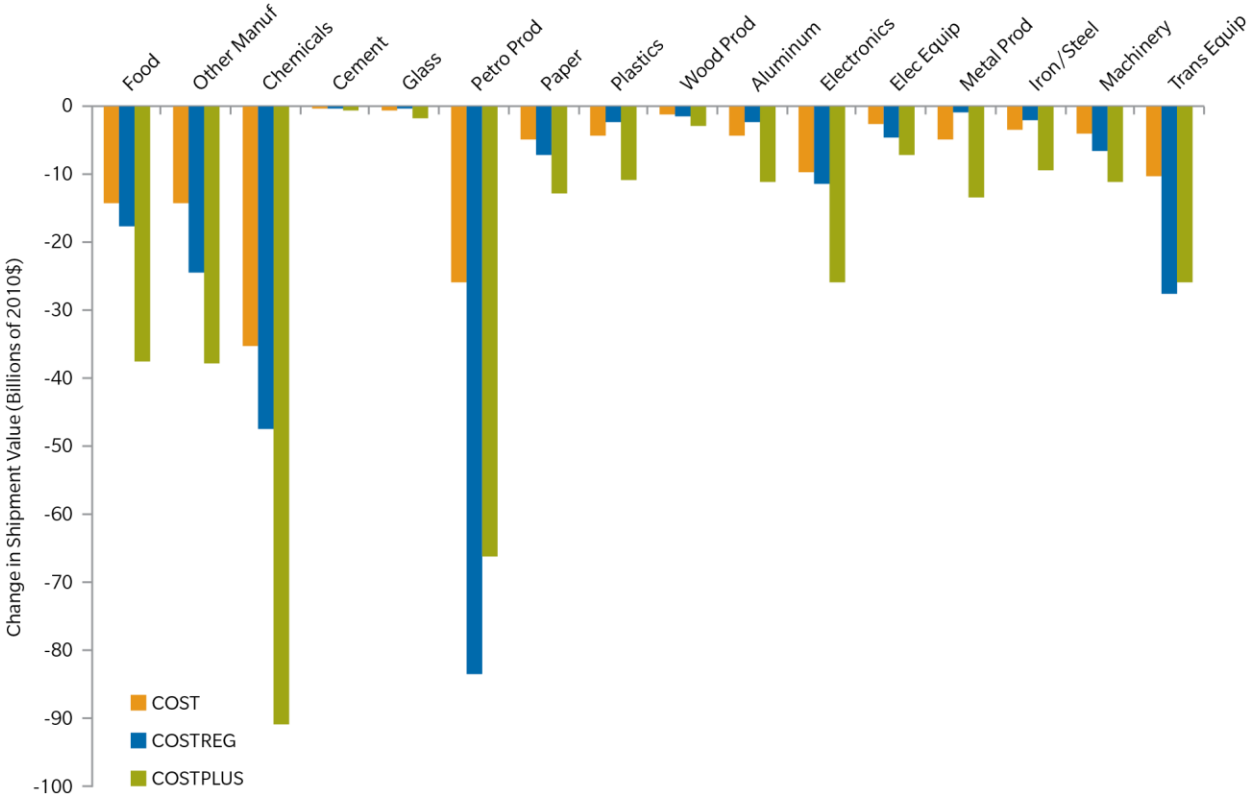


At a sectoral level, petroleum products (OIL), chemicals (CHM), transportation equipment (TRQ), and food products (FOO) sectors could see the largest reduction in shipment value under the COSTPLUS scenario. The chemicals sector alone could see a reduction of $40 billion in constant 2010 dollars under the COST scenario to $90 billion in constant 2010 dollars in its value of shipment in the COSTPLUS scenario because of higher energy prices.

Refineries loss in shipment value could be in similar range, $30 billion in constant 2010 dollars under the COST scenario and $85 billion in constant 2010 dollars under the COSTPLUS scenario. The average change in shipment value is negative in all scenarios in aggregate with the petroleum refinery and chemicals sectors receiving the greatest impacts **(Figure 21).**

[47] As per the Census Bureau, pre-tax profit for the manufacturing sector in 2010 was $585 billion constant 2010 dollars.

Figure 21: Annual Average Change in Shipment Value by Subsectors (Averaged Over 2012-2021, in Billions of Constant 2010 dollar)



c. Exports From Manufacturing Subsectors Decrease

A higher burden of regulations on the manufacturing sector leads to higher costs of production. As a result, we see domestic goods as relatively uncompetitive in the international markets. Loss of competitive edge of the U.S. manufacturing sector is reflected by a reduction in exports; export levels of energy-intensive sectors are especially impacted. On average, 2012 exports decrease by 7%, 11.5%, and 17% under COST, COSTREG, and COSTPLUS, respectively. **Figure 22** and **Figure** 23 show the percentage change in 2012 exports and 2012-2021 exports for all manufacturing sectors. Loss in export revenues from the manufacturing sector will have impacts on the balance of payments account and hence worsen the current U.S. deficit level more than would exist without the estimated regulatory burden.[48]

[48] U.S. does not export petroleum products in the baseline or the scenario. Hence, the percentage change in OIL is zero in **Figure 22** and **Figure 23**.

Figure 22: Percentage Change in Exports From Manufacturing Subsectors in 2012 (in %)

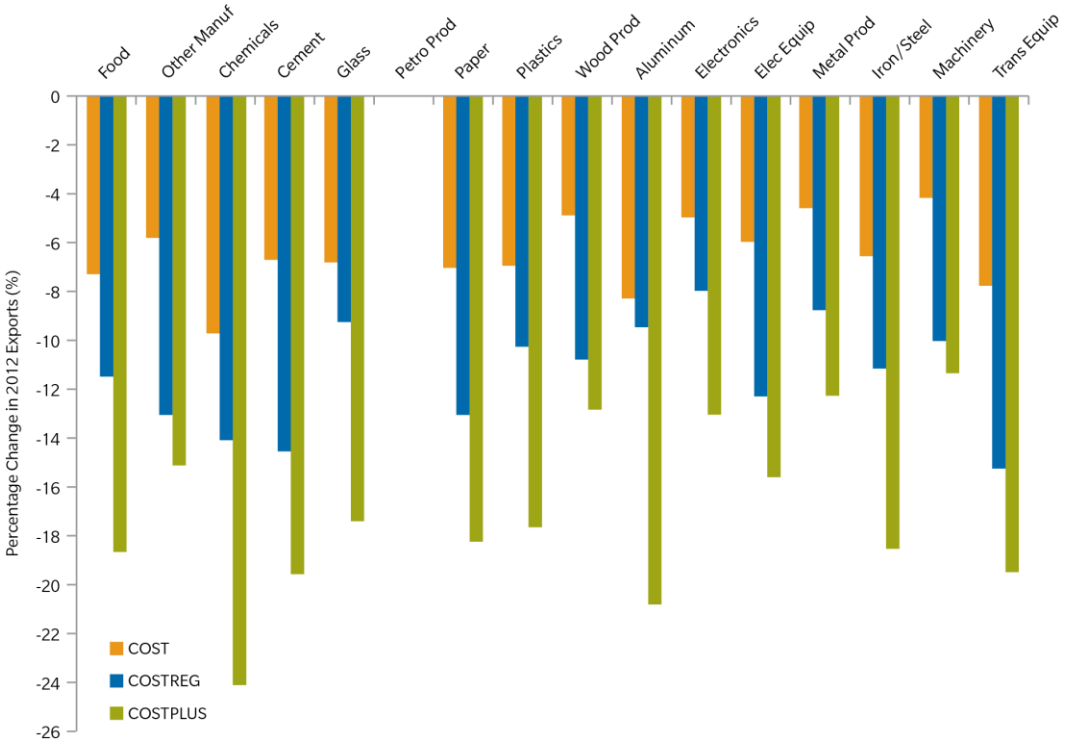
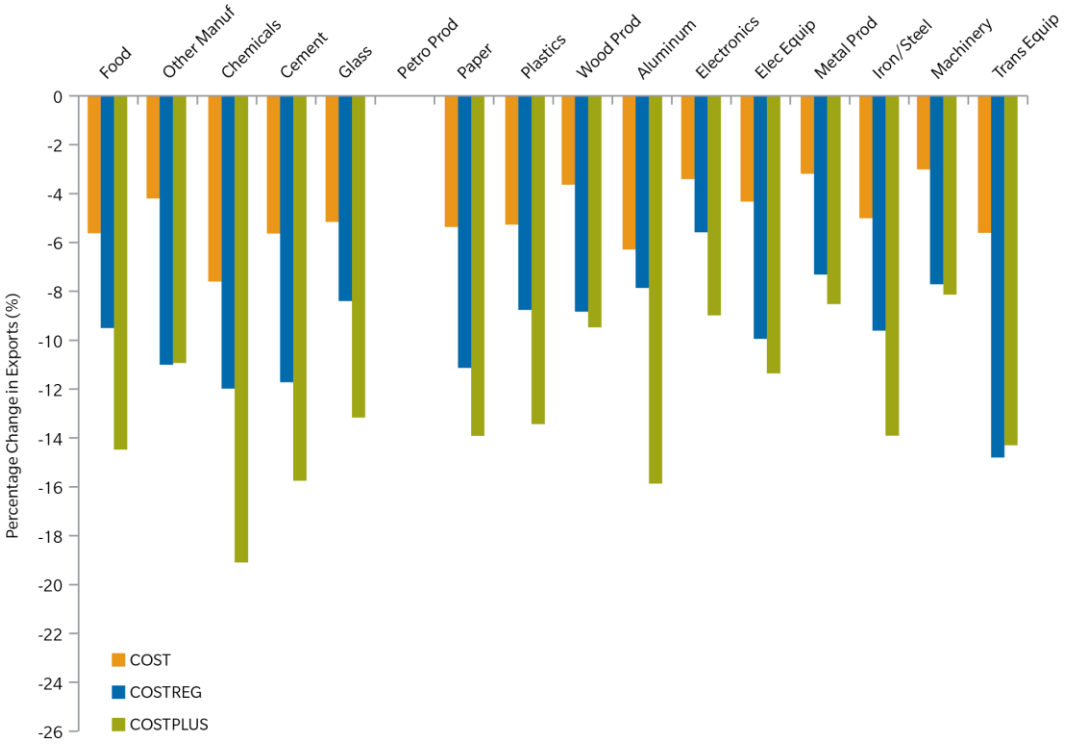


Figure 23: Percentage Change in Exports From Manufacturing Subsector (Averaged Over 2012-2021, in %)



C. Impacts on the Overall Economy

1. Economic Impacts

Manufacturing subsectors interact with other parts of the overall economy. Impacts on the non-manufacturing sectors could have indirect impacts and unintended consequences on the manufacturing subsectors. The impacts on the overall economy provide indication of the impacts on the rest of the economy as well.

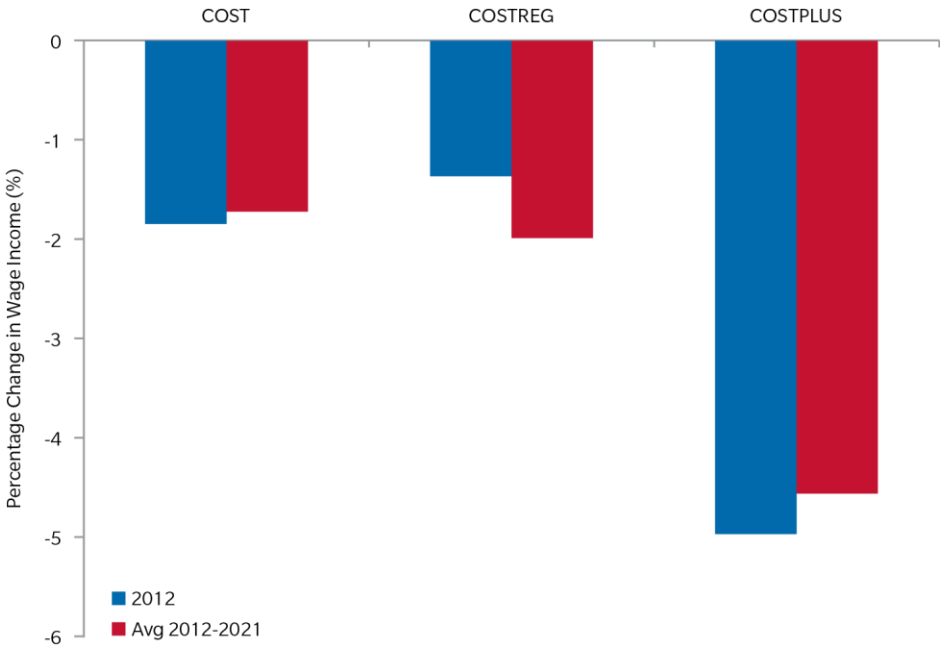
The results from the COSTPLUS scenarios that approximate the cost for all major regulations have the largest economic impacts while the COST scenario tends to exhibit the smallest impacts. The COSTPLUS scenario, which accounts for continued growth in burden, has the highest burden relative to the other scenarios because it assumes that annual increase in regulatory burden will itself grow as it has for the past four years. On the other hand, the COST scenario, which reflects stable burden, assumes that the additional regulatory burden in each year will be the same as it has been on average since 1993. The COSTREG scenario's impact (GDP) is in the middle of the other two core scenarios, COST and COSTPLUS. This is because the additional burden of energy and environmental regulations (INDIRECT) along with the impacts on the manufacturing sector from the DIRECT scenario tend to amplify impacts more than the COST scenario.

Despite the variation in magnitudes of impacts, all scenarios displayed net negative macroeconomic impacts. We show impacts for 2012 and average impacts over 2012 through 2021 on the overall economy.

a. Employment Compensation Decreases

Wage income decreases by about 2% under the COST and COSTREG scenarios (**Figure 24**). Direct operational costs are the most visible and of greatest concern to manufacturing executives since regulations that impact wages would be perceived as having a greater negative impact than other regulations. The COSTPLUS scenario, which has the highest tax rates to reflect the high cost of regulations, has the greatest impact and indicates that wage income could reduce by as much as 5% if the regulatory burden continues to increase as it has over the past five years.

Figure 24: Percentage Change in Wage Income (Averaged Over 2012-2021, in %)



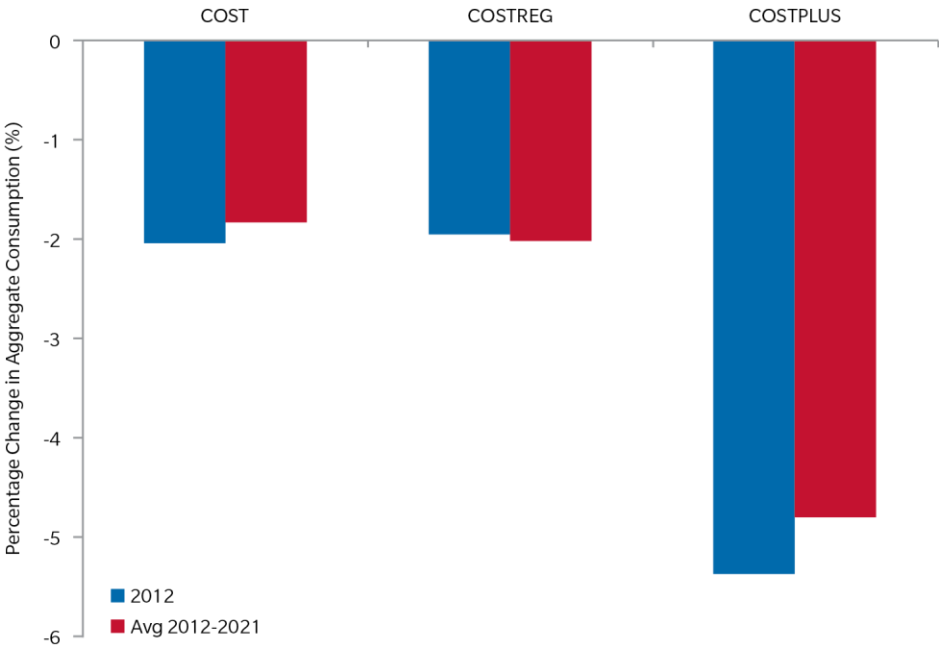
b. Regulatory Burden Reduces Aggregate Consumption

Consumers earn income from wage income and returns on capital. Lower wage income for consumers mean that there is less to spend on goods and services and hence less saving in the economy.

This impact is most significant in the COSTPLUS scenario which shows possible aggregate consumption reductions of about 5% (**Figure 25**). The results are consistent with wage income as household expenditures are largely financed by wage income. Lower income also leads to lower saving which is used for investment in the economy. The cost of complying with new regulations can impede investment in several ways: (1) increasing the resources required in order to expand capacity by requiring more costly equipment or pollution controls; (2) lowering the return on investment because of increased operating costs; and (3) increasing the costs of investment goods because of impacts on the industries that manufacture them.[49]

[49] Dale W. Jorgenson & Peter J. Wilcoxen, 1993. "The Economic Impact of the Clean Air Act Amendments of 1990," *The Energy Journal*, International Association for Energy Economics, vol. 14 (Number 1), pages 159-182.

Figure 25: Percentage Change in Aggregate Consumption (2012 and Averaged Over 2012-2021, in %)

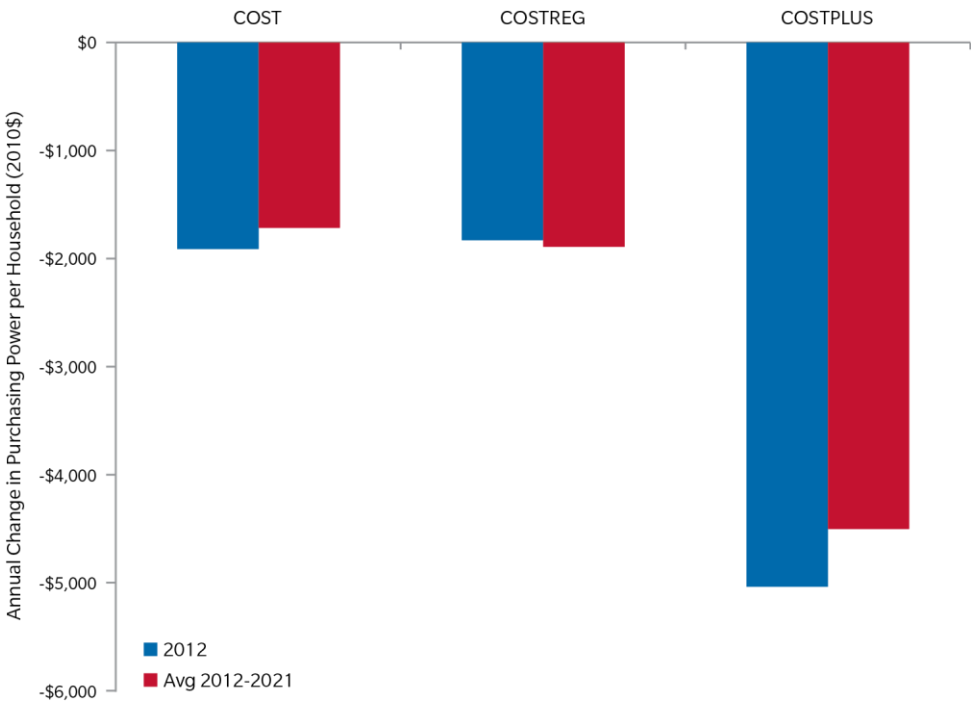


c. Regulatory Burden Reduces Purchasing Power of U.S. Households

The negative impact of the cost of regulations to an average U.S. household could be as great as $5,000 per year loss in household purchasing power, as seen in the COSTPLUS scenario (**Figure 26**). This loss amounts to about 10% of current median U.S. household's income.[50] The other two scenarios show smaller, potential impacts, with the cost of regulations showing a loss of about $2,000 per year in purchasing power. The range of losses, $1,800 to $5,000 per year, is a significant amount. The loss in purchasing power suggests two conclusions: whether or not the regulatory burden continues to grow as it has in the past four years is a critical determinant of impacts on the average household, and the major energy and environmental regulations are responsible for a large share of that cost.

[50]Real median household income in the United States in 2010 was $49,445. http://www.census.gov/newsroom/releases/archives/income_wealth/cb11-157.html.

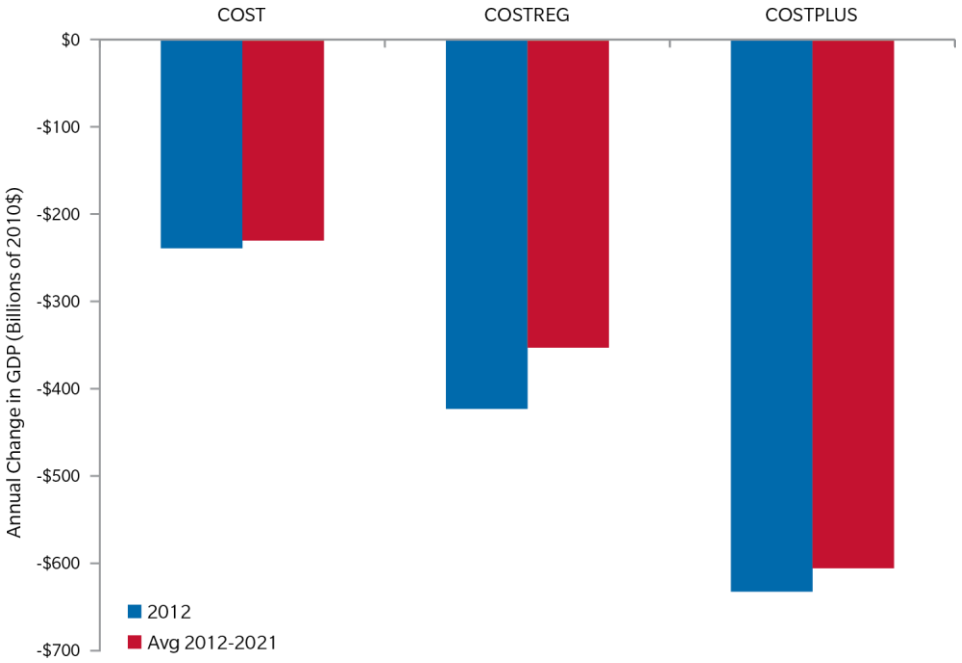
Figure 26: Annual Average Change in Purchasing Power for an Average U.S. Household (2012 and Averaged Over 2012-2021, in Constant 2010 Dollars)



d. Reduced Economic Activities Lead to Lower Gross Domestic Product

As the broadest measure of economic impact, the reductions in GDP due to costs of regulation are notable in each of the scenarios, with the COSTPLUS scenario showing the greatest reductions of more than $600 billion (in constant 2010 dollars) per year (**Figure 27**). The most notable observation in comparing the three different results is the magnitude of the potential difference in GDP loss when we account for all major regulations. We see that there is an additional loss of about $400 billion (in constant 2010 dollars) if we account for the costs associated with regulations that are either missing in the OMB Reports or that have not been taken into account by our estimate. This is the difference in loss in GDP between the COST and COSTPLUS scenarios. The GDP impact under the COSTREG is about $400 billion (in constant 2010 dollars) which falls between the low and the high estimates of GDP impact.

Figure 27: Annual Average Change in GDP (2012 and Averaged Over 2012-2021, in Billions of Constant 2010 Dollars)



D. Interaction Effects of Regulations Lead to Non-Additive Impacts

In this section, we briefly describe the interaction effects of regulations by combining the DIRECT and INDIRECT sub scenarios. The impacts of DIRECT and INDIRECT are compared with those of the integrated scenario, COSTREG. Results comparing these scenarios show interesting outcomes since the anticipated regulatory costs used in DIRECT are based on estimates from surveyed executives and it might be anticipated that these manufacturing company executives would be overly pessimistic regarding the negative impacts of regulation on their businesses. We suspect that this resulting relationship in costs across scenarios could be caused by CEOs tending to perceive the costs most visible to their day-to-day operations (e.g., labor regulation or health and safety standards) as being the most significant while at the same time not fully taking into account increases in costs that may be one or two degrees separated from their operations (e.g., power sector regulations, which could drive up their energy expenses). We show below, as a sensitivity case, the effect of underestimating indirect effects by layering an environmental, energy, and financial regulation on top of the DIRECT scenario. This exercise also shows that layering on regulations leads to additional distortions in the economy. The distortion affects all parts of the economy, including the manufacturing sector, leading to greater burden on the economy.

Figure 28 shows that when we simulate the DIRECT and INDIRECT sub scenarios alone, GDP losses are about $173 billion and $159 billion (in 2010 constant dollars), respectively. The total loss in GDP from the DIRECT and INDIRECT scenarios is $332 billion (in constant 2010 dollars), however, when we run these two scenarios together, DIR_INDIR scenario, we compute

a GDP loss of about $353 billion. Layering on three regulations created an inefficiency cost of $20 billion to the economy.

Similarly, if we look at the resulting average loss in purchasing power (a metric of loss in aggregate consumption as well), the loss in the DIRECT, INDIRECT, and COSTREG scenarios are $1,020, $610, and $1,890 (in constant 2010 dollars) respectively (**Figure 29**). The COSTREG scenario creates an additional loss in purchasing power of an average U.S. household of about $250 per year.

The results point to an important result in this study that as more and more regulations are piled onto the economy in general and the manufacturing sector in particular, regulators will increase the cost of inefficiency in the economy.

Figure 28: Annual Change in GDP by Combining DIRECT and INDIRECT Scenarios (in Billions of Constant 2010 Dollars)

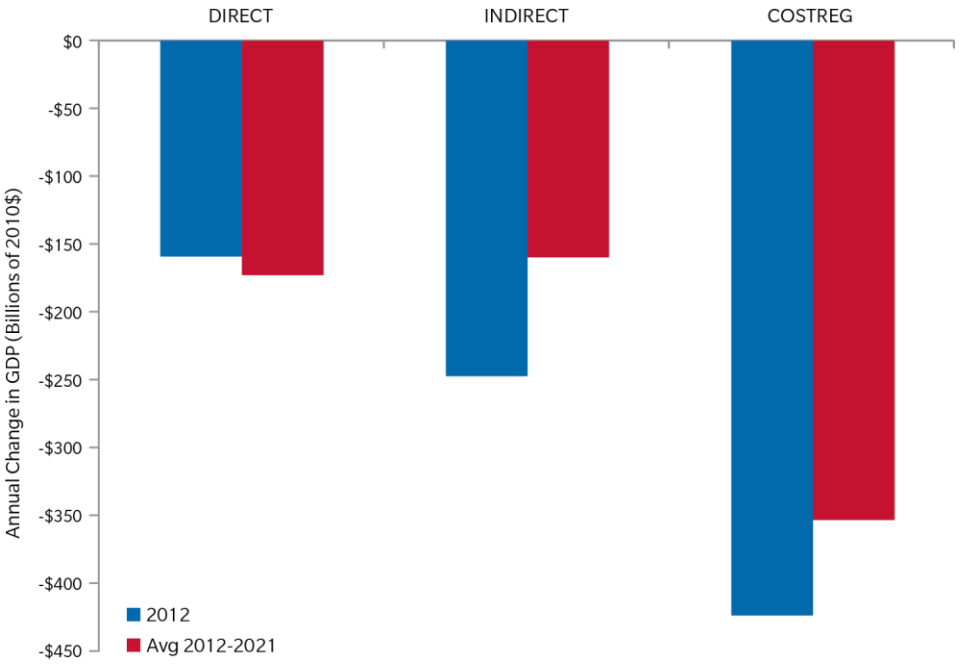
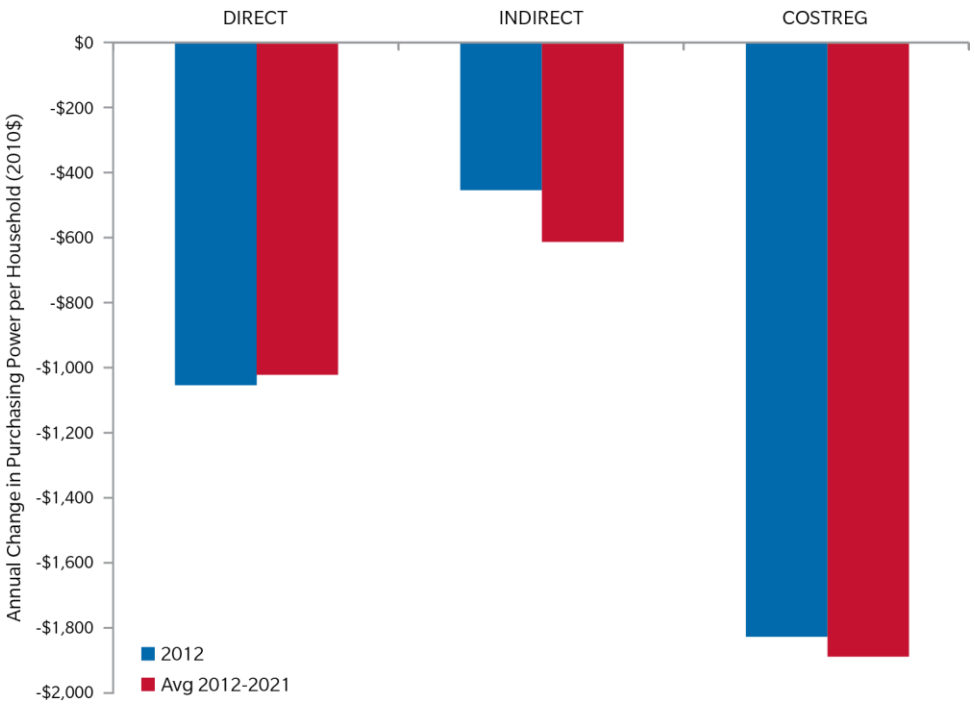


Figure 29: Annual Change in Purchasing Power of Households by Combining DIRECT and INDIRECT Scenarios (in Constant 2010 Dollars)



1. Sensitivity Cases to COST and COSTPLUS Scenarios

We present two sensitivity cases around the COST and COSTPLUS scenarios. The objective of the sensitivity cases is to bound impacts at the low end (with COST_LOW and COSTPLUS_LOW) and high end (with COST_HIGH and COSTPLUS_HIGH). The sensitivity case for the low end was produced using a lower growth rate to project cost of regulations, while the high end impacts were produced using a higher growth rate. As seem from the results (Appendix-H), the impacts are quite robust to the growth rate assumption. The change in impact within a scenario is relatively insignificant. [51]

VI. CONCLUSION

This study examines qualitative and quantitative impacts of federal regulations on the U.S. economy as a whole and the manufacturing sector in particular. NERA applied its general equilibrium model of the U.S. economy ("N_{ew}ERA Model") to evaluate the macroeconomic consequences of regulation based on cost estimates of federal regulations developed from the qualitative part of this study. The modeling framework enables us to capture direct and indirect

[51] Model results (not present in this study) show that the impacts are more sensitive to how we project the sunk cost moving forward since the value of the sunk cost is much larger than the annual cost of regulations.

effects of increases in the cost of production in the manufacturing sector, because the model takes into account interactions between all parts of the economy. We outline some salient points of our analysis below.

Regulations impose costs across the entire manufacturing sector. Overall, regulations reduce manufacturing sector output by between 2% and 10% annually, this range reflects analysis based on several scenarios. Because of the data limitations on regulatory costs, we investigated several scenarios to estimate and bound the overall cost and macroeconomic impacts of regulations. These scenarios are based on three different estimates of the current annual cost of regulations: the total cost estimates of regulations assigned by OMB, an extrapolation of those costs to all major regulations issued in the period of study, and an estimate based on the responses of manufacturing chief executives to a survey.

In NERA's highest cost scenario, sectors that are more energy intensive (e.g., refining, iron and steel, and chemicals) seem to be affected more than sectors that are less energy intensive (e.g., food beverage and tobacco products, machinery, and transport equipment). This result follows from our finding that a large part of the macroeconomic impact comes from energy and environmental regulations which have an indirect effect on manufacturing by raising the cost of energy.

Reduction in output leads to a loss in output value and profits for manufacturers. The manufacturing sector as a whole could suffer a loss in shipment value as large as $500 billion in 2012. This represents about 85% of the 2010 pre-tax profit of the entire manufacturing sector. Such large losses could have serious consequences on the growth, unemployment, and innovation in the manufacturing sector.

At a sub-sectoral level, petroleum refining and chemicals sectors see large reduction in shipment values because they are regulation sensitive, while food sectors could see the largest reduction in shipment value because it is one of the largest manufacturing subsector.

In terms of the broader economy, reductions in GDP caused by the costs of regulation are notable in each of the scenarios, with the scenario based on all regulations (COSTPLUS) showing the greatest reductions of over $600 billion in constant 2010 dollars per year. Of this amount, costs associated with regulations that are either missing in the OMB reports or not included in our estimate total $400 billion per year. Even in the scenario with the least impact, we estimate the GDP loss to be more than $200 billion annually.

The regulatory burden for an average U.S. household could be as great a loss of $5,000 per year in constant 2010 dollars in household purchasing power based on the estimate of costs of all major regulations and continued growth in regulation at the rate experienced so far during the Obama administration. This figure equals about 10% of current median U.S. household income. The other scenarios show smaller potential impacts, but the impact on households' purchasing power is more than $1,800 per year.

Wage income losses could be as much as 5% in 2012 under the scenario that includes costs of all major regulations. The drop is about 1.4% under a scenario based only on regulations for which cost estimates were available.

The Environmental Protection Agency imposes the largest regulatory burden: a cumulative estimated cost in the overall economy from 1993 through 2011 of $158 billion in constant 2010 dollars. The EPA has the third-highest total number of regulations and total number of economically significant or major regulations, and the cost impact of each of its regulations is far higher than average. The Department of Transportation is in second position for total cost, followed by the Departments of Health and Human Services and Labor. Financial regulations are underrepresented because OMB's data does not contain information on most of the relevant financial agencies except the Department of Treasury.

Overall, the manufacturing sector is negatively impacted by regulations that are already in place, and the impacts will worsen if the growth in regulations continues at the current rate. Resurgence of the manufacturing sector requires overhauling existing regulations to reduce their burden and being judicious in implementing any new regulations so as to not simply add to the burden while achieving no measurable benefits.

Appendix-A: Sources of Information on Regulations

a. Office of Management and Budget Databases

As part of its responsibility for regulatory review, OMB makes available to the public several sources of information on regulations and their estimated costs and benefits. The two main OMB sources used in this study are the Office of Information and Regulatory Affairs ("OIRA") database and OMB Reports to Congress.

OIRA makes available to the public at the webpage reginfo.gov XML reports with regulations reviewed from 1981 through 2012.[52] We refer to this database as the "OIRA database." The OIRA database displays these regulatory actions by agency, length of review, economic significance, and stage of rulemaking. Although this database does not contain information on cost and benefits estimates, it is still a very useful source to describe how the number of regulations has evolved over time and across agencies. This report also uses it as the main source to compose a list of relevant regulations that were further screened by NERA experts.

OMB also provides public information on the cost and benefits of some regulations through reports entitled "Informing Regulatory Decisions: 20XX Report to Congress on the Costs and Benefits of Federal Regulations and Unfunded Mandates on State, Local, and Tribal Entities" ("OMB Reports to Congress"). These reports are available at OMB's webpage. Although these reports cover a limited set of regulations and focus mainly on the major (economically significant) regulations, they can be used in conjunction with other secondary sources to create a database of cost and benefits estimates for the regulations.

i. OIRA Database

The OIRA database contains a total of 41,697 regulations from 1981 through April 2012.[53] The OIRA database reports exactly when each regulation was received, completed, and published. The OIRA database also describes the stage of each regulation. There are multiple types of stages, and the main types are final rule, proposed rule, final rule no material change, notice, interim final rule, and pre-rule. Ninety-three percent of all regulations are final or proposed (final: 21,442, or 51% of the total; proposed: 17,436, or 42% of the total). This analysis focuses on these two stages by including only final rules or rules proposed in the past five years for which no final rule has been issued.

The OIRA database also describes whether a regulation is economically significant, independent of the stage of the rule. A regulation is classified as economically significant or major "if OIRA determines that it is likely to have an annual effect on the economy of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or tribal governments

[52] http://www.reginfo.gov/public/do/XMLReportList

[53] This amounts to an average of 1,303 regulations per year.

or communities."[54] For each economically significant regulation, Executive Order 12866 requires agencies to provide an assessment of the likely benefits and costs of the regulatory action, including a quantification of those effects.[55]

In the OIRA database, each regulation is uniquely identified by a RIN—Regulation Identifier Number. A RIN consists of a 4-digit agency code plus a 4-character alphanumeric code. For example, all RINs for the Occupational Safety and Health Administration have agency code 1218. The RIN for OSHA's rulemaking on hazard communication is 1218-AC20.[56]

Each regulation in the OIRA dataset has an agency code. Each agency code can be matched to a sub-agency. There are 266 sub-agencies in the database, including federal government, independent agencies, and government corporations. Using information provided to NERA by OIRA personnel and through research at the OIRA webpage, each sub-agency (for instance, Air and Radiation) was further mapped to an agency (for instance, the EPA). There are 85 agencies in the database. Unfortunately, there are some important agencies and sub-agencies missing from the database. For instance, some of the main agencies that issue financial regulations, such as the Securities and Exchange Commission (SEC), Federal Deposit Insurance Corporation (FDIC), Federal Trade Commission (FTC), and Federal Reserve System (FRS) are not included. Also, some of the independent agencies are not included. Therefore, the number of regulations calculated from this database underestimates the real number of regulations issued by the United States federal government in the relevant time period.

The OIRA database needed to be cleaned before we could use it. Duplicate entries and regulations that were not final had to be removed. Each regulation should be identified by a unique RIN; however, there are RINs in the OIRA database with more than one observation. To remove duplicates and to filter for "sunsetted" regulations, we first eliminated from the database proposed and other pre-final rules for which rules have been declared final. Next, if there was more than one final rule left remaining for the same RIN, only the most recent regulation was kept. Finally, regulations that were proposed but not finalized for more than five years were also eliminated.[57] After filtering the data for duplicates and "sunsetted" regulations, we arrived at a dataset with a total of 20,262 regulations, about 48.6% of the original data size.

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[54] Extracted from http://www.reginfo.gov/public/jsp/Utilities/faq.jsp in response to the question "What does it mean when a regulation is determined to be "'economically significant?'"

[55] Executive Order 12866 was issued by President Clinton on September 30, 1993. It "establishes and governs the process under which OIRA reviews agency draft and proposed final regulatory actions. For all significant regulatory actions, the Executive Order requires OIRA review before the actions take effect. On the part of the agencies, Executive Order 12866 requires an analysis of the costs and benefits of rules and, to the extent permitted by law, action only on the basis of a reasoned determination that the benefits justify the costs." Extracted from http://www.reginfo.gov/public/jsp/Utilities/faq.jsp in the response to the question "What is Executive Order 12866?"

[56] This information was extracted from http://www.reginfo.gov/public/jsp/eAgenda/StaticContent/UA_HowTo.jsp at the section "Regulation Identifier Numbers."

[57] We calculated the average amount of time for a given rule to move from the "proposed" stage to the "final" stage. We found that, on average for all regulations, it takes approximately 1.4 years for a proposed regulation to

Finally, we added 121 major regulations issued by independent agencies from 2001 through 2011. These regulations were obtained from the OMB Reports to Congress from 1997 through the present using different tables than the ones used to construct the database of cost estimates for regulations discussed below.[58] Unfortunately, there is no cost information available for these 121 regulations.

Our final dataset has 20,383 regulations from 1981 through April 2012. This dataset was used to screen the regulations affecting the manufacturing sector using manufacturing sector keywords and also to qualitatively describe the burden of the number of regulations over time and across the main agencies to the manufacturing sector and more broadly to the overall economy. It was also used as background information in the NERA Experts Survey and as input for some of the extrapolation exercises used to estimate the total cost of regulations.

ii. OMB Reports to Congress

Using the OMB Reports to Congress from 2000 through 2012 NERA created a dataset with a total of 464 regulations with some sort of cost estimate (qualitative and/or quantitative) and in some cases transfer estimates.[59] This dataset contains regulations from October 1, 1992 through September 30, 2011. For each year, OMB reviews major Federal rulemakings finalized over the previous 10 years. OMB generally provides a range instead of a point estimate for costs and transfers. Given that the last publicly available OMB Report to Congress, the 2012 Report, includes only regulations through September 30, 2011, the most recent regulations are missing. In order to fill this gap, NERA included all the major regulations from October 1, 2011 through April 2012 as identified using the OIRA database, which had some sort of cost estimate available either at the OIRA webpage or the Government Accountability Office ("GAO") webpage. Using this approach, we added 15 regulations to the previous database, resulting in a total of 479 regulations for which we had some type of cost or transfer estimate.

Out of these 479 regulations, only a fraction had quantitative information on costs and/or transfers. 320 regulations had quantitative cost estimates, 105 regulations had quantitative transfer estimates, and 394 regulations had either quantitative cost or transfer estimates. Of the

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become final. Of the agencies central to our analysis, the Department of Labor had the longest lag (approximately 2.1 years) in this regard.

[58] More specifically, we compiled the data using table 11 from the 2002 Report to Congress, table 6 from the 2003 Report to Congress, table 6 from the 2004 Report to Congress, table 1-7 from the 2005 Report to Congress, table 1-7 from the 2006 Report to Congress, table 1-7 from the 2007 Report to Congress, table 1-7 from the 2008 Report to Congress, table 1-7 from the 2009 Report to Congress, table 1-7 from the 2010 Report to Congress, table 1-7 from the 2011 Report to Congress, and table 1-7 from the 2012 Report to Congress.

[59] More specifically we compiled the data using tables 7, 16, 17, and 18 from the 2000 Report to Congress, table 4 from the 2001 Report to Congress, table 9 from the 2002 Report to Congress, tables 4, 20, 21, and 22 from the 2003 Report to Congress, table 4 from the 2004 Report to Congress, table A-1 from the 2005 Report to Congress, table A-1 from the 2006 Report to Congress, table A-1 from the 2007 Report to Congress, table A-1 from the 2008 Report to Congress, table A-1 from the 2009 Report to Congress, table A-1 from the 2010 Report to Congress, table A-1 from the 2011 Report to Congress, and table A-1 from the 2012 draft Report to Congress.

320 regulations with quantitative cost estimates 280 regulations had or probably had annualized values, and 40 regulations have NPV values.

We annualized the 40 rules with NPV values assuming a discount rate of 7% and a life time of 20 years.[60]

We decided to ignore the regulations with transfer estimates because none of them (e.g. price support programs, welfare programs, education grants, and loan guarantee programs) are likely to impose a measurable cost on the manufacturing sector.

b. The Business Roundtable (BRT)

The Business Roundtable ("BRT") "is an association of chief executive officers of leading U.S. companies with over $6 trillion in annual revenues and more than 14 million employees".[61] The 2011 BRT report identified 62 regulations or issues that were burdensome to businesses. These 62 regulations were distributed across eight categories of regulations shown below.

Table A1: Number of Regulations in the Business Roundtable Report

Category	Number of Regulations
Environmental	19
Energy	3
Financial Regulatory Reform	5
Food	4
Labor	3
Transport	2
Health Care	16
Other	10
Total	**62**

NERA associated these 62 regulations with a unique RIN whenever possible. Most of the environmental and energy regulations could be identified to a unique RIN. All of the financial regulations were related to the Dodd-Frank Act. Using the RINs, NERA further mapped these BRT regulations to the OIRA database. NERA used the regulations identified by BRT that were not included in the OIRA database to complement the list of relevant regulations that were handed to NERA experts for further screening.

[60] The discount rates commonly used at the OMB Reports to Congress to annualized costs and benefits are 3% and 7%. See for instance the "Draft 2012 Report to Congress on the Benefits and Costs of Federal Regulations and Unfunded Mandates on State, Local and Tribal Entities" at table A-1, page 110: "Annualized benefits from EPA's model year analysis are as follows: $3.1 billion (7% DR) or $2.6 billion (3% DR)."

[61] Business Roundtable, September 2011, p. 2.

c. The Government Accountability Office (GAO)

The Government Accountability Office ("GAO") is "an independent, nonpartisan agency that works for Congress."[62] GAO makes available to the public estimates of cost and benefits for selective major regulations. We use GAO as a secondary source to complement our database of cost estimates of major rules.

d. Other Secondary Sources

Unfortunately, none of the data sources described above contains a complete list of all the regulations issued by the United States federal government. There are still many regulations missing from our dataset such as sub-national regulations and regulations issued by some independent agencies. Focusing on the types of regulations in which this study is particularly interested, financial regulations are those with the biggest gap of information. In order to fill this gap, we used the lists of regulations available at the Securities and Exchange Commission ("SEC"), Federal Deposit Insurance Corporation ("FDIC"), Federal Trade Commission ("FTC"), and Federal Reserve System ("FRS") websites. Unfortunately, these sources provided very little information about the financial regulations besides their names. This lack of information prevented us from further adding these extra financial regulations to the database containing the number of regulations over time or to the database containing cost estimates for regulations. Nevertheless, these extra names of financial regulations were added to our list of relevant regulations that were handed to NERA experts. NERA experts further complemented the list of relevant regulations with any regulations with which they were aware that were missing from our original list.

NERA also disseminated a survey to CEOs of MAPI member companies. This survey asked the CEOs, among other things, to list any major regulations that were missing from the original list of regulations. The CEOs provided a list of regulations that complemented the set of regulations to be considered as inputs at the quantitative analysis.

e. Construction of the Set of Regulations

Using the sources of information described above, NERA constructed a set of regulations that was used to qualitatively and quantitatively describe the burden of regulations to the manufacturing sector over time and across its different sub-sectors. Qualitatively this information was used to describe the burden in terms of the number of regulations issued over time and by the main agencies affecting the manufacturing sector and the overall economy, and also to describe the cumulative cost imposed by the major and non-major regulations over time to the overall economy. Lists of relevant regulations for the environmental, energy, transportation, labor, and financial sectors were also constructed using the sources above and were handed to NERA experts.

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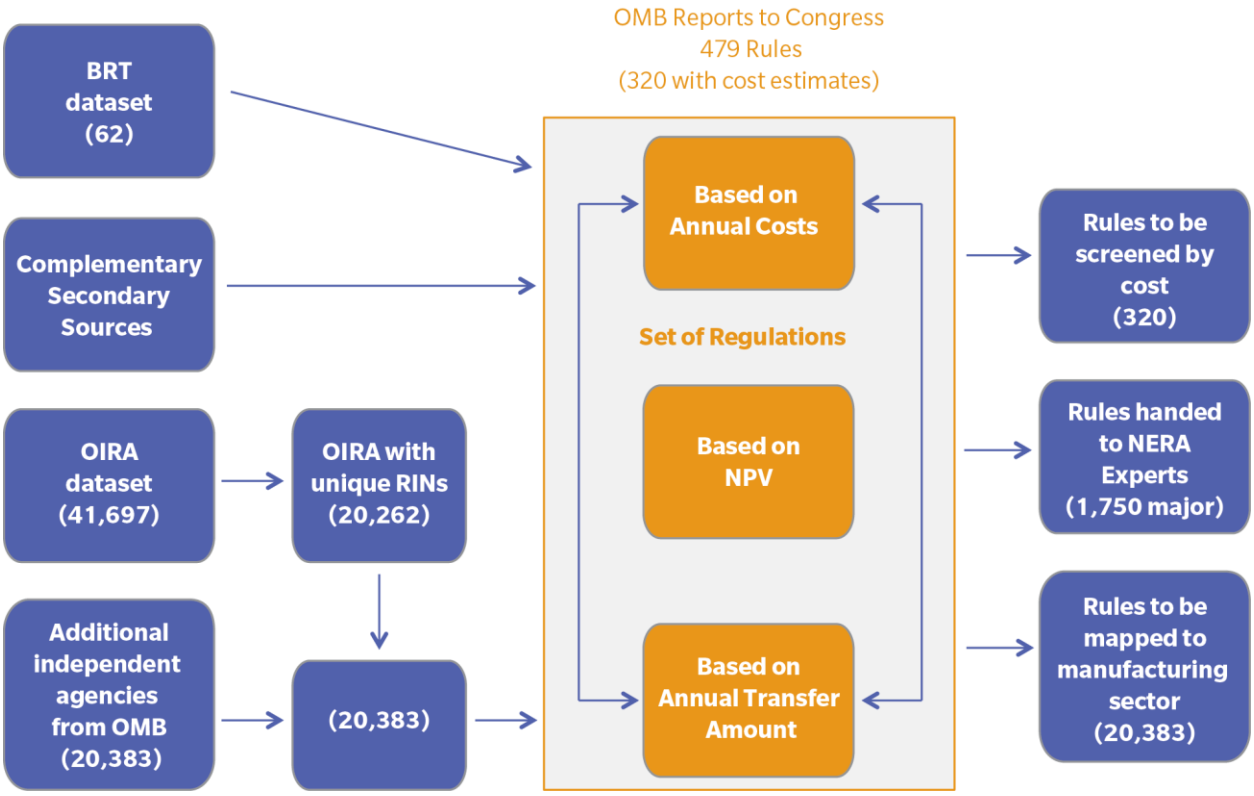
[62] As described at GAO's webpage http://www.gao.gov/about/index.html

Cost estimates compiled for these regulations were used as inputs to the N_{ew}ERA macroeconomic model. **Figure A1** illustrates how the different sources of information were used together in order to complement and verify each other and create a set of all the regulations for which we have some sort of information available and a subset of regulations for which we have cost estimates.

Figure A1: Construction of the Regulation Database



Appendix-B: List of Major Regulations Screened by Cost

Report Year End	Agency	Title
9/30/1993	Department of Health and Human Services	Food Labeling
9/30/1993	Environmental Protection Agency	Control of air pollution from new motor vehicles and new motor vehicle engines, regulations requiring on-board diagnostic systems on 1994 and later model year light-duty vehicles
9/30/1993	Environmental Protection Agency	Acid Rain Permits, Allowance System, Emissions Monitoring, Excess Emissions and Appeals Regulations Under Title IV of the Clean Air Act Amendments of 1990
9/30/1993	Environmental Protection Agency	Vehicle Inspection and Maintenance Requirements for State Implementation Plan (Final Rule)
9/30/1994	Environmental Protection Agency	Accelerated phase-out of ozone depleting chemicals and listing and phase-out of methyl bromide
9/30/1994	Environmental Protection Agency	Fuel and fuel additives: standards for reformulated gasoline
3/31/1997	Department of Agriculture	Conservation Reserve Program
3/31/1998	Environmental Protection Agency	National Ambient Air Quality Standards (NAAQS): Particulate Matter
3/31/1998	Environmental Protection Agency	National Ambient Air Quality Standards (NAAQS): Ozone
3/31/1999	Environmental Protection Agency	Regional Transport of Ozone (NOx SIP Call)
3/31/2000	Environmental Protection Agency	Tier 2 / New Motor Vehicle Emissions Standards
3/31/2000	Environmental Protection Agency	Regional Haze Rule
3/31/2000	Environmental Protection Agency	Storm Water Discharges (Phase II)
9/30/2001	Environmental Protection Agency	Identification of Dangerous Levels of Lead
9/30/2001	Department of Labor	Ergonomics Program
9/30/2001	Environmental Protection Agency	Heavy-Duty Engine and Vehicle Standards
9/30/2001	Department of Transportation	Advanced Airbags
9/30/2001	Department of Energy	Energy Conservation Standards for Clothes Washers
9/30/2001	Department of Health and Human Services	Standards for Privacy of Individually Identifiable Heath Information
9/30/2001	Architectural and Transportation Barriers Compliance Board	Electronic and Information Technology Accessibility Standards
9/30/2002	Department of Transportation	Tire Pressure Monitoring Systems (TPMS) (67 FR 38703
9/30/2003	Department of Transportation	Truck Driver Hours of Service [68 FR 22456]
9/30/2003	Department of Transportation	Light Truck CAFE for Model Years 2005-2007 [68 FR 16867]
9/30/2004	Department of Transportation	Pipeline Integrity Management in High Consequence Areas (Gas Transmission Pipelines) [68 FR 69777]
9/30/2004	Environmental Protection Agency	Control of Emissions of Air Pollution From Nonroad Diesel Engines and Fuel [69 FR 38958]
9/30/2004	Department of Homeland Security	Required Advance Electronic Presentation of Cargo Information [68 FR 68139]

9/30/2004	Environmental Protection Agency	NESHAP: Industrial/ Commercial/ Institutional Boilers and Process Heaters [69 FR 55218]
9/30/2004	Department of Health and Human Services	Health Insurance Reform: Standard Unique Health Care Provider Identifier [69 FR 3433]
9/30/2004	Department of Labor	Defining and Delimiting the Exemptions for Executive, administrative, Professional, Outside Sales, and Computer Employees [69 FR 22122]
9/30/2005	Environmental Protection Agency	Clean Air Interstate Rule [70 FR 25162]
9/30/2005	Environmental Protection Agency	Clean Air Visibility Rule: Best Available Retrofit Technology (BART) [70 FR 39104]
9/30/2005	Department of Transportation	Tire Pressure Monitoring Systems [70 FR 18136]
9/30/2005	Environmental Protection Agency	Clean Air Mercury Rule--Electric Utility Steam Generating Units [70 FR 28606]
9/30/2006	Environmental Protection Agency	Review of the National Ambient Air Quality Standards (NAAQS) for Particulate Matter [71 FR 61144]
9/30/2006	Department of Transportation	Average Fuel Economy Standards for Light Trucks Model Years 2008-11 [71 FR 17566]
9/30/2007	Environmental Protection Agency	Clean Air Fine Particle Implementation [72 FR 20586]
9/30/2007	Department of Homeland Security	Chemical Facility Anti-Terrorism Standards [72 FR 65396]
9/30/2007	Department of Transportation	Side Impact Protection [72 FR 51907]
9/30/2007	Department of Transportation	Electronic Stability Control (ESC) [72 FR 17235]
9/30/2008	Environmental Protection Agency	Review of the National Ambient Air Quality Standards for Ozone [73 FR 16435]
9/30/2008	Department of Homeland Security	Minimum Standards for Driver's Licenses and Identification Cards Acceptable by Federal Agencies for Official Purposes [73 FR 5272]
9/30/2008	Department of Treasury	Implementation of a Revised Basel Capital Accord (Basel II) [72 FR 69288]
9/30/2009	Department of Homeland Security	Importer Security Filing and Additional Carrier Requirements [73 FR 71729]
9/30/2009	Environmental Protection Agency	Review of the National Ambient Air Quality Standards for Lead [73 FR 66963]
9/30/2009	Department of Transportation	Passenger Car and Light Truck Corporate Average Fuel Economy Model Year 2011 [74 FR 14195]
9/30/2009	Department of Transportation	Roof Crush Resistance [74 FR 22347]
9/30/2009	Department of Health and Human Services	Updates to Electronic Transactions (Version 5010) (CMS-00090F) [74 FR 3296]
9/30/2009	Department of Health and Human Services	Use of Ozone-Depleting Substances; Removal of Essential Use Designations [Epinephrine] [73 FR 69532]
9/30/2009	Department of Housing and Urban Development	Real Estate Settlement Procedures Act (RESPA); To Simplify and Improve the Process of Obtaining Mortgages and Reduce Consumer Costs (FR-5180) [73 FR 68203, 74 FR 22822]
9/30/2010	Department of Transportation and Environmental Protection Agency	Light-Duty Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards [75 FR 25323]
9/30/2010	Environmental Protection Agency	Review of the National Ambient Air Quality Standards for Sulfur Dioxide [75 FR 35519]

9/30/2010	Department of Transportation	Positive Train Control [75 FR 2597]
9/30/2010	Department of Energy	Energy Efficiency Standards for Pool Heaters and Direct Heating Equipment and Water Heaters [75 FR 20112]
9/30/2010	Environmental Protection Agency	NESHAP: Portland Cement Notice of Reconsideration [75 FR 54970]
9/30/2011	Department of Labor	Statutory Exemption for Provision of Investment Advice
9/30/2011	Department of Transportation	Ejection Mitigation
9/30/2011	Department of Energy	Energy Efficiency Standards for Residential Refrigerators, Refrigerator-Freezers, and Freezers
10/19/2011	Department of Health and Human Services	Part B Monthly Actuarial Rates, Monthly Premium Rates, and Annual Deductible Beginning January 1, 2012 (CMS-8045-N)
10/31/2011	Department of Health and Human Services	Inpatient Hospital Deductible and Hospital and Extended Care Services Coinsurance Amounts for CY 2012 (CMS-8043-N)
12/12/2011	Department of Health and Human Services	Policy and Technical Changes to the Medicare Advantage and the Medicare Prescription Drug Benefit Programs for Contract Year 2013 (CMS-4157-F)
12/20/2011	Environmental Protection Agency	National Emission Standards for Hazardous Air Pollutants From Coal- and Oil-Fired Electric Utility Steam Generating Units and Standards of Performance for Electric Utility Steam Generating Units
1/6/2012	Environmental Protection Agency	Oil and Natural Gas Sector--New Source Performance Standards and National Emission Standards for Hazardous Air Pollutants
2/6/2012	Department of Transportation	Hours of Service

Appendix-C: List of Major Regulations Screened by NERA Experts

Below is the list of the regulations screened by NERA experts. The regulations are sorted by type and are classified according to the broader areas.

Energy-Specific Regulations			
Date Review Completed	**RIN**	**Title of Regulation**	**Agency**
Energy Efficiency Standards for Durable Goods and Equipment			
8/25/2011	1904-AB79	Energy Efficiency Standards for Residential Refrigerators, Refrigerator-Freezers, and Freezers	Department of Energy
4/26/2012	1904-AB90	Energy Conservation Standards for Residential Clothes Washers	Department of Energy
3/30/2010	1904-AA90	Energy Efficiency Standards for Pool Heaters and Direct Heating Equipment and Water Heaters	Department of Energy
6/6/2011	1904-AC06	Energy Efficiency Standards for Residential Furnace, Central Air Conditioners and Heat Pumps	Department of Energy
7/8/2004	1904-AB46	Energy Conservation Standards for Central Air Conditioners and Heat Pumps; Technical Amendment	Department of Energy
4/15/1997	1904-AA47	Energy Conservation Program for Consumer Products: Energy Conservation Standards for Refrigerators, Refrigerator-Freezers, and Freezers	Department of Energy
2/25/2010	1904-AB70	Energy Conservation Standards for Small Electric Motors	Department of Energy
4/8/2011	1904-AA89	Energy Efficiency Standards for Clothes Dryers and Room Air Conditioners	Department of Energy
8/31/2000	1904-AA75	Energy Conservations Standards for Fluorescent Lamp Ballasts	Department of Energy

12/18/2008	1904-AB59	Energy Efficiency Standards for Commercial Refrigeration Equipment	Department of Energy
11/6/2007	1904-AA78	Energy Efficiency Standards for Residential Furnaces and Boilers	Department of Energy
7/17/1997	1904-AA38	Energy Conservation Standards for Room Air Conditioners	Department of Energy
12/23/2009	1904-AB93	Energy Efficiency Standards for Commercial Clothes Washers	Department of Energy
2/5/1991	1904-AA37	Energy Conservation Program for Consumer Products, Energy Conservation Standards for Dishwashers, Clothes Washers, and Clothes Dryers	Department of Energy
1/2/2001	1904-AA67	Energy Efficiency Standards for Clothes Washers	Department of Energy
1/9/2001	1904-AA76	Energy Efficiency Standards for Water Heaters	Department of Energy
1/31/2002	1904-AA77	Energy Efficiency Standards for Central Air Conditioners and Heat Pumps	Department of Energy
9/27/2007	1904-AB08	Energy Efficiency Standards for Electric Distribution Transformers	Department of Energy
6/26/2009	1904-AA92	Energy Efficiency Standards for General Service Fluorescent Lamps and Incandescent Lamps	Department of Energy
10/28/2011	1904-AB50	Energy Efficiency Standards for Fluorescent Lamp Ballasts	Department of Energy
1/31/2012	1904-AC07	Energy Efficiency Standards for Microwave Ovens (Standby and Off Mode)	Department of Energy
2/1/2012	1904-AC04	Energy Efficiency Standards Determination for Distribution Transformers	Department of Energy
3/5/2012	1904-AB57	Energy Efficiency Standards for Battery Chargers and External Power Supplies	Department of Energy

7/10/1983	1900-YA04	Energy Conservation Program for Consumer Products, Final Rule for Refrigerators and Refrigerator-Freezers, Freezers, Water Heaters, Room Air Conditioners, and Furnaces	Department of Energy
6/28/1985	1904-YA15	Energy Conservation Program for Consumer Products, Test Procedures for Water Heaters	Department of Energy
6/23/2004	1904-AB09	Energy Conservation Standards for Commercial Unitary Air Conditioners and Heat Pumps	Department of Energy
9/26/2008	1904-AB44	Energy Efficiency Standards for Packaged Terminal Air Conditioners and Packaged Terminal Heat Pumps	Department of Energy
3/27/2009	1904-AB49	Energy Conservation Standards for Residential Electric and Gas Ranges and Ovens and Microwave Ovens, and Commercial Clothes Washers	Department of Energy
8/6/2009	1904-AB58	Energy Efficiency Standards for Refrigerated Bottled or Canned Beverage Vending Machines	Department of Energy
Energy Efficiency Standards for Buildings			
8/7/1987	1904-AA31	Residential Energy Conservation Rules Amendment and Removal of Commercial and Apartment Conservation Rules (Final Rule)	Department of Energy
1/16/1991	1904-AA27	Energy Conservation Standards for New Buildings, Subpart C, Mandatory Performance Standards for New Federal Residential Buildings	Department of Energy
2/12/2010	1904-AC11	Energy Efficiency Standards for Manufactured Housing	Department of Energy
3/16/2010	1904-AC13	Energy Efficiency and Sustainable Design Standards for New Federal Buildings, Solar Hot Water Requirements, Water Efficiencies and Green Building Ratings	Department of Energy
6/23/2011	1904-AC42	Determination Regarding Energy Efficiency Improvements in the Energy Standard for Buildings, Except Low-Rise Residential Buildings, ANSI/ASHRAE/IESNA Standard 90.1-2010	Department of Energy
6/23/2011	1904-AC18	Determination Regarding Energy Efficiency Standard for Buildings, ANSI/ASHRAE/IESNA Standard 90.1-2004	Department of Energy

4/26/2012	1904-AC59	Updating State Residential Building Energy Efficiency Codes--IECC 2012	Department of Energy
Alternative Fuel Mandates for Fleets			
2/22/1996	1904-AA64	Alternative Fuel Transportation Program	Department of Energy
7/12/1996	1904-AA72	Alternative Fueled Vehicle Requirements for Private and Local Fleets	Department of Energy
4/7/2006	1901-AB11	Guidelines for Voluntary Greenhouse Gas Reporting	Department of Energy

Environment-Specific Regulations			
Date Review Completed	**RIN**	**Title of Regulation**	**Agency**
National Ambient Air Quality Standard for Particular Matter			
7/16/1997	2060-AE66	National Ambient Air Quality Standards for Particulate Matter	Environmental Protection Agency
9/21/2006	2060-AI44	Review of the National Ambient Air Quality Standards for Particulate Matter	Environmental Protection Agency
National Ambient Air Quality Standard for Ozone			
7/12/1997	2060-AE57	National Ambient Air Quality Standards for Ozone	Environmental Protection Agency
3/12/2008	2060-AN24	Review of the National Ambient Air Quality Standards for Ozone	Environmental Protection Agency
9/6/2011	2060-AP98	Reconsideration of the 2008 Ozone Primary and Secondary National Ambient Air Quality Standards	Environmental Protection Agency

National Ambient Air Quality Standard for Sulfur Dioxide			
6/2/2010	2060-AO48	Review of the Primary National Ambient Air Quality Standard for Sulfur Dioxide	Environmental Protection Agency
3/8/1996	2060-AA61	National Ambient Air Quality Standards for Sulfur Oxides (Sulfur Dioxide), Final Decision	Environmental Protection Agency
National Ambient Air Quality Standard for Lead			
3/28/2008	2070-AC83	Lead-Based Paint; Amendments for Renovation, Repair and Painting	Environmental Protection Agency
4/22/2010	2070-AJ55	Lead; Amendment to the Opt-out and Recordkeeping Provisions in the Renovation, Repair, and Painting Program	Environmental Protection Agency
10/15/2008	2060-AN83	Review of the National Ambient Air Quality Standards for Lead	Environmental Protection Agency
1/8/2001	2070-AD38	Lead and Lead Compounds; Lowering of Reporting Thresholds; Community Right-to-Know Toxic Chemical Release Reporting	Environmental Protection Agency
National Emission Standards for Hazardous Air Pollutants (NESHAP)			
12/10/2010	2060-AN99	NESHAP: Mercury Cell Chlor-Alkali Plants, Amendments	Environmental Protection Agency
12/15/2000	2060-AI34	National Emission Standards for Hazardous Air Pollutants for Chemical Recovery Combustion Sources at Kraft, Soda, Sulfite, and Stand-Alone Semichemical Pulp Mills	Environmental Protection Agency
2/17/2010	2060-AP36	National Emission Standards for Hazardous Air Pollutants for Reciprocating Internal Combustion Engines	Environmental Protection Agency
8/10/2010	2060-AQ13	National Emission Standards for Hazardous Air Pollutants for Reciprocating Internal Combustion Engines--Existing Stationary Spark Ignition (Gas-Fired)	Environmental Protection Agency
2/26/2004	2060-AG99	National Emissions Standards for Hazardous Air Pollutants: Surface Coating of Automobiles and Light-Duty Trucks	Environmental Protection Agency
2/26/2004	2060-	National Emission Standards for Hazardous Air Pollutants for	Environmental

	AG63	Stationary Reciprocating Internal Combustion Engines	Protection Agency
8/6/2010	2060-AO15	NESHAP: Portland Cement Notice of Reconsideration	Environmental Protection Agency
10/9/1997	2040-AB53	National Emission Standards for Hazardous Air Pollutants for Sources Category: Pulp and Paper Production; Effluent Limitation Guidelines; Pretreatment Standards; and New Source Performance	Environmental Protection Agency
7/28/1995	2060-AD94	National Emission Standards for Hazardous Air Pollutants for Petroleum Refineries	Environmental Protection Agency
2/21/2011	2060-AM44	National Emission Standards for Hazardous Air Pollutants for Area Sources: Industrial, Commercial, and Institutional Boilers	Environmental Protection Agency
2/21/2011	2060-AQ25	National Emission Standards for Hazardous Air Pollutants for Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters	Environmental Protection Agency
2/26/2004	2060-AG69	National Emission Standards for Hazardous Air Pollutants: Industrial/Commercial/Institutional Boilers and Process Heaters	Environmental Protection Agency
2/28/1994	2060-AC19	Hazardous Organic NESHAP (HON) for the Synthetic Organic Chemical Manufacturing Industry (SOCMI) and Other Processes Subject to the Negotiated Regulation for Equipment Leaks	Environmental Protection Agency
11/14/1990	2050-AC43	Hazardous Waste Management System: Identification and Listing of Hazardous Waste - Wood Preservatives	Environmental Protection Agency
6/29/1998	2050-AD88	Hazardous Waste Management System Identification and Listing of Hazardous Waste: Petroleum Refining Process Wastes; Land Disposal Restrictions for Newly Identified Wastes; CERCLA Hazardous, etc.	Environmental Protection Agency
Cross State Air Pollution Rule (CSAPR)			
7/28/2000	2060-AI12	Control of Emissions of Air Pollution from 2004 and Later Model Year Highway Heavy-Duty Engines; Revision of Light-Duty Truck Definition	Environmental Protection Agency
2/14/2008	2060-AM06	Control of Emissions from New Locomotives and New Marine Diesel Engines Less Than 30 Liters per Cylinder	Environmental Protection Agency

3/1/2000	2060-AE29	Phase 2 Emission Standards for New Nonroad Small Spark Ignition Handheld Engines At or Below 19 Kilowatts and Minor Amendments to Emission Requirements Applicable to Small Spark Ignition Engines	Environmental Protection Agency
8/18/2008	2060-AM34	Control of Emissions From Nonroad Spark-Ignition Engines and Equipment	Environmental Protection Agency
12/16/1997	2060-AD33	Emission Standards for Locomotives and Locomotive Engines	Environmental Protection Agency
10/14/1994	2060-AD71	Interim Requirements for Deposit Control Gasoline Additives, Regulations of Fuels and Fuel Additives	Environmental Protection Agency
11/23/1999	2060-AI17	Control of Emissions of Air Pollution from New CI Marine Engines At or Above 37 Kilowatts (Final Notice)	Environmental Protection Agency
12/17/2009	2060-AO38	Control of Emissions From New Marine Compression-Ignition Engines at or Above 30 Liters per Cylinder	Environmental Protection Agency
12/21/1999	2060-AI23	Control of Air Pollution from New Motor Vehicle Emissions Standards and Gasoline Sulfur Control Requirements	Environmental Protection Agency
12/21/2000	2060-AI69	Heavy-Duty Engine Emission Standards and Diesel Fuel Sulfur Control Requirements 2007	Environmental Protection Agency
9/13/2002	2060-AI11	Emissions From Nonroad Spark-Ignition Engines and Standards for Recreational Spark-Ignition Engines	Environmental Protection Agency
5/7/2004	2060-AK27	Control of Emissions of Air Pollution From Nonroad Diesel Engines and Fuel (Final Rule)	Environmental Protection Agency
5/18/2009	2060-ZA15	Notice of Upcoming Joint Rulemaking to Establish Vehicle GHG Emissions and CAFE Standards	Environmental Protection Agency
2/8/2007	2060-AK70	Control of Hazardous Air Pollutants From Mobile Sources	Environmental Protection Agency
7/1/2011	2060-AP50	Transport Rule (CAIR Replacement Rule)	Environmental Protection Agency
Clean Air Mercury Rule			
3/28/2007	2060-	Clean Air Fine Particle Implementation Rule	Environmental

	AK74		Protection Agency
6/15/2005	2060-AJ31	Clean Air Visibility Rule	Environmental Protection Agency
2/7/2008	2060-AN98	Clean Air Mercury Rule: Federal Plan	Environmental Protection Agency
6/24/1992	2060-AD16	Operating Permits Regulations Title V of the Clean Air Act	Environmental Protection Agency
5/23/1996	2050-AD26	Accidental Release Prevention Requirements: Risk Management Programs under Clean Air Act Section 112(r)(7)	Environmental Protection Agency
Greenhouse Gas Reporting Rule			
3/31/2010	2060-AP58	EPA/NHTSA Joint Rulemaking to Establish Light-Duty Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards	Environmental Protection Agency
9/16/2009	2060-AO79	Greenhouse Gas Mandatory Reporting Rule	Environmental Protection Agency
5/12/2010	2060-AP86	Prevention of Significant Deterioration/Title V Greenhouse Gas Tailoring Rule	Environmental Protection Agency
8/8/2011	2060-AP61	Control of Greenhouse Gas Emissions From Medium and Heavy-Duty Vehicles	Environmental Protection Agency
New Source Performance Standards			
1/15/1988	2060-AB68	New Source Performance Standard for New Residential Wood Heaters	Environmental Protection Agency
11/30/1987	2060-AB33	NSPS: Industrial-Commercial-Institutional Steam Generating Units (SO2)	Environmental Protection Agency
6/29/1983	2040-AA04	Electroplating and Metal Finishing Point Source Categories Effluent Limitations Guidelines, Pretreatment Sources, and New Source Performance Standards	Environmental Protection Agency
4/30/2008	2060-	Petroleum Refineries--New Source Performance Standards (NSPS)--	Environmental

	AN72	Subpart J	Protection Agency
Other Environmental Regulations			
8/12/1992	2070-AA49	Worker Protection Standards -- 40 CFR Parts 156 and 170	Environmental Protection Agency
3/28/1983	2070-AA27	Premanufacture Notification and Review Procedures	Environmental Protection Agency
2/26/2004	2060-AG52	Plywood and Composite Wood Products	Environmental Protection Agency
4/22/1997	2070-AC71	Addition of Facilities in Certain Industry Sectors, Toxic Chemical Release Reporting, Community Right-to-Know	Environmental Protection Agency
2/15/1996	2050-AD38	Land Disposal Restrictions Phase III; Decharacterized Wastewaters, Carbamate Wastes, and Spent Aluminum Potliners	Environmental Protection Agency
8/14/1998	2060-AE55	National Volatile Organic Compound Emission Standards for Architectural Coatings	Environmental Protection Agency
5/13/1982	2000-YH12	Iron and Steel Manufacturing Point Source Category - Effluent Limitations Guidelines	Environmental Protection Agency
9/19/1987	2040-AA05	Organic Chemicals, Plastics and Synthetic Fibers Point Source Category Effluent Limitations Guidelines and Standards (Final Rule)	Environmental Protection Agency
1/29/1988	2070-AB71	Toxic Chemical Release Inventory Reporting, Community Right-to Know	Environmental Protection Agency
2/26/2004	2040-AD56	Effluent Guidelines and Standards for the Meat and Poultry Products Point Source Category (Revisions)	Environmental Protection Agency
8/4/1988	2050-AB19	Notification, Recordkeeping, and Reporting Requirements for Underground Storage Tanks	Environmental Protection Agency
9/30/1988	2050-AB89	RCRA Financial Responsibility Requirements for Underground Storage Tanks	Environmental Protection Agency
5/7/1990	2050-AC73	Land Disposal Restrictions for Third Schedule Wastes	Environmental Protection Agency

11/23/2009	2040-AE91	Effluent Limitations Guidelines and Standards for the Construction and Development Point Source Category	Environmental Protection Agency
9/16/2011	2050-AG46	Revising Underground Storage Tank Regulations--Revisions to Existing Requirements and New Requirements for Secondary Containment and Operator Training	Environmental Protection Agency
8/27/2003	2060-AK28	Prevention of Significant Deterioration (PSD) and Nonattainment New Source Review (NSR): Routine Maintenance and Repair	Environmental Protection Agency
11/29/1993	2060-AD91	Accelerated Phaseout of Ozone Depleting Chemicals and Listing and Phaseout of Methyl Bromide	Environmental Protection Agency
10/21/1996	2060-AF48	Acid Rain Phase II Nitrogen Oxides Emission Reduction (Final Rule)	Environmental Protection Agency
6/14/1991	2040-AA55	Monitoring for 8 Volatile Organic Chemicals, MCLE's and MCL's for Aldicarb, Aldicarb Sulfoxide, Aldicarb Sulfone, Pentachlorophenol, and Barium	Environmental Protection Agency

Transportation-Specific Regulations			
Date Review Completed	**RIN**	**Title of Regulation**	**Agency**
Fuel Economy Standards for Light Truck and Passenger Automobile			
3/30/1994	2127-AE91	Light Truck Average Fuel Economy Standards, Model Years 1996-1997	Department of Transportation
3/29/1996	2127-AF16	Light Truck Average Fuel Economy Standard, Model Year 1998	Department of Transportation
3/28/1997	2127-AG64	Light Truck Average Fuel Economy Standard Model Year 1999	Department of Transportation
3/31/1998	2127-AG72	Light Truck Average Fuel Economy Standard, Model Year 2000	Department of Transportation
4/5/1999	2127-AH52	Light Truck Average Fuel Economy Standard, Model Year 2001	Department of Transportation

3/27/2000	2127-AH95	Light Truck Average Fuel Economy Standard, Model Year 2002	Department of Transportation
3/29/2001	2127-AI35	Light Truck Average Fuel Economy Standard, Model Year 2003	Department of Transportation
3/29/2002	2127-AI68	Light Truck Average Fuel Economy Standard Model Year 2004	Department of Transportation
10/13/1984	2127-AA75	Light Truck Fuel Economy Standards for Model Years 1985-86	Department of Transportation
9/27/1985	2127-AB33	Light Truck Fuel Economy Standards for Model Year 1987	Department of Transportation
9/30/1985	2127-AB32	Passenger Automobile Average Fuel Economy Standard, Model Year 1986	Department of Transportation
3/24/2009	2127-AK29	Passenger Car and Light Truck Corporate Average Fuel Economy Model Year 2011	Department of Transportation
4/17/1986	2127-YA69	Light Truck Fuel Economy Standards for Model Year 1988	Department of Transportation
2/26/1987	2127-AC02	Light Truck Fuel Economy Standards for Model Year 1989	Department of Transportation
3/30/1988	2127-AC05	Light Truck Fuel Economy Standards for Model Years 1990 and 1991	Department of Transportation
1/18/1989	2127-AB75	Passenger Automobile Fuel Economy Standards for Model Year 1990	Department of Transportation
3/29/1990	2127-AC51	Light Truck Fuel Economy Standard for Model Year 1992	Department of Transportation
3/14/1991	2127-AD56	Light Truck Average Fuel Economy Standards for Model Years 1993 and 1994	Department of Transportation
3/31/2003	2127-AI70	Light Truck Average Fuel Economy Standards, Model Years 2005-2007	Department of Transportation

3/31/2010	2127-AK50	Passenger Car and Light Truck Corporate Average Fuel Economy Standards MYs 2012 to 2016	Department of Transportation
3/28/2006	2127-AJ61	Light Truck Average Fuel Economy Standards, Model Year 2008 and Possibly Beyond	Department of Transportation
Fuel Economy Standards for Off-Road Engines			
5/29/2002	2127-AI33	Tire Pressure Monitoring Systems	Department of Transportation
8/8/2011	2127-AK74	Commercial Medium- and Heavy-Duty On-Highway Vehicles and Work Truck Fuel Efficiency Standards	Department of Transportation
1/13/1999	2127-AG50	Federal Motor Vehicle Safety Standards: Child Restraint Anchorage Systems, Child Restraint Systems	Department of Transportation
6/20/1996	2060-AG06	Certification Standards for Deposit Control Gasoline	Environmental Protection Agency
3/18/2010	2126-AA89	Electronic On-Board Recorders for Hours-of-Service Compliance	Department of Transportation
2/13/1995	2127-AA00	FMVSS: Stability and Control of Medium and Heavy Vehicles During Braking	Department of Transportation
3/8/1985	2060-AA52	NOX Emission Standards for Light-Duty Trucks and Heavy-Duty Engines and Particulate Emissions for Heavy-Duty Diesel Engines	Environmental Protection Agency
5/30/1990	2060-AB89	Volatility Regulations for Gasoline and Alcohol Blends Sold in Calendar Years 1992 and Beyond	Environmental Protection Agency
5/15/1991	2060-AD25	Tier 1 Light-Duty Tailpipe Standards and Useful Life Requirements	Environmental Protection Agency
10/1/1992	2060-AD74	Guidelines for Oxygenated Gasoline Credit Programs Under Section 211(m)(s) of the Clean Air Act, As Amended	Environmental Protection Agency
6/14/1994	2060-AC10	Clean Fuel Fleet Program Requirements for Vehicle Conversions and the California Pilot Program	Environmental Protection Agency
2/1/2010	2060-AO81	Renewable Fuels Standard Program	Environmental Protection Agency

10/19/1990	2127-AB86	Side Impact Protection, Moving Deformable Barrier	Department of Transportation
10/19/1990	2127-AB86	Reporting Compliance with Phasing-in of Dynamic Side Impact Test Requirements	Department of Transportation
10/19/1990	2127-AA48	Side Impact Protection, Anthropomorphic Test Dummy	Department of Transportation
10/19/1990	2127-AB86	Side Impact Protection (Main Notice)	Department of Transportation
3/18/1991	2127-AD10	Automatic Crash Protection in Light Trucks	Department of Transportation
12/29/1993	2127-AE47	Antilock Brake Systems for Light Vehicles (ANPRM)	Department of Transportation
12/18/2003	2127-AJ17	Reforming the Automobile Fuel Economy Standards Program	Department of Transportation
11/23/2004	2127-AH09	Upgrade of Head Restraints	Department of Transportation
11/30/2004	2127-AI91	Rear Center Lap/Shoulder Belt Requirement--Standard 208	Department of Transportation
8/28/2007	2127-AJ10	Side Impact Protection Upgrade--FMVSS No. 214	Department of Transportation
4/30/2009	2127-AG51	Roof Crush Resistance	Department of Transportation
3/17/2010	2127-AK45	Tire Fuel Efficiency Consumer Information	Department of Transportation
Regulation of Fuels and Fuel Additives			
2/26/1985	2060-AB50	Regulation of Fuels and Fuel Additives, Gasoline Lead Content -- Lead Phasedown	Environmental Protection Agency
12/15/1993	2060-AD27	Fuel and Fuel Additives: Standards for Reformulated Gasoline	Environmental Protection Agency

7/2/1990	2060-AC00	Regulation of Fuels and Fuel Additives - Fuel Quality Regulations for Highway Diesel Fuel Sold in 1993 and Later Calendar Years	Environmental Protection Agency
6/29/1994	2060-AE69	Regulation of Fuels and Fuel Additives: Renewable Oxygenate Requirement for Reformulated Gasoline (Final Rule)	Environmental Protection Agency

Labor-Specific Rules			
Date Review Completed	**RIN**	**Title of Regulation**	**Agency**
Regulations on Workplace Safety			
3/31/1998		Respiratory Protection	Department of Labor
2/21/2012	1218-AC20	Hazard Communication	Department of Labor
11/6/1998	1218-AB33	Powered Industrial Truck Operator Training	Department of Labor
6/13/1990	1218-AA32	Electrical Safety-Related Work Practices	Department of Labor
		Scaffolding, Fall Protection, Lockout/Tagout, Electrical and Wiring Methods, Ladders, and Machine Guarding	Department of Labor
Rulemaking by the NLRB that Increases Unionization or Enhances Union Bargaining Power			
		Requirement for employers to post notices explaining workers' rights to form a union (recent NLRB rule overturned by a federal judge, but may be appealed)	Department of Labor
		Change in union election procedures designed to shorten the period of time between the filing of an election petition and the holding of the election (NLRB rule recently overturned)	Department of Labor
	1245-AA03	Persuader Agreements: Employer and Labor Consultant Reporting Under the LMRDA (Labor-Management Reporting and Disclosure Act)	Department of Labor

Payment of a Federal Minimum Wage and Overtime Hours			Department of Labor
		Fair Labor Standards Act (FLSA)	
Regulations Involving Unemployment Compensation and Notice of Layoffs			
		The Emergency Unemployment Compensation Program	Department of Labor
		Requirement for notice of plant closings or layoffs meeting certain requirements under the Worker Adjustment and Retraining Notification Act (WARN)	Department of Labor
Affirmative Action and Nondiscrimination Obligations of Contractors and Subcontractors Regarding Individuals With Disabilities			
	1250-AA02	Affirmative Action and Nondiscrimination Obligations of Contractors and Subcontractors Regarding Individuals With Disabilities	Department of Labor

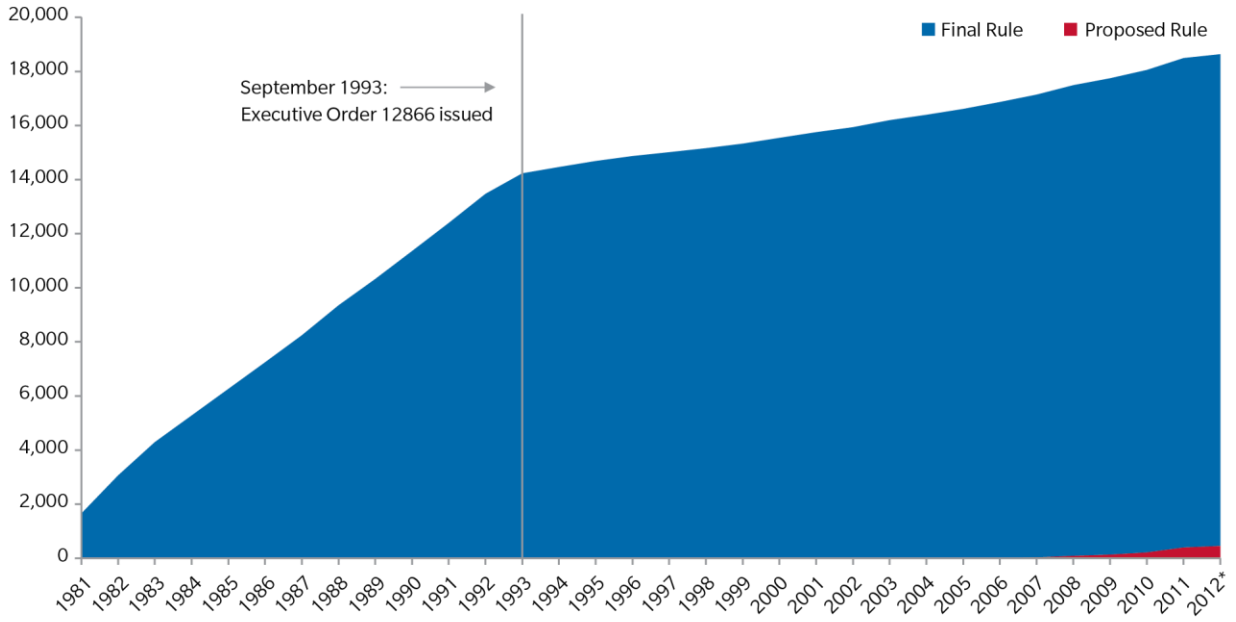
Finance-Specific Rules			
Date	**SEC Release Number**	**Title of Regulation**	**Agency**
Internal Controls Over Financial Reporting (Section 404 of Sarbanes-Oxley)			
9/15/2010	33-9142	Internal Control over Financial Reporting in Exchange Act Periodic Reports of Non-Accelerated Filers	Securities and Exchange Commission
6/22/2009	33-8934A	Technical Amendment: Internal Control Over Financial Reporting in Exchange Act Periodic Reports of Non-Accelerated Filers (Conforming to Federal Register Version)	Securities and Exchange Commission
6/20/2007	33-8809	Amendments to Rules Regarding Management's Report on Internal Control Over Financial Reporting (Corrected)	Securities and Exchange Commission

12/15/2006	33-8760	Internal Control Over Financial Reporting in Exchange Act Periodic Reports of Non-Accelerated Filers and Newly Public Companies	Securities and Exchange Commission
8/9/2006	33-8730A	Internal Control Over Financial Reporting In Exchange Act Periodic Reports of Foreign Private Issuers That Are Accelerated Filers	Securities and Exchange Commission
9/22/2005	33-8618	Management's Report on Internal Control Over Financial Reporting and Certification of Disclosure in Exchange Act Periodic Reports of Companies that Are Not Accelerated Filers	Securities and Exchange Commission
3/2/2005	33-8545	Management's Report on Internal Control over Financial Reporting and Certification of Disclosure in Exchange Act Periodic Reports of Non-Accelerated Filers and Foreign Private Issuers; Extension of compliance dates	Securities and Exchange Commission
2/24/2004	33-8392	Management's Report on Internal Control over Financial Reporting and Certification of Disclosure in Exchange Act Periodic Reports	Securities and Exchange Commission
Swap End-User Rules			
		(various)	Commodity Futures Trading Commission
Conflict Mineral Disclosure Rules			
		(various)	Securities and Exchange Commission
Proxy Access Rules			
		(various)	Securities and Exchange Commission

Appendix-D: Cumulative Number of Proposed and Final Rules for the OIRA Reduced Dataset

The cumulative number of proposed and final regulations over time using the OIRA reduced dataset shows the cumulative number of final rules now in effect and also the cumulative number of proposed rules not yet finalized.

Figure D1: Cumulative Number of Proposed and Final Rules by Year 1981-2012 (Reduced Set)



Notes: In addition to Proposed and Final Rules, there are 1,748 additional rules at various stages (e.g., "Prerule" and "Notice") in the OIRA dataset that brings the total regulation count (at all stages) to 20,383. President Bill Clinton issued Executive Order 12866 in September 1993, greatly reducing the scope of OIRA regulatory review
* The count of regulations in 2012 is shown only through April.

Source: OIRA dataset.

Appendix-E: Description of N_{ew}ERA Model Sectors

Table E1: Sectors Modeled in N_{ew}ERA and the Corresponding IMPLAN and NAICS Codes

		IMPLAN	NAICS
Energy Industries			
COL	Coal	21	
GAS	Natural gas	32	
OIL	Refined Petroleum Products	115, 119	
CRU	Crude Oil	20	
ELE	Electricity	31, 428, 431	
Non-Manufacturing Industries			
AGR	Agriculture Crop Production and Other Agriculture Production Including Livestock	1-19	111, 112-115
CNS	Construction	34-40	233-235
MIN	Mining	22-30	2121, 211, 2122-2123
TRN	Transportation	332-334, 430	
TRK	Trucking	335-336	
M_V	Motor vehicle	276-283	
SRV	Services	33, 319-331, 337-360, 362-427, 429, 433-440	
Energy-Intensive and Non-Energy-Intensive Manufacturing Industries			
FOO	Food Products	41-69	311
PAP	Paper and Allied Products	104-112	322
CHM	Bulk Chemicals Including Inorganic, Organic, Resins, and Agricultural	120-141	32512-32518, 32511, 32519, 3252, 3253
GLS	Glass and Glass Products	156-159	3272
CMT	Cement	160	32731
I_S	Iron and Steel	170-171	3311-3312
ALU	Aluminum	172-180	3313
FAB	Fabricated Metal Products	181-202	332
MAC	Machinery	203-233	333
CMP	Computer and Electronic Products	234-258	334
ELQ	Electrical Equipment	259-275	335
TRQ	Transportation Equipment	284-294	336
WOO	Wood Products	95-103	321
PLA	Plastic and Rubber Products	142-152	326
OMB	Balance of Manufacturing	70-94, 113-114, 116-118, 153-155, 161-169, 295-318	All Remaining Manufacturing NACIS

Table E2: Value of Shipments in 2011 in the Manufacturing Subsectors

Subsector Code	Manufacturing Subsector	Share of Manufacturing Subsector
OIL	Refined Petroleum Products	10.8%
FOO	Food Products	14.6%
PAP	Paper and Allied Products	3.4%
CHM	Bulk Chemicals Including Inorganic, Organic, Resins, and Agricultural	6.8%
GLS	Glass and Glass products	0.5%
CMT	Cement	0.2%
I_S	Iron and Steel	2.7%
ALU	Aluminum	0.7%
FAB	Fabricated Metal Products	6.0%
MAC	Machinery	7.6%
CMP	Computer and Electronic Products	10.6%
ELQ	Electrical Equipment	2.5%
TRQ	Transportation Equipment	6.3%
WOO	Wood Products	1.8%
PLA	Plastic and Rubber products	3.9%
OMA	Balance of Manufacturing	21.5%
	Total	**100.0%**

Source: Energy Information Agency, Annual Energy Outlook 2012

Petroleum Refinery (OIL): The petroleum refinery (OIL) subsector represents industrial entities based on NAICS 3241. The subsector transforms crude petroleum and coal into useable products. It is the third largest subsector among the manufacturing subsectors. The share of value of shipment of the OIL industries in the manufacturing sector as a whole in 2011 was 10.8%.

Food Products (FOO): The food manufacturing subsector (NAICS 311) transforms livestock and agricultural products into food products. This subsector made up 14.6% of the total value of shipments in the manufacturing sector in 2011.

Paper and Allied Products (PAP): The paper manufacturing subsector (NAICS 322) makes pulp, paper or converted paper products. The share of value of shipments of the PAP subsector was 3.4% in 2011.

Bulk Chemicals (CHM): In the chemical manufacturing subsector (NAICS 325), the EIA has identified industries that manufacture bulk chemicals as energy-intensive. These include inorganic (NAICS 32512-32518), organic (NAICS 32511, 32519), resin (NAICS 3252) and

agricultural (NAICS 3253) chemical manufacturing. These industries made up 6.8% of the total value of shipments in the manufacturing sector in 2011.

Glass and Glass Products (GLS): Glass and glass products (GLS) represent the industrial entities based on NAICS 3272. The share of value of shipments of the GLS subsector was 0.2% in 2011.

Cement (CMT): The cement product manufacturing industries (NAICS 32731) transforms mined or quarried nonmetallic minerals, such as sand, gravel, stone, clay, and refractory materials, into intermediate or final products. These industries made up 0.1% of the total value of shipments in the manufacturing sector in 2011.

Iron and Steel (I_S): The iron and steel mills and steel product manufacturing subsector (NAICS 3311-3312) smelt and/or refine ferrous metals from ore, pig or scrap, using electrometallurgical and other metallurgical techniques. The share of value of shipments of I_S industries was 2.7% in 2011.

Aluminum (ALU): Aluminum (ALU) represents the industrial entities based on NAICS 3313. These industries made up 0.7% of the total value of shipments in the manufacturing sector in 2011.

Fabricated Metal Products (FAB): The fabricated metal product manufacturing subsector (NAICS 332) transforms metal into intermediate or end products or treats metals and metal formed products with processes like forging, stamping, bending, forming, machining, welding and assembling. This subsector made up for 6.0% of the total value of shipments in the manufacturing sector in 2011.

Machinery (MAC): Industries in machinery manufacturing subsector (NAICS 333) create end products that apply mechanical force to perform work. The subsector is distinctive in terms of the complex assembly operations involved in the production process. The share of value of shipments of MAC industries was 7.6% in 2011.

Computer and Electronic Products (CMP): The computer and electronic product manufacturing subsector (NAICS 334) manufactures computers, computer peripherals, communications equipment, and similar electronic products or components for such products. The share of value of shipments of CMP industries was 10.6% in 2011.

Electrical Equipment (ELQ): Industries in the electrical equipment, appliance and component manufacturing subsector (NAICS 335) manufacture products that generate, distribute and use electrical power. Products in this subsector include lighting equipment, household appliances, electric motors, generators, batteries, and wiring devices. This subsector made up 2.5% of the total value of shipments in the manufacturing sector in 2011.

Transportation Equipment (TRQ): The transportation equipment manufacturing subsector (NAICS 336) produces motor vehicles, body, trailer and parts of motor vehicles, aerospace products and parts, railroad rolling stock, and ships and boats among others. The TRQ sector

only includes transportation parts production but excludes personal motor vehicle production. The share of value of shipments of TRQ industries was 6.3% in 2011.

Wood Products (WOO): The wood product manufacturing subsector (NAICS 321) manufactures wood products such as lumber, plywood, veneers, wood containers, wood flooring, wood trusses and mobile homes, and prefabricated wood buildings. This subsector made up 1.8% of the total value of shipments in the manufacturing sector in 2011.

Plastic and Rubber Products (PLA): The plastics and rubber products manufacturing subsector (NAICS 326) makes goods by processing plastic materials and raw rubber. This subsector made up 3.9% of the total value of shipments in the manufacturing sector in 2011.

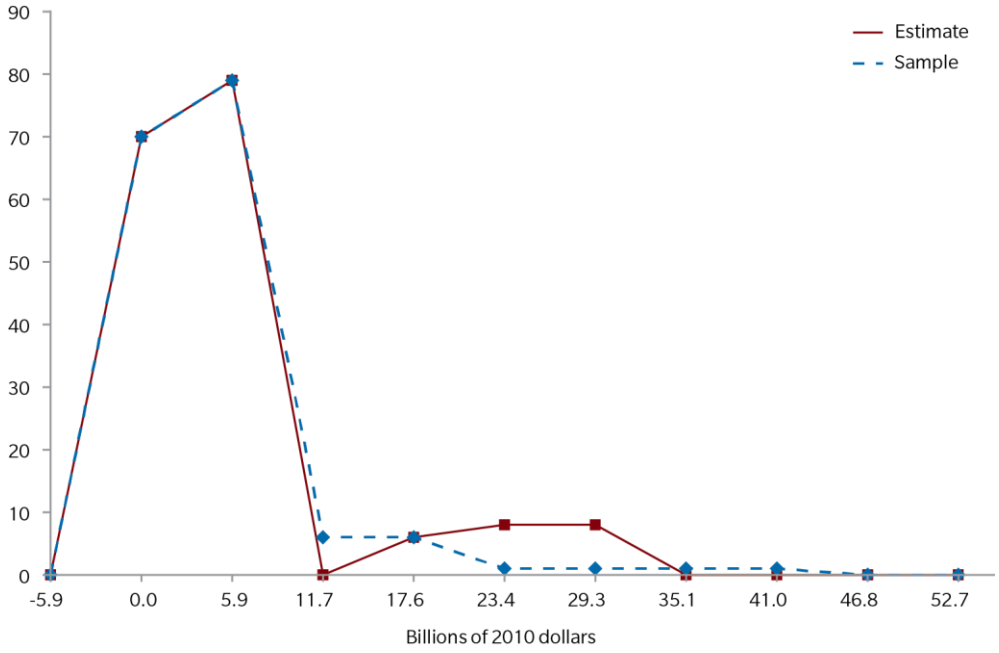
Balance of Other Manufacturing (OMA): All remaining manufacturing subsectors are grouped into the category "Balance of Other Manufacturing" (OMB). This category includes industries like furniture manufacturing (NAICS 337), fine chemical manufacturing (NAICS 3254 – 3256, 3259), beverage and tobacco product manufacturing (NAICS 312), textile and textile product mills (NAICS 313-314), apparel manufacturing (NAICS 315), and printing and paper manufacturing (NAICS 322-323). This was the largest subsector with a value share of 21.5% in 2011.

Appendix-F: CEO Survey Cost Estimation Approach

The range of impacts defined in the CEO Survey were first converted to a dollar value by using the 2010 pre-tax profit of the manufacturing as a whole; which was $585 billion. An impact of 1%, 2%, and 5% was equivalent to $5.85, $11.70, and $29.25 billion, respectively. From the information on the value of impacts and the number of responses, we constructed a histogram of cost (probability density function) of energy, environmental, finance, labor, and transportation categories. **Figure F1** depicts the histogram for the environmental category. We then fit a lognormal distribution that best represents the sample distribution.[63] Having found a distribution, we then estimated the mean value from the distribution. The mean cost (average cost per year) for the environmental category was estimated to be $16.8 billion. Plotting similar distributions, we estimated the annual average cost of regulations for energy, finance, labor, and transportation to be $26.6, $11.3, $35.5, and $21.4 billion, respectively.

We estimated equivalent ad-valorem tax rates using a similar approach adopted to compute the tax rates for other scenarios. As with other scenarios, energy tax rates are differentiated by sectors and other tax rates are applied uniformly across the manufacturing sectors only.

Figure F1: Probability Density Function of Cost for the Environmental Category



[63] We fit a Beta and lognormal distribution and determine that the lognormal best represents the underlying sample distribution for all categories.

Appendix-G: Estimated Tax Rates for All Scenarios

DIRECT Scenario Tax Rates on Manufacturing Sector Inputs (%)

Sector	Labor	Capital	Transportation Services	Energy
OIL	4.8	5.2	15.3	5.4
FOO	4.8	5.2	15.3	1.4
PAP	4.8	5.2	15.3	1.3
CHM	4.8	5.2	15.3	7.7
GLS	4.8	5.2	15.3	0.4
CMT	4.8	5.2	15.3	0.4
I_S	4.8	5.2	15.3	1.5
ALU	4.8	5.2	15.3	0.3
FAB	4.8	5.2	15.3	0.5
MAC	4.8	5.2	15.3	0.2
CMP	4.8	5.2	15.3	0.3
ELQ	4.8	5.2	15.3	0.1
TRQ	4.8	5.2	15.3	0.2
WOO	4.8	5.2	15.3	0.2
PLA	4.8	5.2	15.3	0.4
OMA	4.8	5.2	15.3	1.8

COST_LOW Scenarios Tax Rates on all Sectors (%)

Input tax rates	Sectors	2012	2015	2018	2021	2024	2027	2030	2033	2036	2039
Energy	**Households**	5.1	4.7	4.3	4.0	4.1	3.8	3.6	3.4	3.1	3.2
	Government	9.5	9.1	8.6	7.7	7.9	7.2	6.7	6.2	5.6	6.4
	OIL	6.2	5.9	5.5	5.1	5.5	5.3	5.1	4.9	4.8	4.8
	ELE	21.1	20.8	19.0	17.6	18.5	17.3	16.6	15.7	14.8	14.0
	AGR	5.4	5.0	4.6	4.2	4.4	4.1	3.8	3.6	3.3	3.4
	CNS	5.3	4.9	4.5	4.1	4.3	4.0	3.7	3.5	3.3	3.2
	MIN	15.0	14.0	12.9	11.5	11.6	10.4	9.8	9.0	8.2	8.0
	TRN	4.6	4.3	3.9	3.6	3.8	3.5	3.3	3.1	3.0	2.8
	TRK	4.8	4.4	4.0	3.7	3.9	3.6	3.4	3.2	3.0	2.9
	SRV	7.9	7.4	6.8	5.9	6.0	5.4	4.9	4.4	3.9	5.4
	FOO	12.9	12.4	11.4	10.0	10.0	9.0	8.2	7.4	6.5	7.8
	PAP	11.4	10.9	9.9	8.8	8.8	8.0	7.3	6.7	5.9	6.9
	CHM	6.3	5.9	5.4	4.9	5.1	4.7	4.4	4.1	3.8	3.8
	GLS	10.3	9.8	9.1	8.2	8.3	7.6	7.0	6.4	5.8	6.3
	CMT	10.1	9.7	8.9	8.1	8.4	7.8	7.3	6.7	6.1	6.6
	I_S	16.1	15.6	14.3	12.8	13.1	11.8	10.8	9.7	8.5	9.8
	ALU	7.6	7.2	6.6	5.8	5.8	5.2	4.7	4.2	3.7	5.0
	FAB	11.0	10.6	9.6	8.3	8.2	7.2	6.5	5.8	5.0	6.5
	MAC	9.7	9.4	8.5	7.3	7.2	6.4	5.7	5.1	4.4	6.0
	CMP	7.3	7.1	6.5	5.6	5.6	5.1	4.6	4.1	3.6	5.0
	ELQ	8.4	7.8	7.1	6.1	6.1	5.5	4.9	4.4	3.9	5.3
	TRQ	10.2	10.0	8.9	7.6	7.5	6.7	6.1	5.5	4.8	6.3
	WOO	9.0	8.4	7.7	6.7	6.7	6.0	5.4	4.8	4.2	5.5
	PLA	8.6	8.1	7.4	6.4	6.3	5.6	5.0	4.4	3.9	5.4
	OMA	10.7	10.4	9.6	8.3	8.3	7.5	6.8	6.1	5.4	6.8
Transportation services		3.7	3.4	3.1	2.9	2.9	2.7	2.4	2.3	2.1	1.9
Labor		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Capital		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Intermediate goods		0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.2

COST Scenarios Tax Rates on all Sectors (%)

Input tax rates	Sectors	2012	2015	2018	2021	2024	2027	2030	2033	2036	2039
Energy	**Households**	5.1	4.9	4.6	4.3	4.5	4.2	3.9	3.7	3.4	3.4
	Government	9.6	9.5	9.1	8.3	8.5	7.8	7.3	6.7	6.1	7.0
	OIL	6.2	6.1	5.9	5.6	6.0	5.7	5.6	5.4	5.2	5.2
	ELE	21.3	21.5	20.2	19.1	20.1	18.8	18.0	17.0	16.1	15.2
	AGR	5.5	5.2	4.9	4.6	4.8	4.4	4.1	3.9	3.6	3.7
	CNS	5.3	5.0	4.7	4.4	4.6	4.3	4.0	3.8	3.6	3.4
	MIN	15.2	14.5	13.7	12.5	12.6	11.3	10.6	9.8	8.9	8.7
	TRN	4.7	4.4	4.1	3.9	4.1	3.8	3.6	3.4	3.2	3.0
	TRK	4.8	4.6	4.3	4.0	4.2	3.9	3.7	3.5	3.3	3.1
	SRV	7.9	7.7	7.2	6.5	6.5	5.9	5.3	4.8	4.2	5.9
	FOO	13.0	12.8	12.1	10.8	10.8	9.7	8.9	8.0	7.1	8.5
	PAP	11.5	11.3	10.5	9.5	9.6	8.7	8.0	7.2	6.4	7.5
	CHM	6.3	6.1	5.7	5.3	5.5	5.1	4.8	4.5	4.2	4.1
	GLS	10.4	10.2	9.7	8.9	9.0	8.2	7.6	6.9	6.3	6.8
	CMT	10.2	10.0	9.4	8.8	9.2	8.5	7.9	7.3	6.7	7.2
	I_S	16.2	16.1	15.2	13.9	14.2	12.9	11.7	10.5	9.2	10.6
	ALU	7.6	7.5	7.1	6.3	6.3	5.7	5.1	4.6	4.0	5.4
	FAB	11.1	10.9	10.2	9.0	8.9	7.9	7.1	6.3	5.5	7.1
	MAC	9.8	9.7	9.0	7.9	7.9	7.0	6.2	5.5	4.8	6.5
	CMP	7.4	7.3	6.9	6.1	6.1	5.5	5.0	4.5	4.0	5.4
	ELQ	8.5	8.1	7.5	6.6	6.6	6.0	5.4	4.8	4.2	5.7
	TRQ	10.3	10.3	9.5	8.3	8.1	7.3	6.6	5.9	5.2	6.9
	WOO	9.1	8.7	8.1	7.2	7.2	6.5	5.8	5.2	4.5	6.0
	PLA	8.6	8.4	7.8	6.9	6.8	6.1	5.4	4.8	4.2	5.9
	OMA	10.8	10.8	10.2	9.1	9.0	8.1	7.4	6.6	5.8	7.4
Transportation services		3.7	3.5	3.3	3.1	3.2	2.9	2.6	2.4	2.3	2.1
Labor		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Capital		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Intermediate goods		0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3

COST_HIGH Scenarios Tax Rates on all Sectors (%)

Input tax rates	Sectors	2012	2015	2018	2021	2024	2027	2030	2033	2036	2039
Energy	**Households**	5.2	5.0	5.0	5.0	5.2	4.9	4.5	4.3	4.0	4.0
	Government	9.6	9.7	9.8	9.7	9.9	9.1	8.5	7.8	7.1	8.1
	OIL	6.3	6.3	6.3	6.5	7.0	6.7	6.5	6.2	6.0	6.0
	ELE	21.3	22.1	21.8	22.3	23.4	21.9	20.9	19.8	18.7	17.7
	AGR	5.5	5.4	5.3	5.4	5.6	5.2	4.8	4.5	4.2	4.3
	CNS	5.3	5.2	5.1	5.2	5.4	5.0	4.7	4.4	4.1	4.0
	MIN	15.2	14.9	14.8	14.6	14.6	13.2	12.4	11.4	10.4	10.1
	TRN	4.7	4.5	4.5	4.5	4.7	4.4	4.2	4.0	3.7	3.5
	TRK	4.8	4.7	4.6	4.7	4.9	4.5	4.3	4.1	3.8	3.6
	SRV	8.0	7.9	7.8	7.5	7.6	6.8	6.2	5.5	4.9	6.8
	FOO	13.0	13.2	13.1	12.6	12.6	11.3	10.4	9.3	8.2	9.8
	PAP	11.6	11.6	11.4	11.1	11.1	10.1	9.3	8.4	7.5	8.7
	CHM	6.4	6.2	6.2	6.2	6.4	5.9	5.5	5.2	4.8	4.8
	GLS	10.4	10.5	10.4	10.3	10.5	9.6	8.8	8.1	7.3	7.9
	CMT	10.2	10.3	10.1	10.2	10.7	9.9	9.2	8.5	7.7	8.3
	I_S	16.3	16.6	16.4	16.2	16.5	15.0	13.6	12.2	10.7	12.4
	ALU	7.7	7.7	7.6	7.4	7.4	6.6	5.9	5.3	4.6	6.3
	FAB	11.2	11.2	11.0	10.4	10.3	9.1	8.2	7.3	6.3	8.2
	MAC	9.8	10.0	9.7	9.2	9.1	8.1	7.2	6.4	5.6	7.6
	CMP	7.4	7.5	7.4	7.1	7.1	6.4	5.8	5.2	4.6	6.3
	ELQ	8.5	8.3	8.1	7.7	7.7	6.9	6.2	5.6	4.9	6.7
	TRQ	10.3	10.6	10.2	9.6	9.5	8.5	7.7	6.9	6.1	8.0
	WOO	9.1	9.0	8.8	8.4	8.4	7.5	6.8	6.0	5.3	7.0
	PLA	8.7	8.7	8.5	8.0	7.9	7.1	6.3	5.6	4.9	6.9
	OMA	10.8	11.1	11.0	10.5	10.5	9.4	8.6	7.7	6.8	8.6
Transportation services		3.7	3.6	3.6	3.6	3.7	3.4	3.1	2.9	2.6	2.4
Labor		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Capital		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Intermediate goods		0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3

COSTPLUS_LOW Scenarios Tax Rates on all Sectors (%)

Input tax rates	Sectors	2012	2015	2018	2021	2024	2027	2030	2033	2036	2039
Energy	**Households**	14.2	13.1	12.0	11.0	11.5	10.6	10.0	9.3	8.7	8.7
	Government	26.4	25.4	23.8	21.3	21.8	20.0	18.6	17.2	15.6	17.8
	OIL	17.2	16.5	15.4	14.2	15.3	14.6	14.2	13.7	13.2	13.2
	ELE	58.6	57.7	52.8	48.8	51.3	47.9	45.9	43.4	41.1	38.7
	AGR	15.0	14.0	12.9	11.7	12.2	11.3	10.6	9.9	9.2	9.5
	CNS	14.6	13.5	12.4	11.3	11.8	11.0	10.3	9.7	9.1	8.8
	MIN	41.9	38.9	35.9	32.0	32.0	28.9	27.1	25.0	22.8	22.2
	TRN	12.9	11.8	10.8	10.0	10.4	9.7	9.1	8.7	8.2	7.7
	TRK	13.3	12.2	11.2	10.3	10.7	10.0	9.4	8.9	8.4	7.9
	SRV	21.9	20.6	19.0	16.5	16.6	15.0	13.5	12.2	10.7	15.0
	FOO	35.8	34.5	31.7	27.7	27.6	24.8	22.7	20.5	18.1	21.6
	PAP	31.8	30.3	27.6	24.3	24.4	22.1	20.3	18.5	16.5	19.1
	CHM	17.5	16.3	14.9	13.6	14.0	12.9	12.1	11.4	10.6	10.5
	GLS	28.6	27.3	25.3	22.6	23.0	21.0	19.4	17.7	16.0	17.4
	CMT	28.0	26.9	24.6	22.4	23.4	21.7	20.2	18.7	17.0	18.3
	I_S	44.8	43.3	39.7	35.5	36.3	32.8	29.9	26.8	23.5	27.2
	ALU	21.1	20.1	18.5	16.2	16.2	14.5	13.0	11.6	10.1	13.8
	FAB	30.7	29.3	26.6	22.9	22.6	20.0	18.0	16.0	13.9	18.0
	MAC	27.0	26.0	23.6	20.2	20.1	17.8	15.9	14.1	12.2	16.6
	CMP	20.4	19.6	17.9	15.6	15.7	14.1	12.8	11.5	10.1	13.8
	ELQ	23.5	21.7	19.6	17.0	17.0	15.2	13.7	12.2	10.7	14.6
	TRQ	28.4	27.7	24.8	21.2	20.8	18.6	16.9	15.2	13.3	17.5
	WOO	25.0	23.4	21.3	18.5	18.4	16.6	14.9	13.2	11.6	15.3
	PLA	23.8	22.6	20.5	17.6	17.4	15.5	13.8	12.3	10.7	15.1
	OMA	29.8	28.8	26.6	23.1	23.0	20.7	18.8	16.9	14.9	18.9
Transportation services		10.3	9.5	8.7	7.9	8.1	7.4	6.8	6.3	5.8	5.3
Labor		0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1
Capital		0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Intermediate goods		1.1	1.1	1.0	0.9	1.0	0.9	0.8	0.8	0.7	0.7

COSTPLUS Scenarios Tax Rates on all Sectors (%)

Input tax rates	Sectors	2012	2015	2018	2021	2024	2027	2030	2033	2036	2039
Energy	**Households**	14.2	13.4	12.5	11.6	12.2	11.3	10.6	9.9	9.2	9.3
	Government	26.6	26.0	24.8	22.6	23.1	21.2	19.8	18.2	16.6	18.9
	OIL	17.3	16.9	16.0	15.1	16.2	15.5	15.0	14.5	14.0	14.0
	ELE	59.0	59.1	55.1	51.8	54.4	50.8	48.6	46.1	43.5	41.1
	AGR	15.1	14.3	13.4	12.4	12.9	12.0	11.2	10.5	9.8	10.1
	CNS	14.7	13.9	12.9	12.0	12.5	11.6	10.9	10.3	9.6	9.3
	MIN	42.1	39.8	37.4	33.9	34.0	30.7	28.7	26.5	24.2	23.5
	TRN	13.0	12.1	11.3	10.6	11.0	10.3	9.7	9.2	8.7	8.2
	TRK	13.4	12.5	11.7	10.9	11.3	10.6	10.0	9.4	8.9	8.4
	SRV	22.0	21.2	19.8	17.5	17.6	15.9	14.3	12.9	11.3	15.9
	FOO	36.0	35.3	33.1	29.3	29.3	26.3	24.1	21.7	19.2	22.9
	PAP	31.9	31.1	28.8	25.8	25.9	23.5	21.5	19.6	17.4	20.2
	CHM	17.6	16.7	15.6	14.4	14.8	13.7	12.8	12.1	11.2	11.1
	GLS	28.8	27.9	26.3	24.0	24.4	22.2	20.5	18.8	16.9	18.4
	CMT	28.2	27.5	25.6	23.8	24.8	23.0	21.4	19.8	18.0	19.4
	I_S	45.0	44.4	41.4	37.6	38.5	34.8	31.6	28.4	24.9	28.8
	ALU	21.2	20.6	19.2	17.2	17.2	15.4	13.8	12.3	10.7	14.6
	FAB	30.9	30.0	27.7	24.2	24.0	21.2	19.1	17.0	14.7	19.1
	MAC	27.2	26.7	24.6	21.5	21.3	18.8	16.8	14.9	13.0	17.6
	CMP	20.5	20.1	18.7	16.5	16.6	15.0	13.5	12.2	10.7	14.6
	ELQ	23.6	22.3	20.5	18.0	18.0	16.1	14.5	13.0	11.4	15.5
	TRQ	28.5	28.4	25.8	22.4	22.0	19.8	17.9	16.1	14.1	18.6
	WOO	25.1	24.0	22.2	19.6	19.5	17.5	15.8	14.0	12.3	16.2
	PLA	24.0	23.1	21.4	18.7	18.5	16.4	14.7	13.0	11.3	16.0
	OMA	29.9	29.5	27.7	24.5	24.4	21.9	19.9	17.9	15.7	20.0
Transportation services		10.4	9.7	9.0	8.4	8.6	7.8	7.2	6.6	6.1	5.6
Labor		0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Capital		0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Intermediate goods		1.1	1.1	1.0	1.0	1.0	0.9	0.9	0.8	0.8	0.7

COSTPLUS_HIGH Scenarios Tax Rates on all Sectors (%)

Input tax rates	Sectors	2012	2015	2018	2021	2024	2027	2030	2033	2036	2039
Energy	**Households**	14.3	13.7	13.3	13.1	13.7	12.7	11.9	11.1	10.4	10.4
	Government	26.7	26.7	26.4	25.4	25.9	23.8	22.2	20.5	18.6	21.2
	OIL	17.4	17.3	17.1	17.0	18.2	17.4	16.9	16.3	15.8	15.7
	ELE	59.3	60.7	58.6	58.2	61.1	57.1	54.6	51.7	48.9	46.1
	AGR	15.2	14.7	14.3	14.0	14.5	13.5	12.6	11.8	11.0	11.3
	CNS	14.8	14.2	13.7	13.5	14.1	13.1	12.2	11.5	10.8	10.5
	MIN	42.3	40.9	39.9	38.1	38.2	34.5	32.3	29.8	27.1	26.4
	TRN	13.0	12.4	12.0	11.9	12.4	11.6	10.9	10.3	9.8	9.2
	TRK	13.5	12.9	12.4	12.2	12.7	11.9	11.2	10.6	10.0	9.4
	SRV	22.1	21.7	21.0	19.6	19.7	17.8	16.1	14.5	12.7	17.9
	FOO	36.2	36.2	35.2	33.0	32.9	29.6	27.1	24.4	21.5	25.7
	PAP	32.1	31.9	30.6	28.9	29.1	26.4	24.2	22.0	19.6	22.7
	CHM	17.7	17.1	16.6	16.2	16.7	15.4	14.4	13.5	12.6	12.5
	GLS	28.9	28.7	28.0	26.9	27.4	25.0	23.1	21.1	19.0	20.7
	CMT	28.3	28.3	27.3	26.7	27.8	25.9	24.0	22.3	20.2	21.8
	I_S	45.3	45.6	44.0	42.3	43.2	39.1	35.6	31.9	28.0	32.4
	ALU	21.3	21.1	20.5	19.3	19.3	17.2	15.5	13.8	12.1	16.4
	FAB	31.0	30.8	29.5	27.2	26.9	23.9	21.4	19.1	16.6	21.4
	MAC	27.3	27.4	26.1	24.1	23.9	21.2	18.9	16.8	14.6	19.8
	CMP	20.6	20.6	19.9	18.6	18.6	16.8	15.2	13.7	12.0	16.4
	ELQ	23.7	22.8	21.8	20.2	20.2	18.1	16.3	14.6	12.8	17.4
	TRQ	28.7	29.2	27.5	25.2	24.7	22.2	20.1	18.1	15.9	20.9
	WOO	25.3	24.6	23.6	22.0	22.0	19.7	17.7	15.8	13.8	18.2
	PLA	24.1	23.8	22.8	21.0	20.8	18.5	16.5	14.6	12.7	18.0
	OMA	30.1	30.3	29.5	27.6	27.4	24.6	22.4	20.1	17.7	22.5
Transportation services		10.4	10.0	9.6	9.4	9.6	8.8	8.1	7.4	6.9	6.3
Labor		0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Capital		0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2
Intermediate goods		1.1	1.1	1.1	1.1	1.1	1.1	1.0	0.9	0.9	0.8

Appendix-H: Sensitivity Results for Different Growth Rate Assumptions

Figure H1: Results of Sensitivity of Growth Rate in Cost of Regulation for COST and COSTPLUS Scenarios