A Report of The Heritage Center for Data Analysis

The Economic Consequences of Waxman–Markey: An Analysis of the American Clean Energy and Security Act of 2009

David W. Kreutzer, Ph.D., Karen A. Campbell, Ph.D., William Beach, Ben Lieberman, and Nicolas D. Loris

CDA09-04 August 6, 2009

The Heritage Foundation
LEADERSHIP FOR AMERICA

214 Massachusetts Avenue, NE • Washington, DC 20002 • (202) 546-4400 • heritage.org

The Economic Consequences of Waxman–Markey: An Analysis of the American Clean Energy and Security Act of 2009

David W. Kreutzer, Ph.D., Karen A. Campbell, Ph.D., William Beach, Ben Lieberman, and Nicolas D. Loris

After a truncated debate and last-minute changes, the House of Representatives narrowly passed climate-change legislation on June 26, 2009, designed by Henry Waxman (D–CA) and Edward Markey (D–MA). The 1,427-page bill would restrict greenhouse gas emissions from industry, mainly carbon dioxide from the combustion of coal, oil, and natural gas.

Since energy is the lifeblood of the American economy, 85 percent of which comes from CO_2-emitting fossil fuels, the Waxman–Markey bill represents an extraordinary level of economic interference by the federal government. For this reason, it is important for policymakers to have a sense of the economic impact that accompanies any environmental benefits.[1]

Analysis by The Heritage Foundation's Center for Data Analysis (CDA) makes clear that Waxman–Markey promises serious perils for the American economy for the years and decades ahead. Waxman–Markey requires arbitrary and severe restrictions on the current energy supply and infrastructure. These restrictions can be met only through large-scale deployment of still-undeveloped or uneconomical technologies and alternative energy sources. In addition to the direct impact on consumers' budgets through higher electric bills and gasoline prices, the resultant increase in energy costs will reverberate throughout the economy and inject unnecessary inefficiencies at virtually every stage of production. It would suppress economic activity and reduce employment, especially in the manufacturing sector. Virtually all costs would eventually filter down to the American people.

Waxman–Markey extracts trillions of dollars from the energy-using public and delivers this wealth to various groups—some of whom may be more deserving than others, and some who are simply better at lobbying. That could mean low-income households in an attempt to compensate them for sharply higher energy costs, or regulated industries that have effectively lobbied for compliance assistance. In any event, cap-and-trade allowances are a tax and would be the largest tax increase in recent history.

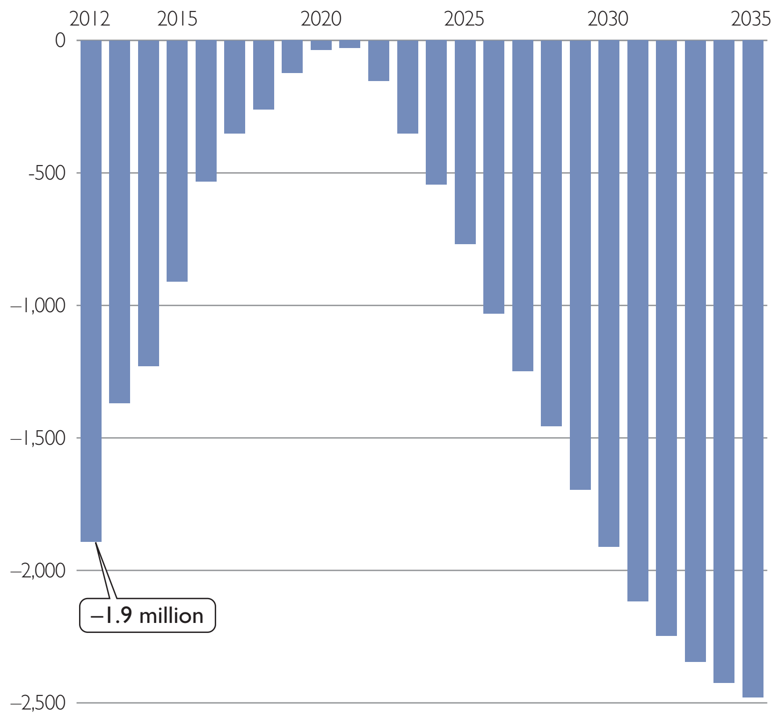
The recent experience with ethanol-use mandates illustrates the costs and unanticipated (at least by proponents) problems with a federal intervention in energy markets. However, Waxman–Markey represents a vastly more complex and comprehensive scheme, which suggests that the scope and intensity of unintended effects could be greater than

1. Scientific questions about global warming, its causes, and the seriousness of the consequences are not discussed in this report.

Waxman–Markey Climate Change Bill Would Cost Millions of Jobs

The legislation would increase unemployment levels for every year: 1.9 million fewer jobs in 2012, and an average of 1.14 million fewer jobs from 2012 through 2035.

Change in Employment Due to Waxman–Markey Climate Change Bill, in Thousands of Jobs



Source: Heritage Foundation calculations based on the IHS/Global Insight U.S. Macroeconomic model.

Chart 1 • CDA 09-04 heritage.org

either proponents or critics of Waxman–Markey currently anticipate. In addition, Europe's experience with climate-change laws similar to Waxman–Markey strongly suggests both high costs and uncertain emissions reductions.

OVERVIEW

Waxman–Markey imposes strict limits on the emissions of six greenhouse gases (GHGs) with the primary emphasis on carbon dioxide (CO_2). The mechanism for capping these emissions requires regulated emitters to acquire federally created permits (allowances) for each ton emitted. The allowances have the economic effect of a tax—energy users will, of course, have to pay for the energy itself, and will also have to pay for the rights to use it if its production involved one of the regulated greenhouse gases. The increase in energy costs stemming from paying for these permits to emit creates correspondingly large transfers of income from private energy consumers to special interests: the federal government collects the revenues from the sale of the allowances and redistributes them to individuals and groups (businesses included) that are listed in the legislation.

Implementing the Waxman–Markey legislation will be very costly, even given the rather optimistic assumptions about how effective it will be in reducing CO_2 emissions and how accommodating the economy will be to the added energy costs. The Heritage Foundation's dynamic analysis of these economic costs are summarized as follows (adjusted for inflation to 2009 dollars):

- Cumulative gross domestic product (GDP) losses are $9.4 trillion between 2012 and 2035;
- Single-year GDP losses reach $400 billion by 2025 and will ultimately exceed $700 billion;
- Net job losses approach 1.9 million in 2012 and could approach 2.5 million by 2035. Manufacturing loses 1.4 million jobs in 2035;
- The annual cost of emissions permits to energy users will be at least $100 billion by 2012 and could exceed $390 billion by 2035;
- A typical family of four will pay, on average, an additional $829 each year for energy-based utility costs; and
- Gasoline prices will rise by 58 percent ($1.38 more per gallon) and average household electric rates will increase by 90 percent.

This CDA analysis extends only to 2035, as this is the forecasting horizon for the macroeconomic model used to prepare these estimates. But it should be noted that the emissions reductions continue to tighten through 2050 and that model-based analysis by other groups whose models extend beyond 2035 shows increasing harm to the U.S. economy.

Effects on Industry

Waxman–Markey affects some industries more than others. Some industries are undoubtedly more energy-intensive and thus hit harder by higher energy prices. Particularly alarming is the damage that Waxman–Markey inflicts on America's manufacturing base. By 2035, the last year of the simulation, durable manufacturing employment will have lost 1.17 million jobs. Nondurable manufacturing losses reach almost 210,000 jobs by 2035. Combined, manufacturing employment averages 389,000 less than the baseline between 2012 and 2035, hitting a high of 1.38 million lost jobs in 2035. [1]

Other industries experience the effects of higher energy prices as well. The fabricated-metal industry will see jobs drop by an average of more than 51,000 below the baseline and 216,000 below by 2035. The machinery industry will shed 263,000 jobs by 2035. Plastic and rubber products employment falls 33,000 jobs below the baseline on average as a result of Waxman–Markey and is 80,000 below business-as-usual in 2035, the last year of the simulation. The employment-services industry faces substantial losses, reaching 428,000 in 2035 and averaging 93,000 fewer jobs than the baseline from 2012 to 2035.

Two other industries adversely affected by this cap-and-trade legislation are transportation and trade. With cap-and-trade regulation, retail-trade unemployment increases by 276,000 in 2035, with a yearly average loss of 78,000, while wholesale trade unemployment increases by 400,000 in 2035, and 191,000 on average each year. The trade, transportation, and utilities sector losses reach 1.1 million jobs by 2035 and 441,000 for the yearly average. Transportation and warehousing employment drops 383,000 by 2035 and has an average yearly loss of 175,000 jobs.

Because agriculture is energy intensive, it would be disproportionately burdened by Waxman–Markey. Higher gasoline and diesel fuel prices, higher electricity costs, and higher natural-gas–derived fertilizer costs all erode farm profits, which are expected to decline by 28 percent in 2012 and average 57 percent lower through 2035.

Also noteworthy are the effects on gas stations, which tend to be small businesses. Employment in the gas station industry is an average 33,000 jobs below the baseline every year from 2012 through 2035.

(continued on next page)

1. The term "baseline" refers to the projections of the U.S. economy's future between 2009 and 2035 without the Waxman–Markey legislation becoming law. This baseline does contain all of the enacted energy legislation by this and previous Congresses. For example, the baseline used in this *CDA Report* contains the current law about fuel efficiency standards and the development of alternative energy sources.

In addition to burdening households, the high energy prices weaken the production side of the economy. Contrary to the claims of an economic boost from "green" investment as firms undertake the changes to reduce emissions and increased employment as so-called green jobs are created to do this work, Waxman–Markey would be a significant *net drain* on GDP and employment.

DESCRIPTION OF THE LEGISLATION

Waxman–Markey is a cap-and-trade bill. It caps greenhouse gas emissions from regulated entities beginning in 2012. At first, each power plant, factory, refinery, and other regulated entity will either be allocated allowances (rights to emit) for six greenhouse gases, or be made to purchase these allowances, or some combination of the two. In the early years, most of the allowances will be given away. Perhaps one result of the ill-conceived last-minute changes is that for some years there are promises to distribute more than 100 percent of the available allowances to various interest groups. However, Heritage analysts assume, as do the bill writers, that most emitters will need to purchase at least some allowances. Note that whether allowances are sold or given away had no effect on the energy cost increases, which are caused by the constraint on supply.

Emitters who reduce their emissions below their annual allotment can sell their excess allowances to those who do not—the trade part of cap and trade. Over time, the cap is ratcheted from a 3 percent

The model also includes an industry-production index. An industry-production index is a composite measure of the output produced by each of the companies within an industry. Roughly, the index is created by a weighted average of the total output by each company within an industry divided by the base year's weighted average total.[2] The index is based on a common year and, therefore, provides a comparable measure of increases or decreases in an industry's output over time.

Of all the industries modeled, only a handful showed increases in output under Waxman–Markey.[3] Most decreased, and the set of industries whose output fell the most include:

- durable goods,
- railroad equipment,
- miscellaneous manufacturers,
- motor vehicles and parts,
- light truck and utility vehicles,
- electrical equipment, appliances, and components,
- communications equipment, computers, and electronics,
- engines and turbines,
- metalworking machinery,
- construction,
- agricultural equipment,
- glass and glass products,
- rubber and plastic products,
- medical equipment and supplies, and
- mining and its support activities.

2. For a more precise description of production indices as well as the methodology used to compile them, see "Studies in Methods—Index Numbers of Industrial Production," Series F, No. 1, United Nations Statistics Division, Department of Economic and Social Affairs, 2008, at *http://unstats.un.org/unsd/cr/temp/IIP_Draft_version_080502.pdf* (July 24, 2009).
3. Those industrial groupings that increase are: leather and allied products; bags and coated and treated paper; semiconductors; newspapers and misc. publishers; periodicals; books; and cutlery and hand tools. The first most likely reflects a consumer switch from synthetically produced materials that require relatively more emissions. There is a broad applicability of semiconductors along with a need to find new technological processes. Newspapers and other media may historically be somewhat inversely related to unemployment as less work time may increase the demand for reading material both for leisure and education. Cutlery and hand tools may be driven by more labor-intensive processes, rather than motorized processes.

reduction of 2005 levels (the base year for measuring and mandating future GHG reductions) by 2012 to an 83 percent reduction by 2050.

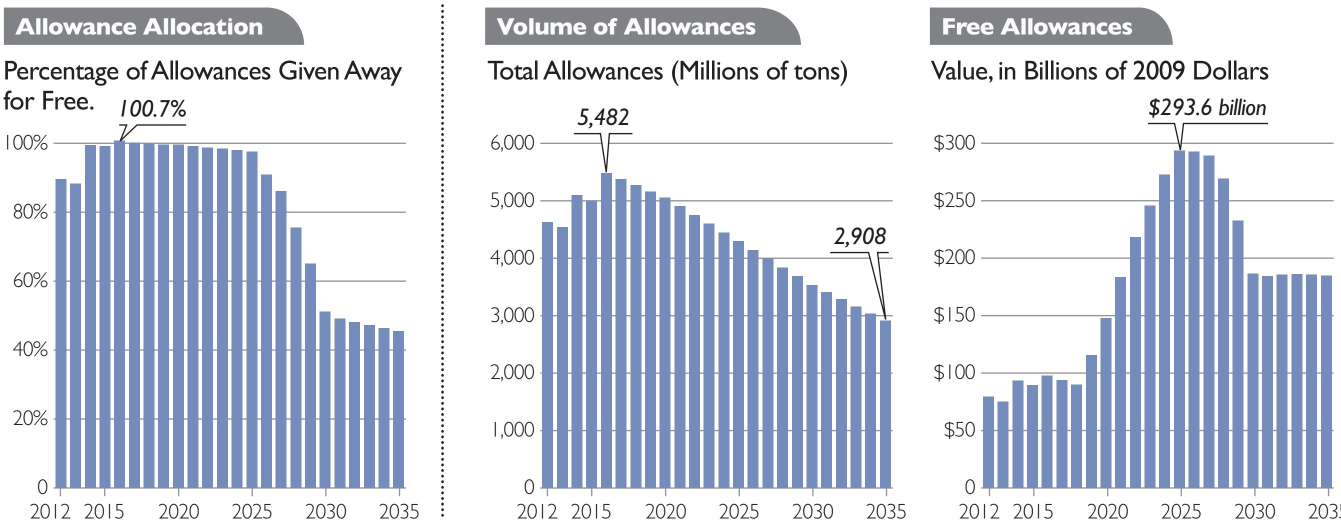
ALLOWANCE GIVEAWAYS

President Obama's budget proposal suggested a 100 percent auction of the emission allowances, forcing companies to bid on the right to emit. In order to get the Waxman–Markey cap-and-trade bill through the House Energy and Commerce Committee, however, Members of Congress promised generous handouts for various industries and special interests. In the near term, the legislation promises to distribute 85–101 percent of the allowances to various interest groups at no cost. The percentages for each industry decrease over time.

Electric Utilities. The biggest winners are the electric utilities, receiving 43.75 percent of the emission allowances in 2012 and 2013. The free allowances fall to 38.89 percent in 2014 and 2015, and 35 percent from 2016 through 2025. Beginning in 2026, the freely distributed allowances fall by 7

Greenhouse Gas Allowances Under Waxman–Markey

Under the Waxman–Markey climate-change legislation, companies would need to have permits, called allowances, to allow them to emit greenhouse gases. From 2012 through 2026, about 90 percent or more of the allowances would be given away for free. Beginning in 2019, the cost of allowances begins to rise dramatically as the caps on emissions become more stringent.



Source: Heritage Foundation calculations based on data from the IHS/Global Insight Energy model.

Chart 2 • CDA 09-04 heritage.org

percent per year, until they reach zero by 2030. Small local-distribution electric companies are given 0.5 percent of the allowance value from the enactment of the bill through 2025; it is then reduced by 0.1 percent until it reaches zero. Energy-efficient cogeneration facilities receive 0.35 percent in the first year, but nothing after that.

Energy Sectors. The natural gas industry receives 9 percent of the allowances beginning in 2016, until they are reduced by 1.8 percent per year beginning in 2026. The handouts reach zero in 2030. For home heating oil and propane consumers, only 1.88 percent of the allowances are given in years 2012 and 2013. This decreases to 1.67 percent for the next two years, and to 1.5 percent from 2016 through 2025. After this they are phased out by 0.3 percent each year. Oil refiners receive 2 percent of the allowances from 2014 through 2026. On top of this, small business refineries will receive 0.25 percent from 2014 to 2026.

Protecting the Poor. The bill stipulates that the revenues from 15 percent of the allowances sold at auction will go to low-income consumers.

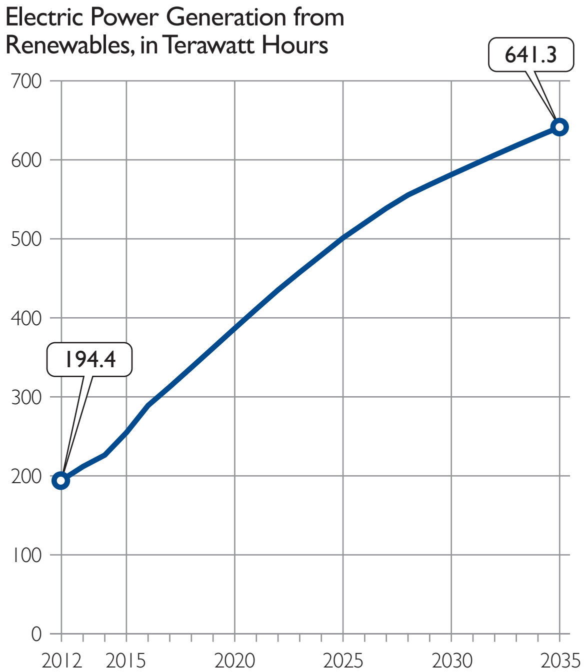
Trade-Affected Industries. Energy-intensive and "trade-exposed" industries will undoubtedly be at a competitive disadvantage in relation to companies in other countries that do not put a price on carbon emissions. To mitigate this result, the bill gives 2 percent of the allowances to affected industries for the first two years of the bill's enactment, which increases to 15 percent beginning in 2014, and then slowly phases them out to zero by 2035.

Transitioning to Cleaner Energy. To invest in clean technology and renewable energy, 10.05 percent of the free allowances are set aside beginning immediately in 2012. The majority of these allowances will go to State Energy and Environmental Development (SEED), which allows state energy offices to allocate the revenue to specified energy efficiency and renewable energy programs. A small portion, 0.5 percent, goes toward more energy-efficient building codes. The free allowances fall to 7.05 percent for 2016 and 2017, 6.03 percent for 2018 to 2021, 1.53 percent for 2022 to 2025, rises back to 8.58 percent from 2026 to 2029, and remains at 5.03 percent thereafter. The auto industry receives 3 percent of the allowances from 2012 to 2017, and 1 percent from 2018 to 2025.

Universities, institutions, and any "Clean Energy Innovation Center," which will study energy-effi-

Renewable Energy Calculations

This study assumes a 430 percent increase in renewable energy by 2035; in 2009, renewable energy generation was 149 terawatt hours.



Source: Heritage Foundation calculations based data from the IHS/Global Insight Energy model.

Chart 3 • CDA 09-04 heritage.org

cient building systems and designs, are awarded 1.05 percent of the allowances beginning in 2012 and lasting until 2050. Eight energy-innovation hubs at universities, private research entities, industry sites, or state institutions that focus on clean-energy technology will receive 0.45 percent of allowances from 2012 through 2050. Worker-assistance programs receive 0.5 percent of the allowances from 2012 through 2021, and 1 percent for 2022 through 2050. For the year 2012 only, 1 percent is designated to early actors, which rewards those who have already taken approaches to reduce carbon dioxide emissions, such as no-till farming and planting trees. The allowance revenue would only be available for entities that publicly stated and reported greenhouse gas reduction goals and demonstrated net reductions. The allowances cover only "reduction activity" that took place between January 1, 2001, and January 1, 2009. To foster the deployment of carbon capture and sequestration (CCS), a relatively untried process that reduces the amount of carbon dioxide emissions from industrial facilities, the bill allocates 1.75 percent of the emission allowances from 2014 through 2017, 4.75 percent from 2018 to 2019, and 5 percent from 2020 through 2050 for installing and operating CCS technologies.

Supplemental Reduction. From 2012 to 2025, 5 percent of the allowance revenue will be allocated for supplemental reduction, such as for funding international forestry products. This falls to 3 percent in 2026, to 2 percent in 2031, and continuing through 2050. Supplemental agriculture and renewable energy receive 0.28 percent of the handouts beginning in 2012 and ending in 2016.

Adaptation Efforts. Domestic adaptation efforts to protect humans, landscapes, and wildlife affected by climate change receive 0.9 percent of the allowances from 2012 through 2021, growing to 1.9 percent in 2022 and to 3.9 percent in 2027. Specifically, 0.1 percent of the allowance handouts will go to the Climate Change Health Protection and Promotion Fund from 2012 to 2050 to protect the health of humans affected by climate change; 0.385 percent and 0.615 percent go to wildlife and natural-resource adaptation distributed to states and the Natural Resources Climate Change Adaptation Fund, respectively. These percentages increase to 0.770 and 1.23, respectively, for the years 2022 to 2026, and increase again to 1.54 percent and 2.46 from 2027 to 2050.

International adaptation to increase resilience as well as reduce vulnerability to climate change and international deployment of clean-energy technologies receive 1 percent each from 2012 to 2021, increasing to 2 percent each year beginning in 2022, and increasing again to 4 percent from 2027 through 2050.

MACROECONOMIC SIMULATION OVERVIEW

In a market-based economy, most effects of a policy are transmitted through price signals that are driven by changes in consumption and production decisions at the micro level. The aggregate impact these changes have on the economy is based on how these price signals interact with other markets and shift the economy's resources. Moving below the baseline means that the economy is operating less efficiently and that the resources in the economy were better utilized under the baseline scenario than under the new policy.

Heritage analysts used the IHS Global Insight long-term macroeconomic model of the U.S. economy to estimate the effects of the Waxman–Markey bill on the overall economy.[2] The simulation was implemented by changing variables in the macroeconomic model according to the changes predicted by a microeconomic model of the energy sector maintained by the CDA (see the section describing the CDA energy model below). In order to estimate the policy impact, three main pieces needed to be simulated: (1) price effects, (2) energy-efficiency (demand) effects, and (3) allowance revenue and allocation effects.

The policy changes in Waxman–Markey affect producer prices in the energy sectors directly through the cost of purchasing allowances and offsets as well as through changes in production needed to reduce emissions.[3] The energy model estimated the change in energy production prices and retail energy prices. These prices were matched with their corresponding variables in the macroeconomic model to estimate the effect these price changes would have on the overall economy.

The energy model projects changes in fuel efficiency and changes in total highway fuel consumption. The corresponding macroeconomic model variables were changed. The effect of these changes helps mitigate some of the total increased consumer expenditure on fuel.

The macroeconomic model does not have specific variables corresponding to the alternative renewable fuel sources in the CDA energy model. The macroeconomic simulation takes into account the increase in domestic alternative-fuel sources by adjusting the amount of imported fuel.

The last piece of the simulation is the allowance revenue component. As discussed above, the value of permits equals the entire value of these permits as government revenue, regardless of whether they are formally auctioned. As much as possible, the revenue allocations followed the details in Henry Waxman and Edward Markey's May 14, 2009, memo "Proposed Allowance Allocation."[4] Any unallocated allowance revenue remained in the federal government's general consumption variable and was thus allocated by the model in ways consistent with the historical pattern of government spending.[5]

THE WAXMAN–MARKEY ENERGY MODEL

To meet the emissions reduction goals of Waxman–Markey, the price of fossil-fuel energy must increase enough to drop the quantity demanded to the target levels. The allowance price is the tax on fossil-fuel energy that causes the price to increase. The allowance tax will be determined as refiners, electric companies, natural gas distributors, and certain other energy users bid against each other for the allowances. As the allowance price increases, these bidders will find it increasingly difficult to pass the costs on to the ultimate consumers, thus they bid for fewer allowances. This, in turn, restricts the amount of fossil fuel that will be consumed and determines the added price consumers must pay for energy.

The amount of CO_2 emitted per unit of energy generated depends on the type of fuel used. The energy model used by the Center for Data Analysis is based on the IHS Global Insight energy module and adds the appropriate cost to each energy source for various allowance prices.[6]

Further, the model incorporates estimates of user responses to price changes (demand elasticity) for natural gas, petroleum products, coal, and electricity. Following a well-known pattern, this responsiveness to price changes grows over time.

---

2. The November 2008 baseline is used for this analysis. Heritage analysts relied on models maintained by IHS Global Insight, Inc., for developing the economic estimates reported in this paper. The IHS Global Insight model is used by private-sector and government economists to estimate how changes in the economy and public policy are likely to affect major economic indicators. The methodologies, assumptions, conclusions, and opinions presented here are entirely the work of analysts at The Heritage Foundation's Center for Data Analysis. They have not been endorsed by, and do not necessarily reflect the views of, the owners of the IHS Global Insight model.
3. Note, even if allowances are not purchased explicitly, but given freely, the producer is now holding an allowance that could be sold and thus carries an opportunity cost. That is, the driver of the cost increases is not the cash payment of allowances, but the constraint on emissions. Contrary to popular belief, giving allowances for "free" does not mitigate this cost.
4. The final legislation passed by the House called for slightly different allocations. While softening the impact for some groups at the expense of others matters for those affected groups, the macroeconomic impact of this rearrangement is not significantly changed. Again, the main driver of the economic impact is the artificial scarcity of emissions that constrains energy production and consumption. Without adequate energy levels, the economy slows down and resources are underused.
5. For a full description and technical details of the simulation see Appendix 1.

In the CDA model, the allowance prices for all years are adjusted until the aggregate amounts of CO_2 emissions from all fuels reaches the target emissions for that year. To account for offsets, the targets are increased by 15 percent above the caps for every year. In the early years, the business-as-usual emissions are greater than the allowances alone, but less than the allowances plus offsets. For those years, the allowance price is set at the estimated world clearing price for offsets—$20 per ton. Beyond the year 2018, the offsets limits are reached and the allowance price rises as the caps become tighter. The allowance price exceeds $120 per ton of CO_2 by 2035.

THE ECONOMIC COSTS OF WAXMAN–MARKEY

The Waxman–Markey bill affects the economy directly through higher prices for carbon-based energy, which reduces quantity demanded and, thus, the quantity supplied of energy from carbon fuels. Energy prices rise because energy producers must pay a fee for each ton of carbon they emit. The fee structure is intended to create an incentive for producers to invest in technologies that reduce carbon emissions during energy production. The bill's sponsors and supporters hope that the fees are sufficiently high to create a strong incentive and demand for cleaner energy production and for the widespread adoption of carbon capture and sequestration technology.

The economic model that CDA analysts used to estimate the bill's broad economic effects treats the fees as a tax on energy producers. Thus, energy prices increase by the amount of the fee or tax. The demand for energy, which largely determines the consumption and, thus, the taxes collected, responds to higher energy prices both directly and indirectly. The direct effect is a reduction in the consumption of carbon-based energy.

The indirect effects are more complex. Generally speaking, the carbon fees reduce the amount of energy used in producing goods and services, which slows the demand for labor and capital and reduces the rate of return on productive capital. This "supply-side" impact exerts the predictable secondary effects on labor and capital income, which depresses consumption.[7]

These are not unexpected effects. Carbon-reduction schemes that depend on fees or taxes attain their goals of lower atmospheric carbon by slowing carbon-based economic activity. Producers and consumers respond to the carbon taxes both by switching to less carbon-intensive production and consumption and by simply reducing production and consumption.

The Heritage study assumes that renewable electricity generation (not including conventional hydro) and biofuels grow by a factor of four between 2010 and 2035. The baseline used in the Heritage analysis already includes significant increases in wind energy, solar power, ethanol, biodiesel, and biomass-derived energy. So, the economic impacts are in addition to the costs of these large baseline increases in alternative energy supply.

With the combined impact of these responses, policymakers can expect results similar to the following economic effects:[8]

Economic Output Declines. The broadest measure of economic activity is the change in GDP after accounting for inflation. GDP measures the dollar value of all goods and services produced in the United States during the year for final sale to consumers. The changes that Waxman–Markey causes

6. Heritage analysts relied on models maintained by IHS Global Insight, Inc., for developing the economic estimates reported in this paper. The IHS Global Insight model is used by private-sector and government economists to estimate how changes in the economy and public policy are likely to affect major economic indicators. The methodologies, assumptions, conclusions, and opinions presented here are entirely the work of analysts at The Heritage Foundation's Center for Data Analysis. They have not been endorsed by, and do not necessarily reflect the views of, the owners of the IHS Global Insight model.

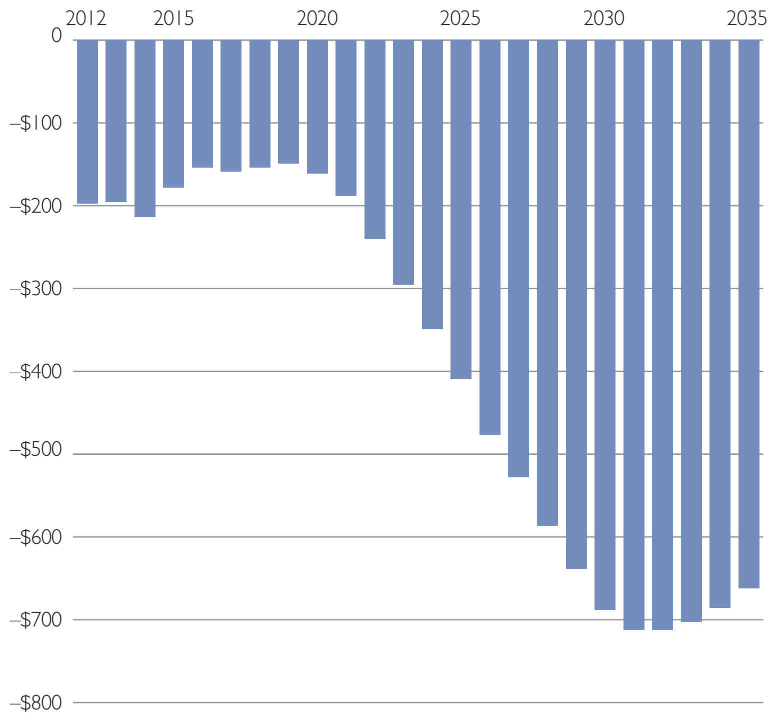
7. This incentive is policy-induced and is not driven by the real fundamental incentive of relative costs to relative benefits. Therefore, artificially increasing the price of carbon-based fuel in order to make alternative fuels more competitive is less efficient. It handicaps a competitive energy source so that a less competitive source has a chance, rather than making the less competitive source more competitive. Arguments that this is creating greater efficiency for clean energy are correct, but they miss the point that relative to the baseline, the economy is being forced to pay more for the same amount of energy or receive less of it, which means there is an overall negative impact on the economy.

8. For detailed results of the simulation, see Appendix 2.

Waxman–Markey Climate Change Bill Would Weaken the Economy

The legislation would reduce the economy by no less than $120 billion in any year, with an average loss of $314 billion from 2012 to 2035 and cumulative losses exceeding $9.4 trillion.

Annual Change in Gross Domestic Product Due to Waxman–Markey Climate Change Bill, in Billions of 2009 Dollars



Source: Heritage Foundation calculations based on the IHS/Global Insight U.S. Macroeconomic model.

Chart 4 • CDA 09-04 heritage.org

in GDP are a broad measure of the altered pattern of all other economic variables.

The initial shock of higher energy prices reduces GDP by nearly $200 billion in each of the first few years. As always, markets strive to counter shocks. Because of the generosity of the offsets, the carbon constraints do not further tighten until 2018 and markets move GDP closer to the higher baseline levels. However, after 2018 the carbon limits put ever increasing pressure on energy markets and GDP losses grow each year. Though the annual losses decrease somewhat after 2032, the Waxman–Markey impact continues to destroy more than $600 billion of GDP value every year until the end year of the Heritage analysis (2035).

Driving energy prices higher is a fundamental feature of cap and trade. It is the higher price of fossil-fuel energy (85 percent of U.S. energy) that forces firms and households to use less of it. There is no allowance-distribution scheme that can lower overall energy costs. Though some allowances given to regulated electric utilities may, at least initially, lower prices for their customers, this would undermine the necessary conservation and force greater costs on other consumers. There will be no net energy price reductions. Further, allowances given to unregulated firms will simply go to the bottom line and not to consumers.

In aggregate, the GDP losses for 2012 to 2035 are $9.4 trillion even after adjusting for inflation.

This slowdown in GDP is seen more dramatically in the slump in manufacturing output. Indeed, by 2020, manufacturing output in this energy-sensitive sector is 2 percent below what it would be if Waxman–Markey never becomes law. By 2035, the manufacturing sector has lost $585 billion in output when compared to the CDA baseline; that is, when compared to the economic world without Waxman–Markey.

Number of Jobs Declines. Though lost GDP is the broadest measure of the economic impact, it often seems a remote measure. Looking beneath the surface of GDP shows the economic reactions to the legislation that led up to the drop in output. The change in employment is one such reaction.

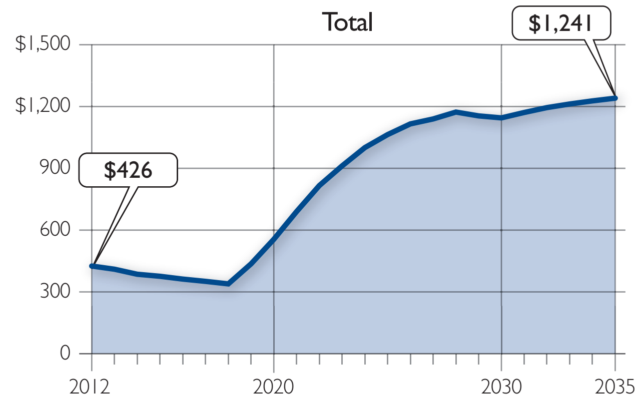
Instead of creating jobs, Waxman–Markey is a job destroyer. Compared to the baseline (a no-Waxman–Markey world), the average year has 1.1 million fewer people working. By 2035, this Waxman–Markey jobs deficit has risen to nearly 2.5 million lost jobs.

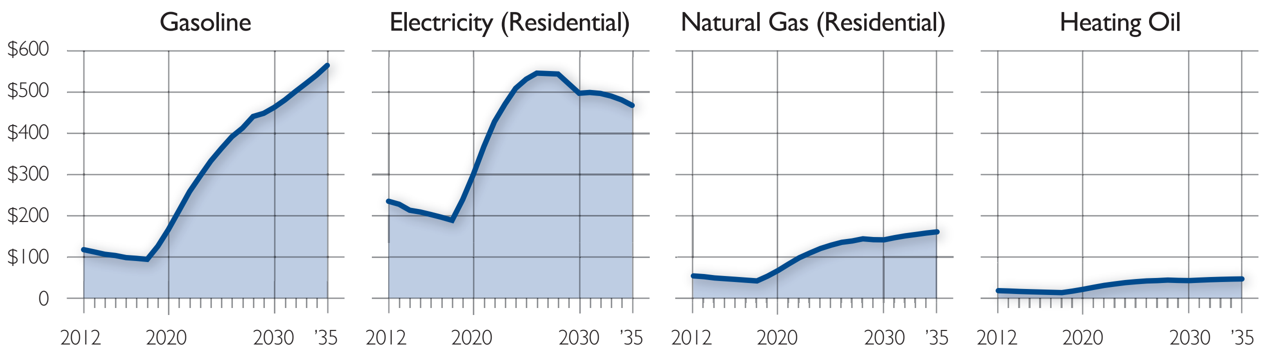
The job losses are widely, but not evenly, distributed. For instance, the construction industry loses 8.5 times as many of its jobs than the economy as a

Waxman–Markey Climate Change Bill Would Increase Energy Costs

The Waxman–Markey climate change bill would increase average total energy costs for a family of four by $426 in 2012. Costs would fall slightly until 2019, when they would begin to rise dramatically. Gasoline and electricity costs alone would cost families $1,033 more per year in 2035.

Total Annual Energy Cost Increases For a Family of Four Due to the Waxman-Markey Climate Change Bill, Adjusted for Inflation in 2009 Dollars





Source: Heritage Foundation calculations based on the IHS/Global Insight U.S. Macroeconomic and Energy models.

Chart 5 • CDA 09-04 heritage.org

whole. The job-loss rate for the textile industry is more than 7.8 times the rate of overall job loss; 4.4 times the overall rate for manufacturing; 5.9 for durable manufacturing; 5.3 for paper products; and 7.1 for wood products.

Because the distribution of energy-intensive jobs across the country is unequal, some states and congressional districts will be hit particularly hard. Notable among the most adversely affected states throughout the duration of the bill are: Wisconsin, Indiana, Minnesota, Iowa, New Hampshire, North Carolina, South Carolina, Idaho, and Alabama. Some states, such as Wyoming, North Dakota, Colorado, and Nebraska are most adversely affected when the policy first takes effect, while other states, such as Michigan, Ohio, and Tennessee, are among the hardest-hit states by 2035.[9]

Energy Prices Rise. The policy-induced higher energy prices, which signal the constraint of energy, are the root cause of the slower economy. As Chart 5 shows, consumer prices for electricity, natural gas, and home heating oil increase significantly between 2015 and 2035. Indeed, by 2035, the total energy bill for a family of four is $1,200 higher than it would be otherwise. Between 2012 and 2035, the total increase in expenditure on energy is nearly $20,000. This increase occurs not only after adjusting for inflation, but also after households have adjusted as well as possible to the higher energy prices.

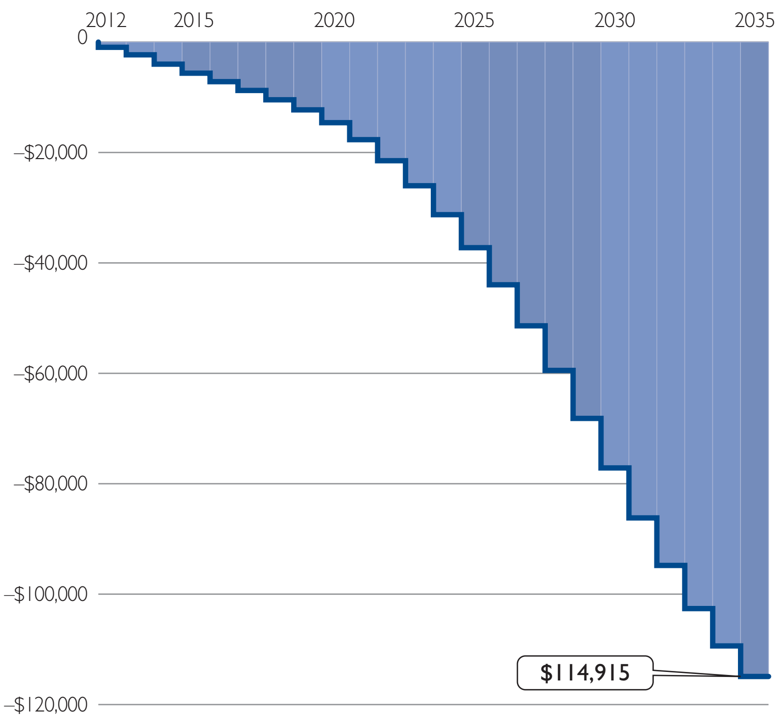
By 2035, Waxman–Markey causes electricity prices to rise 90 percent over and above the rise that would have occurred anyway. By turning thermostats down in winter and up in summer; by purchasing more energy-efficient, but more expensive, appliances; by adding more insulation to houses; by living in smaller houses; and by manifold other changes, U.S. energy consumption is cut by more than 30 percent. Nevertheless, even these cuts are not suffi-

9. For detailed state results of the simulation, see Appendix 3.

Waxman–Markey Climate Change Bill Would Add to Families' Shares of National Debt

The legislation would add every year an average of $5,000 to each family's share of the national debt. By 2035, that share will have grown by nearly $115,000.

Change in Average Share of National Debt for a Family of Four Due to Waxman–Markey Climate Change Bill



Source: Heritage Foundation calculations based on the IHS/Global Insight U.S. Macroeconomic model.

Chart 6 • CDA 09-04 heritage.org

cient to fully offset the price increase for electricity. The net effect is that a family of four will spend $468 more on electricity alone because of Waxman–Markey.

Incomes and Consumption Decline. Higher energy prices also drive up production costs, which must be reflected in product prices. Since higher prices reduce quantities sold, producers produce less. In turn, workers and investors earn less, and household incomes decline. The especially sharp income and employment reductions in the energy-intensive sectors spread and cause declines in demand for other sectors of the economy.

The CDA simulation captures this effect of higher energy prices. Consumption outlays by individuals and households follow the pattern of lower income. In 2012, consumption expenditures are $129 billion lower than they would be in an economic world in which Waxman–Markey is not the law. By 2030, the drop in consumption expenditures reaches $357 billion—$3,823 less per family of four.

Taxes Increase. The allowances created by Waxman–Markey to restrain CO_2 emissions do not create economic value, which is another way of saying that the allowances do not improve the material well-being of Americans. Instead, they are a form of taxation and will be one of the largest taxes collected by the federal government.[10] This tax created by Waxman–Markey will collect $5.7 trillion over the period 2012 to 2035—at a cost of thousands of dollars per year per family.

National Debt Grows. Because the Waxman–Markey cap-and-trade tax reduces income, it reduces the revenues collected from other taxes, such as personal and corporate income taxes. And because the revenue collected from Waxman-Markey is spent, the net effect is to increase the national debt. By 2035, Waxman–Markey will have added 9.1 trillion nominal dollars to the national debt, which amounts to an increased tax liability of $12,803 for every American, or a $51,216 liability for a family of four in today's (2009) dollars.

Climate Impact Does Not Register. Because of market-driven increases in energy efficiency, CO_2 emissions have grown more slowly than has national income for decades in the United States.[11] Contrasted with the moderating growth of American CO_2 emissions, those of the developing world,

10. For a discussion of why the allowances can be considered taxes, see "Congressional Budget Office Cost Estimate: H.R. 2454, American Clean Energy and Security Act of 2009," June 5, 2009, at *http://www.cbo.gov/ftpdocs/102xx/doc10262/hr2454.pdf* (July 25, 2009).

Cost to Americans: Hundreds—or Thousands?

Analyses of the economic impact of Waxman-Markey fall into two basic categories: (1) studies that show annual economic costs to be a few hundred dollars per family per year; and (2) others showing family costs measured in thousands of dollars per year.

These two notable "postage stamp" studies come from the EPA and the Congressional Budget Office.[1] The EPA asserts that Waxman–Markey will reduce household consumption by $98 to $140 per year throughout the duration of the policy. What is never mentioned by those trumpeting this number is what it really means.

First, the EPA employs a technique from the financial world called "discounting" to reduce the value. For example, the EPA estimates that the inflation-adjusted cost per household in 2050 will be $1,287. However, after this value is discounted to the present, the cost is $140 per household.[2] Note that discounting is not done to adjust for inflation—that has already been done. Present-value discounting is a technique for comparing the value of money paid at different points in time. If a household must pay $1,287 in 2050, the $140 represents the amount that household would have to pay into an interest-bearing account today so that the interest would allow it to grow to $1,287 by 2050. Discounting can be a legitimate tool for cost-benefit and investment analysis where costs and benefits are paid and benefits received at different times. Thus, both are discounted to the same point in time and compared. Without discounted environmental impacts for comparison, using the technique, here, does little except undercount the cost that families will actually be paying in 2050.

(continued on next page)

1. Environmental Protection Agency, "EPA Analysis of the American Clean Energy and Security Act of 2009 H.R. 2454 in the 111th Congress," June 23, 2009, at *http://www.epa.gov/climatechange/economics/pdfs/HR2454_Analysis.pdf* (July 25, 2009), and Congressional Budget Office, "The Estimated Costs to Households from the Cap-and-Trade Provisions of H.R. 2454," June 19, 2009, at *http://www.cbo.gov/ftpdocs/103xx/doc10327/06-19-CapAndTradeCosts.pdf* (July 25, 2009).
2. EPA, p. 13.

especially China and India, have been accelerating. China is now the world's largest emitter of CO_2. Because the developing world is so populous and because large segments are finally experiencing the rapid economic growth that perverse economic policies had previously stifled, the growth in CO_2 emissions will swamp the cuts proposed in the U.S. by Waxman–Markey.

Climatologists estimate that Waxman–Markey's impact on world temperature will be too small to even measure in the first several decades. The theoretical moderation of world temperature would be 0.05 degree centigrade by 2050. If CO_2-emission levels meet the Waxman–Markey target of 17 percent of 2005 emissions by the year 2050, and if they are frozen at that level for the rest of the century, Waxman–Markey would still reduce the world temperature by only 0.2 degree Celsius by 2100.

CONCLUSION

The Waxman–Markey bill proposes a new national tax of historic proportions. Though levied directly on carbon-based energy, the tax's impact spreads through the economy, increasing prices, reducing income, destroying jobs, and significantly expanding the national debt.

As with many policies coming from Washington these days, the Waxman–Markey bill seeks to "level the playing field" by making a more competitive player weaker, in this case hamstringing

11. For example, between 2005 and 2006 CO_2 emissions decreased by 1.3 percent, while the U.S. economy grew by 3.3 percent. Only 0.9 percent of the decrease was due to a decrease in overall energy use during this time, which indicates that the U.S. economy is becoming less carbon-intensive even without more mandates. Margo Thorning, "The Impact of America's Climate Security Act of 2007 (S. 2191) on the U.S. Economy and on Global Greenhouse Gas Emissions," testimony before the Committee on Environmental and Public Works, U.S. Senate, November 8, 2007, at *http://www.accf.org/pdf/test-climate-security.pdf* (July 28, 2009).

Second, the EPA measures consumption, not income. The broadest and best measure of cost is lost income—lost GDP. Consumption only comes after taxes and savings are deducted. Ignoring lost savings and lost payments for government services underestimates the costs by about 40 percent.

Third, the EPA measures cost per household. Households are not necessarily families. One person living alone counts as a household, as do three single people sharing an apartment. The EPA uses the average household size of 2.6 people. Converting from this EPA household size to a family of four adds more than 50 percent to the cost estimate.

So, the EPA's $174 cost per household is actually above $2,700 (even after adjusting for inflation) when presented as lost income per family of four. This is not a postage stamp per day.

The CBO study, on the other hand, does not even attempt a comprehensive measure of lost income and it explicitly states so in footnote 3 of its report.[3] In addition, the CBO study assumes that government expenditure of one dollar is the same as not taxing that dollar. Finally, the CBO created an artificial year (2020 in terms of a 2010 economy), which allows it to project a lower tax cost in the first place because the baseline GDP in 2010 is lower than the baseline in 2020. The CBO's methodology effectively measures the administration costs of collecting and distributing the allowances rather than the full economic cost.

Analysts from across the ideological spectrum who estimate comprehensive measures of lost income due to Waxman–Markey find costs that are also measured in thousands of dollars per year. The Heritage estimate for lost GDP in 2020 is $161 billion, which translates to nearly $1,900 per family of four. The CRA International study (conducted for the National Black Chamber of Commerce) and a Brookings Institution study both project costs that translate to about $5,000 per family of four.[4]

3. CBO, p. 4.

4. David Montgomery *et al*., "Impact on the Economy of the American Clean Energy and Security Act of 2009 (H.R.2454)," CRA International, May 2009, at *http://www.nationalbcc.org/images/stories/documents/CRA_Waxman-Markey_%205-20-09_v8.pdf* (July 25, 2009), and Warwick McKibbin, Pete Wilcoxen, and Adele Morris, "Consequences of Cap and Trade," Brookings Institution, June 8, 2009, at *http://www.brookings.edu/~/media/Files/events/2009/0608_climate_change_economy/20090608_climate_change_economy.pdf* (July 25, 2009).

carbon-based energy sources, rather than ensuring an environment where less competitive players can become stronger. This policy hurts everyone, including alternative-energy investors, because it uses resources less efficiently, which creates deadweight losses. This means there will be underused resources leading to fewer opportunities in the future as slower growth reduces the resources available to help power the research and development investments that will create the technologies of the future.

As President Obama said about his cap-and-trade program during the presidential election campaign, "electricity prices would necessarily skyrocket."[12] The same applies to many other prices as the Waxman–Markey energy tax spreads through the economy. Businesses and consumers will adapt as well as possible to these higher prices. They will spend more for less energy. They will build smaller houses and buildings. They will drive smaller, less safe vehicles. They will turn thermostats up in the summer and down in the winter. They will divert income to more expensive energy-saving appliances. But these activities and more will not be enough to offset the higher energy costs. The net effect is lower income, higher prices, and fewer jobs.

In particular, the Heritage analysis projects that by 2035:

- Gasoline prices will rise 58 percent (or $1.38) above the baseline forecast, which already contains price increases;

12. "Obama: My Plan Makes Electricity Rates Skyrocket," YouTube, January 17, 2008, at *http://www.youtube.com/watch?v=HlTxGHn4sH4* (July 25, 2009).

- Natural gas prices will rise 55 percent;
- Heating oil prices will rise 56 percent;
- Electricity prices will rise 90 percent;
- A family of four can expect to pay $1,241 more for energy costs per year;
- Including taxes, a family of four will pay $4,609 more per year;
- A family of four will reduce its consumption of goods and services by up to $3,000 per year, as its income and savings fall;
- Aggregate GDP losses will be $9.4 trillion;
- Job losses will be nearly 2.5 million; and
- The national debt will rise an additional $12,803 per person.

(All figures are in constant 2009 dollars.)

All of these costs will be paid for no more than a 0.2 degree (Celsius) moderation in world temperature increases by 2100, and no more than a 0.05 degree reduction by 2050. Saddling the next generation with higher prices, higher debt, less income, fewer jobs, and more taxes does not seem like a worthy legacy—especially when the purported environmental benefits are so small they can barely be measured.

—David W. Kreutzer, Ph.D., is Senior Policy Analyst for Energy Economics and Climate Change in the Center for Data Analysis; Karen A. Campbell, Ph.D., is Policy Analyst in Macroeconomics in the Center for Data Analysis; William W. Beach is Director of the Center for Data Analysis; Ben Lieberman is Senior Policy Analyst in Energy and the Environment in the Thomas A. Roe Institute for Economic Policy Studies; and Nicolas D. Loris is a Research Assistant in the Thomas A. Roe Institute for Economic Policy Studies, at The Heritage Foundation.

APPENDIX 1
METHODOLOGICAL APPENDIX

IHS/Global Insight Long-Term U.S. Macroeconomic Model

The IHS/Global Insight long-term U.S. macroeconomic model is a large-scale 30-year (120-quarter) macroeconometric model of the U.S. economy. It is used primarily for commercial forecasting.

Over the years, analysts at The Heritage Foundation's Center for Data Analysis (CDA) have worked with economists at Global Insight (GI) to adapt the GI model to policy analysis. CDA analysts use the GI model to evaluate the effects of policy changes not only on disposable income and consumption in the short run, but also on the economy's long-run supply-side potential. They can do so because the GI model imposes the long-run structure of a neoclassical growth model but makes short-run fluctuations in aggregate demand a focus of analysis.

The Global Insight model can be used to forecast more than 1,400 macroeconomic aggregates. Those aggregates describe final demand, aggregate supply, incomes, industry production, interest rates, and financial flows in the U.S. economy. The GI model includes such a wealth of information about the effects of important changes in the economic and policy environment because it encompasses detailed modeling of consumer spending, residential and non-residential investment, government spending, personal and corporate incomes, federal (and state and local) tax revenues, trade flows, financial markets, inflation, and potential gross domestic product.

Consistent with the rational-expectations hypothesis, economic decision-making in the GI model is generally forward-looking. In some cases, Global Insight assumes that expectations are largely a function of past experience and recent changes in the economy. Such a retroactive approach is taken in the model because GI believes that expectations change little in advance of actual changes in the economic and policy variables about which economic decision makers form expectations.

Operation of the U.S. Macroeconomic Model

The policy changes contained in Waxman–Markey and simulated in the U.S. energy model (as described in the paper) resulted in changes in the U.S. macroeconomic model of energy-price variables, energy use and demand variables, and government revenue and spending variables. The changes predicted by the energy model were introduced into the macro model in order to simulate the overall economic impact of the Waxman–Markey bill. In order to mitigate differences in scale and baseline assumptions between the energy model variables and the corresponding macroeconomic variables, the percentage changes in variables predicted by the energy model, rather than the new value, were imposed on their macroeconomic variable counterparts. These changes were implemented in the following ways:

Energy Price Effects. The macro model contains a host of prices that are changed through their interaction with other variables in this model. The policy changes in Waxman–Markey affect the prices that consumers pay for energy and the prices that producers in the energy sectors pay for their inputs directly. The direct microeconomic impact of the legislation is thus simulated by the microeconomic model of the energy sector. (The energy model is described in the main text.) The direct micro effect is then used to change the macro model in order to simulate the net economic effect on the macro economy induced by the far-reaching ripple effects of the microeconomic changes to the energy sector.

Price changes simulated by the energy model for the producer prices were used to adjust the corresponding variables in the macro model. The prices that energy-sector producers pay were then made exogenous; thus these prices were driven by the energy-model simulation. The following producer-price categories were affected: coal, natural gas, electricity, natural gas, petroleum products, and residual fuel oil.

CDA analysts employed a similar procedure in implementing changes in consumer prices. In this case, the variables affected were all consumption-price deflators. Once again, we substituted changes predicted by the energy-model simulation for these variables for their macro-model counterparts. The following consumption price deflators were affected: fuel oil and coal, gasoline, electricity, and natural gas.

Unlike in the Lieberman–Warner climate-change bill, the energy model simulation of Waxman–Markey did not predict changes for major macroeconomic cost drivers: West Texas Intermediate Crude Spot Price, Refiners' Average Cost of Crude Oil (domestic and imported), Henry Hub Spot Price, and Natural Gas Wellhead Price. These prices are largely affected by the imported price of crude oil. Instead, the Waxman–Markey legislation influences market prices further down the domestic production line where emissions constraints are binding.

Energy Consumption Effects. In theory, higher energy prices could be driven by increased energy demand. Thus, CDA analysts adjusted the macroeconomic model to account for decreases in the demand for carbon-based fuels. The changes that were made for the variables total energy consumption, total end-use consumption for petroleum, total end-use consumption for natural gas, total end-use consumption for coal, and total end-use consumption for electricity were again obtained from the energy model simulation.

Both the energy model and the macro model contain equations that predict changes in demand for energy, given changes in energy prices, but the energy model contains a more detailed treatment of demand. Preferring details over generality, CDA analysts lined up the demand equations in both models and substituted settings from the energy model for those in the macro model. Specifically, analysts lined up these demand equations:

- Total energy consumption,
- Total end-use consumption for petroleum,
- Total end-use consumption for natural gas,
- Total end-use consumption for coal, and
- Total end-use consumption for electricity.

In addition to the consumption price effects, overall spending is influenced by changes in fuel efficiency. The energy model predicts changes in fuel efficiency and changes in total highway fuel consumption. The macro model variables for average miles per gallon of new light vehicles and the average miles per gallon of the light vehicle stock were changed according to the change predicted by the energy model. The highway consumption of fuel was adjusted by an average of the change simulated in the energy model of highway consumption of fuel by cars and light trucks.

Renewable Energy Production. The energy model predicted changes in renewable sources. These energy supplies would affect market prices for energy, albeit the macro model does not have an explicit price deflator for renewable energy. The effect of domestic renewable sources of energy would also influence the amount of oil imported. The macro model adjusts differences between supply and demand in energy by affecting imports through a residual variable that is exogenous in the model. This means that the model would not account for substitutions in supply and would incorrectly increase imports by the decrease in traditional sources of domestic energy. Thus this residual value was changed in the macro model according to the changes estimated by the energy model for the new level of imports, domestic production (both renewable and nonrenewable), and domestic consumption. This allowed the macroeconomic simulation to implicitly take account of the increase in alternative fuel source supply.

Revenue Estimates. The energy model produces estimates of carbon emissions and of the carbon fee in dollars per metric ton. By multiplying the emissions by the carbon fee, analysts obtained the "revenue" from the emissions permits.

Heritage analysts assumed that the revenue value of permits equals the entire value of these permits as government revenue, regardless of whether they are formally auctioned. If the government chooses to transfer ownership of the permits to other entities, that would be reflected as a transfer payment in the national income accounts. The allocation of the value of this revenue is a source of much debate among the legislators. Heritage analysts allocated the revenue as much as possible, given the sparse detail in the memo "Proposed Allowance Allocation" by Chairman Henry A. Waxman and Chairman Edward J. Markey dated May 14, 2009. Any unallocated allowance revenue remained in the federal government's general consumption variable and was thus allocated by the model in ways consistent with the historical pattern of government spending.

Specifically, the allowance value was transferred to individuals in the form of non-Medicare or Social Security full-employment transfers (as opposed to an aid transfer driven by an economic downturn like an unemployment benefit transfer). The various transfers specified in the memo amounted to 15.5 percent of the value transferred until 2021, and 16 percent of the value transferred to individuals thereafter.

Revenues allocated to state and local governments were more complicated. These were: 11.5 percent in

2012 to 2015; 9 percent in 2016 to 2017; 8 percent in 2018 to 2021; 6.5 percent in 2022 to 2025; 6 percent in 2026; 5.75 percent in 2027; 5.5 percent in 2028; 5.25 percent in 2029; and 5 percent in 2030 to 2035.

The state and local transfers were then allocated as transfers of aid to individuals in the amount of 1.5 percent of state funds through 2030. The remaining allowance value that was given to states and not transferred to individuals was put in the state and local general consumption variable and allocated by the macro model according to the historical pattern used for these funds. (At the state and local levels these historical uses are largely additional transfers to individuals.)

The macro model would have deficit-financed this increased spending rather than recognize the value as being generated by the allowances purchased (explicitly or implicitly) in the private sector. The variable for federal government tax receipts on production and imports other than from a value-added tax was increased by the value of the allowances to account for the increased revenue generation. This allowed the macro model to more accurately forecast the likely debt burden, interest rate effects, and so on, as well as the tax burden on the private sector by this transfer to government.

Monetary Policy. The monetary policy variable in the macro model was turned on, dictating that monetary policy would be adjusted according to a Taylor-type rule over the forecast horizon. The Taylor rule adjusts the federal funds rate in an effort to keep inflation low and minimize any gap between potential GDP and real GDP. This reaction helps to mitigate the harmful economic and inflationary effects of the legislation.

APPENDIX 2
KEY ECONOMIC INDICATORS

How Waxman–Markey Would Affect Key Economic Indicators

	2012	2014	2016	2018	2020	2022	2024	2026	2028	2030	2032	2034	2035	2012–2035 Average
Gross Domestic Product, *in Billions of Inflation-Adjusted Dollars Indexed to the 2000 Price Level*														
Forecast	$12,280.1	$13,040.4	$13,908.6	$14,694.3	$15,511.0	$16,235.2	$16,967.9	$17,767.2	$18,567.3	$19,409.0	$20,353.4	$21,415.3	$21,986.4	$16,891.9
Baseline	$12,438.0	$13,211.1	$14,031.7	$14,817.4	$15,640.0	$16,427.2	$17,247.0	$18,148.3	$19,036.3	$19,959.1	$20,923.1	$21,963.6	$22,515.8	$17,206.3
Difference	**–$157.9**	**–$170.7**	**–$123.2**	**–$123.1**	**–$129.0**	**–$192.0**	**–$279.0**	**–$381.1**	**–$469.0**	**–$550.1**	**–$569.8**	**–$548.3**	**–$529.4**	**–$314.4**
Real GDP Growth Rate, *Percent Change from Year Ago*														
Forecast	4.3	2.9	3.2	2.8	2.7	2.2	2.2	2.3	2.2	2.3	2.4	2.6	2.7	2.6
Baseline	3.5	2.9	3.0	2.8	2.7	2.5	2.5	2.6	2.4	2.4	2.4	2.5	2.5	2.6
Difference	**0.8**	**–0.1**	**0.2**	**0.1**	**0.0**	**–0.2**	**–0.2**	**–0.3**	**–0.2**	**–0.1**	**0.1**	**0.1**	**0.2**	**0.0**
Total Employment, *in Thousands of Jobs*														
Forecast	137,542.0	142,897.4	147,270.5	150,348.5	153,007.4	155,363.0	157,654.3	159,884.2	162,110.4	164,233.9	166,801.3	169,450.7	170,725.9	156,286.6
Baseline	139,433.4	144,126.5	147,803.3	150,608.8	153,042.4	155,515.8	158,198.1	160,914.4	163,565.8	166,145.5	169,048.3	171,875.7	173,205.2	157,432.4
Difference	**–1,891.4**	**–1,229.1**	**–532.8**	**–260.3**	**–35.0**	**–152.8**	**–543.8**	**–1,030.2**	**–1,455.4**	**–1,911.6**	**–2,246.9**	**–2,425.0**	**–2,479.3**	**–1,145.8**
Private Employment, *in Thousands of Jobs*														
Forecast	115,264.5	119,992.9	123,894.7	126,666.5	128,981.1	131,255.1	133,428.5	135,544.3	137,677.2	139,658.2	142,214.0	144,724.2	145,918.3	132,295.5
Baseline	116,931.9	121,142.5	124,496.2	127,031.5	129,094.8	131,425.9	133,867.4	136,313.5	138,701.0	140,974.6	143,729.3	146,343.0	147,576.1	133,183.8
Difference	**–1,667.4**	**–1,149.7**	**–601.6**	**–365.0**	**–113.7**	**–170.8**	**–438.9**	**–769.2**	**–1,023.8**	**–1,316.4**	**–1,515.3**	**–1,618.8**	**–1,657.8**	**–888.3**
Unemployment Rate, *Percent of Civilian Labor Force*														
Forecast	7.5	6.2	5.2	4.7	4.5	4.6	4.8	5.1	5.3	5.5	5.6	5.7	5.7	5.3
Baseline	7.3	6.2	5.5	5.0	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	5.2
Difference	**0.3**	**0.0**	**–0.3**	**–0.3**	**–0.4**	**–0.2**	**0.0**	**0.2**	**0.4**	**0.6**	**0.7**	**0.8**	**0.8**	**0.2**
Disposable Personal Income, *in Billions of Inflation-Adjusted Dollars Indexed to the 2000 Price Level*														
Forecast	$9,226.8	$9,832.9	$10,612.2	$11,306.0	$12,071.3	$12,777.8	$13,478.2	$14,219.6	$14,991.2	$15,785.0	$16,593.2	$17,397.6	$17,800.8	$13,376.9
Baseline	$9,432.5	$10,024.3	$10,755.7	$11,427.6	$12,187.6	$12,892.7	$13,598.4	$14,339.6	$15,094.3	$15,867.3	$16,655.8	$17,465.4	$17,881.3	$13,494.5
Difference	**–$205.7**	**–$191.4**	**–$143.5**	**–$121.6**	**–$116.3**	**–$114.9**	**–$120.2**	**–$120.0**	**–$103.1**	**–$82.2**	**–$62.6**	**–$67.9**	**–$80.5**	**–$117.5**
Disposable Income Per Capita, *in Inflation-Adjusted Dollars Indexed to the 2000 Price Level*														
Forecast	$29,138.6	$30,461.1	$32,251.0	$33,711.6	$35,316.3	$36,686.6	$37,987.6	$39,355.4	$40,757.5	$42,171.5	$43,575.7	$44,922.7	$45,581.7	$37,550.9
Baseline	$29,788.3	$31,054.0	$32,687.1	$34,074.1	$35,656.7	$37,016.5	$38,326.3	$39,687.4	$41,037.8	$42,391.3	$43,740.1	$45,097.9	$45,787.8	$37,891.4
Difference Per Person	**–$649.7**	**–$592.8**	**–$436.1**	**–$362.6**	**–$340.4**	**–$329.9**	**–$338.7**	**–$332.0**	**–$280.3**	**–$219.7**	**–$164.4**	**–$175.2**	**–$206.1**	**–$340.5**
Difference for Family of Four	**–$2,598.8**	**–$2,371.4**	**–$1,744.4**	**–$1,450.3**	**–$1,361.6**	**–$1,319.6**	**–$1,354.8**	**–$1,327.9**	**–$1,121.2**	**–$878.9**	**–$657.6**	**–$700.8**	**–$824.5**	**–$1,362.1**
Personal Consumption Expenditures, *in Billions of Inflation-Adjusted Dollars Indexed to the 2000 Price Level*														
Forecast	$8,701.1	$9,167.8	$9,783.0	$10,352.4	$10,927.5	$11,461.2	$11,992.5	$12,565.5	$13,172.9	$13,814.1	$14,524.5	$15,284.5	$15,670.4	$11,963.7
Baseline	$8,804.3	$9,283.6	$9,866.2	$10,434.0	$11,034.1	$11,615.4	$12,199.8	$12,816.8	$13,450.3	$14,099.9	$14,781.2	$15,498.5	$15,866.3	$12,143.7
Difference	**–$103.2**	**–$115.8**	**–$83.2**	**–$81.6**	**–$106.6**	**–$154.3**	**–$207.3**	**–$251.3**	**–$277.3**	**–$285.8**	**–$256.7**	**–$214.0**	**–$195.9**	**–$180.0**
Personal Savings, *in Billions of Inflation-Adjusted Dollars Indexed to the 2000 Price Level*														
Forecast	$174.6	$267.6	$383.9	$481.8	$647.5	$806.9	$965.1	$1,123.7	$1,276.7	$1,418.6	$1,504.2	$1,536.2	$1,547.4	$911.6
Baseline	$268.3	$335.1	$443.0	$522.9	$658.4	$766.5	$873.5	$983.1	$1,088.1	$1,195.4	$1,285.1	$1,359.2	$1,398.1	$838.5
Difference	**–$93.7**	**–$67.5**	**–$59.1**	**–$41.0**	**–$10.9**	**$40.4**	**$91.6**	**$140.6**	**$188.6**	**$223.2**	**$219.1**	**$177.0**	**$149.3**	**$73.0**

Sources: Heritage Foundation calculations based on data from the IHS/Global Insight U.S. Macroeconomic model.

Table A2-1 • CDA 09-04 heritage.org

How Waxman–Markey Would Affect Other Economic Indicators

More Economic Indicators	2012	2014	2016	2018	2020	2022	2024	2026	2028	2030	2032	2034	2035	2012–2035 Average
Personal Savings Rate, *Percent of Disposable Personal Income*														
Forecast	1.9	2.7	3.6	4.3	5.4	6.4	7.2	8.0	8.6	9.1	9.1	8.9	8.7	6.4
Baseline	2.9	3.4	4.2	4.6	5.5	6.0	6.5	6.9	7.2	7.5	7.7	7.7	7.8	5.9
Difference	**–1.0**	**–0.6**	**–0.5**	**–0.3**	**0.0**	**0.4**	**0.8**	**1.1**	**1.4**	**1.5**	**1.4**	**1.1**	**1.0**	**0.5**
Gross Private Domestic Investment, *in Billions of Inflation-Adjusted Dollars Indexed to the 2000 Price Level*														
Forecast	$1,872.7	$2,099.2	$2,311.2	$2,426.8	$2,546.6	$2,649.2	$2,803.5	$3,020.5	$3,236.8	$3,498.1	$3,829.5	$4,178.3	$4,363.3	$2,928.7
Baseline	$1,934.0	$2,183.4	$2,375.9	$2,506.6	$2,645.5	$2,782.5	$2,948.5	$3,161.5	$3,347.5	$3,559.1	$3,805.2	$4,067.5	$4,212.0	$2,993.6
Difference	**–$61.3**	**–$84.2**	**–$64.7**	**–$79.8**	**–$98.9**	**–$133.3**	**–$145.0**	**–$141.0**	**–$110.7**	**–$61.0**	**$24.4**	**$110.8**	**$151.3**	**–$64.8**
Non-Residential Fixed Investment, *in Billions of Inflation-Adjusted Dollars Indexed to the 2000 Price Level*														
Forecast	$1,405.7	$1,614.7	$1,771.3	$1,906.0	$2,054.6	$2,219.5	$2,412.5	$2,651.8	$2,918.4	$3,222.0	$3,586.6	$3,979.2	$4,185.0	$2,540.9
Baseline	$1,481.9	$1,685.5	$1,841.2	$1,985.4	$2,138.7	$2,318.7	$2,514.0	$2,739.9	$2,971.6	$3,224.4	$3,514.7	$3,826.1	$3,992.6	$2,575.7
Difference	**–$76.2**	**–$70.8**	**–$69.9**	**–$79.5**	**–$84.0**	**–$99.2**	**–$101.4**	**–$88.0**	**–$53.2**	**–$2.4**	**$71.9**	**$153.0**	**$192.4**	**–$34.9**
Residential Fixed Investment, *in Billions of Inflation-Adjusted Dollars Indexed to the 2000 Price Level*														
Forecast	$430.5	$493.0	$533.4	$535.3	$528.8	$503.8	$493.1	$499.9	$493.5	$495.2	$508.8	$522.3	$532.0	$505.4
Baseline	$436.6	$499.3	$534.1	$538.8	$542.2	$528.4	$524.3	$534.3	$527.5	$524.4	$526.7	$527.9	$532.5	$522.7
Difference	**–$6.0**	**–$6.4**	**–$0.7**	**–$3.6**	**–$13.4**	**–$24.6**	**–$31.2**	**–$34.4**	**–$34.0**	**–$29.2**	**–$17.9**	**–$5.5**	**–$0.5**	**–$17.3**
Change in the Stock of Business Inventories, *in Billions of Inflation-Adjusted Dollars Indexed to the 2000 Price Level*														
Forecast	$69.8	$31.5	$51.9	$45.2	$42.6	$35.4	$38.6	$42.4	$44.6	$50.9	$61.1	$68.0	$70.4	$48.7
Baseline	$53.8	$41.8	$50.6	$46.4	$45.5	$44.1	$47.4	$53.5	$54.4	$60.1	$63.4	$69.9	$71.9	$52.8
Difference	$16.1	–$10.3	$1.2	–$1.2	–$2.9	–$8.7	–$8.8	–$11.1	–$9.8	–$9.3	–$2.4	–$1.9	–$1.5	–$4.1
Full-Employment Capital Stock, *in Billions of Inflation-Adjusted Dollars Indexed to the 2000 Price Level*														
Forecast	$14,607.0	$15,330.3	$16,178.1	$17,130.3	$18,133.2	$19,224.8	$20,419.8	$21,774.4	$23,288.4	$24,986.6	$26,900.6	$28,995.8	$30,100.4	$20,918.6
Baseline	$14,843.4	$15,734.5	$16,722.7	$17,778.4	$18,876.8	$20,045.0	$21,285.6	$22,619.6	$24,044.0	$25,569.5	$27,223.3	$29,000.0	$29,936.9	$21,473.8
Difference	**–$236.4**	**–$404.2**	**–$544.5**	**–$648.0**	**–$743.6**	**–$820.2**	**–$865.8**	**–$845.2**	**–$755.6**	**–$582.9**	**–$322.8**	**–$4.1**	**$163.5**	**–$555.2**
Consumer Price Index, *Percent Change from Year Ago*														
Forecast	3.0	2.2	2.0	2.2	2.7	3.1	3.2	3.1	3.1	2.9	2.4	2.0	1.9	2.6
Baseline	2.5	2.4	2.0	2.1	2.0	2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.1
Difference	**0.5**	**–0.2**	**–0.1**	**0.1**	**0.7**	**1.0**	**1.1**	**1.1**	**1.1**	**0.8**	**0.3**	**0.0**	**–0.2**	**0.5**
Treasury Bill – 3 Month, *Annualized Percent*														
Forecast	4.2	4.5	4.7	4.9	5.5	5.9	6.0	5.9	5.8	5.4	4.7	4.1	3.8	5.1
Baseline	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6
Difference	**–0.4**	**–0.1**	**0.1**	**0.3**	**0.9**	**1.3**	**1.4**	**1.3**	**1.2**	**0.8**	**0.2**	**–0.5**	**–0.8**	**0.5**
Treasury Bond – 10 Year, *Annualized Percent*														
Forecast	5.5	5.5	5.6	5.7	6.2	6.5	6.6	6.6	6.6	6.3	5.8	5.3	5.1	6.0
Baseline	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4
Difference	**0.0**	**0.1**	**0.2**	**0.3**	**0.7**	**1.1**	**1.2**	**1.2**	**1.1**	**0.9**	**0.4**	**–0.1**	**–0.3**	**0.6**

Sources: Heritage Foundation calculations based on data from the IHS/Global Insight U.S. Macroeconomic model.

Table A2-2 • CDA 09-04 heritage.org

How Waxman–Markey Would Affect Other Economic Indicators (cont.)

	2012	2014	2016	2018	2020	2022	2024	2026	2028	2030	2032	2034	2035	2012–2035 Average
Household Net Worth, *in Billions of Inflation-Adjusted Dollars Indexed to the 2000 Price Level*														
Forecast	$45,946.0	$50,441.0	$55,864.1	$61,013.8	$66,054.7	$70,785.9	$75,563.8	$80,977.4	$86,801.1	$93,010.7	$100,127.9	$107,947.3	$112,177.6	$75,998.2
Baseline	$46,373.6	$50,848.6	$56,195.4	$61,340.8	$66,533.0	$71,566.1	$76,688.0	$82,490.9	$88,681.0	$95,148.8	$102,296.9	$109,988.1	$114,123.1	$77,163.8
Difference	–$427.6	–$407.7	–$331.3	–$327.0	–$478.3	–$780.2	–$1,124.2	–$1,513.5	–$1,879.8	–$2,138.1	–$2,168.9	–$2,040.8	–$1,945.5	–$1,165.7
After-Tax Hourly Compensation in the Private Sector, *in Inflation Adjusted Dollars*														
Forecast	$17.9	$18.2	$18.8	$19.4	$20.0	$20.4	$20.9	$21.4	$21.9	$22.5	$23.1	$23.6	$23.9	$20.8
Baseline	$18.1	$18.5	$19.1	$19.7	$20.3	$20.8	$21.4	$21.9	$22.5	$23.0	$23.5	$24.1	$24.3	$21.2
Difference	**–$0.2**	**–$0.3**	**–$0.3**	**–$0.3**	**–$0.3**	**–$0.4**	**–$0.5**	**–$0.5**	**–$0.5**	**–$0.5**	**–$0.5**	**–$0.4**	**–$0.4**	**–$0.4**
Total Manufacturing Employment, *in Millions*														
Forecast	12.1	12.8	12.8	12.9	12.8	12.5	12.1	11.6	11.1	10.7	10.3	9.9	9.8	11.8
Baseline	12.4	12.8	12.8	12.8	12.7	12.4	12.2	11.9	11.7	11.5	11.4	11.2	11.2	12.1
Difference	**–0.3**	**0.0**	**0.1**	**0.1**	**0.2**	**0.1**	**–0.1**	**–0.3**	**–0.6**	**–0.9**	**–1.1**	**–1.3**	**–1.4**	**–0.4**
Real Gross Private Investment in Mines and Wells, *in Billions of Inflation-Adjusted Dollars Indexed to the 2000 Price Level*														
Forecast	$22.4	$22.8	$20.8	$19.9	$19.7	$20.4	$20.8	$21.2	$21.1	$20.8	$20.7	$20.3	$20.3	$20.8
Baseline	$35.9	$37.2	$35.5	$34.7	$33.0	$32.5	$32.2	$32.8	$32.6	$32.3	$32.2	$31.5	$31.4	$33.4
Difference	**–$13.5**	**–$14.4**	**–$14.8**	**–$14.8**	**–$13.2**	**–$12.1**	**–$11.4**	**–$11.6**	**–$11.6**	**–$11.5**	**–$11.5**	**–$11.2**	**–$11.1**	**–$12.6**
Durable Manufacturing Employment, *in Millions*														
Forecast	7.7	8.3	8.3	8.3	8.2	8.0	7.6	7.3	6.9	6.6	6.3	6.0	5.9	7.4
Baseline	7.9	8.2	8.2	8.2	8.1	7.9	7.7	7.5	7.4	7.3	7.2	7.1	7.1	7.7
Difference	**–0.2**	**0.0**	**0.1**	**0.1**	**0.2**	**0.1**	**–0.1**	**–0.3**	**–0.5**	**–0.7**	**–1.0**	**–1.1**	**–1.2**	**–0.3**
Non Durable Manufacturing Employment, *in Millions*														
Forecast	4.8	4.5	4.5	4.6	4.6	4.6	4.5	4.3	4.2	4.1	4.0	3.9	3.8	4.3
Baseline	4.8	4.6	4.6	4.6	4.6	4.6	4.5	4.4	4.3	4.3	4.2	4.1	4.1	4.4
Difference	**–0.1**	**–0.1**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**–0.1**	**–0.1**	**–0.1**	**–0.2**	**–0.2**	**–0.2**	**–0.1**

Sources: Heritage Foundation calculations based on data from the IHS/Global Insight U.S. Macroeconomic model.

Table A2-3 • CDA 09-04 heritage.org

APPENDIX 3
STATE RESULTS

How the Waxman–Markey Bill Would Affect the States

	Average Personal Income Loss, 2012–2035 (in Millions)	Average GDP Loss, 2012–2035 (in Millions)	Average Non-Farm Job Loss, 2012–2035
Alabama	–$1,524	–$3,793	–19,090
Alaska	–$293	–$1,019	–2,051
Arizona	–$2,069	–$5,652	–24,472
Arkansas	–$868	–$2,182	–10,807
California	–$15,268	–$41,481	–134,396
Colorado	–$2,043	–$5,407	–19,870
Connecticut	–$1,910	–$4,948	–13,649
Delaware	–$347	–$1,376	–3,265
District of Columbia	–$376	–$2,147	–529
Florida	–$6,920	–$16,806	–66,938
Georgia	–$3,191	–$9,072	–38,389
Hawaii	–$507	–$1,408	–3,738
Idaho	–$475	–$1,170	–6,534
Illinois	–$5,318	–$13,947	–50,178
Indiana	–$2,107	–$5,639	–29,154
Iowa	–$1,070	–$2,952	–13,395
Kansas	–$1,036	–$2,684	–11,136
Kentucky	–$1,322	–$3,528	–16,254
Louisiana	–$1,564	–$4,945	–15,438
Maine	–$454	–$1,101	–5,209
Maryland	–$2,641	–$6,148	–17,781
Massachusetts	–$3,207	–$8,043	–21,810
Michigan	–$3,417	–$8,739	–39,445
Minnesota	–$2,173	–$5,834	–22,963
Mississippi	–$842	–$2,026	–10,694
Missouri	–$2,026	–$5,250	–23,058
Montana	–$323	–$784	–3,438
Nebraska	–$652	–$1,833	–7,137
Nevada	–$1,017	–$2,911	–9,279
New Hampshire	–$546	–$1,312	–6,060
New Jersey	–$4,291	–$10,650	–30,685
New Mexico	–$621	–$1,743	–6,209
New York	–$9,101	–$25,237	–55,878
North Carolina	–$3,091	–$9,139	–38,907
North Dakota	–$245	–$634	–2,361
Ohio	–$3,966	–$10,669	–46,065
Oklahoma	–$1,317	–$3,188	–12,622
Oregon	–$1,325	–$3,620	–15,644
Pennsylvania	–$4,888	–$12,152	–46,762
Rhode Island	–$417	–$1,073	–3,870
South Carolina	–$1,389	–$3,497	–18,572
South Dakota	–$291	–$776	–2,718
Tennessee	–$2,074	–$5,580	–25,628
Texas	–$9,187	–$26,128	–94,041
Utah	–$806	–$2,417	–11,170
Vermont	–$235	–$562	–2,667
Virginia	–$3,247	–$8,762	–26,604
Washington	–$2,697	–$7,122	–25,718
West Virginia	–$549	–$1,320	–5,611
Wisconsin	–$2,040	–$5,315	–26,759
Wyoming	–$258	–$721	–1,949

Source: Heritage Foundation calculations based on data from American Community Survey; Bureau of Economic Analysis, U.S. Department of Commerce; and the IHS/Global Insight U.S. Macroeconomic model.

Table A3 • CDA 09-04 heritage.org