# WHO BENEFITS FROM FREE EMISSION ALLOWANCES? AN ECONOMIC ANALYSIS OF THE WAXMAN-MARKEY CAP-AND-TRADE PROGRAM

by

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Chamberlain Economics Policy Study No. 2009-07

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September 2009

ABSTRACT

Recent Congressional Budget Office (CBO) estimates of H.R. 2454, the "American Clean Energy and Security Act of 2009," suggest the bill's costs would be progressive across income groups. However, the analysis relies on assumptions about the incidence of free emission" allowances" that are not supported by microeconomic theory. We provide alternative estimates of the costs faced by U.S. households from the legislation. We find the bill—both on a gross and net basis—to be regressive, imposing the largest burdens on low- and middle-income households. On a gross basis, the bill would cost $106 billion per year or $892 per household, ranging from $451 to $1,531 depending on income. On a net basis, households in the four lowest-earning quintiles would pay between $31 and $512 per year, while households in the highest-earning quintile would actually profit by $604 per year—effectively redistributing roughly $14 billion per year to the highest-earning households in the U.S. We also examine the bill's distribution of free allowances to various industries, finding that the legislation is likely to generate large windfall profits for various politically favored industries at the expense of U.S. consumers. As debate over climate policy moves to the U.S. Senate, lawmakers should be wary of these flaws in the structure of the Waxman-Markey cap-and-trade bill.

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# I. INTRODUCTION

By a narrow vote of 219 to 212, the U.S. House of Representatives recently approved H.R. 2454, the "American Clean Energy and Security Act of 2009."[1] The bill's passage marks a significant shift in U.S. climate policy and a major legislative step toward a comprehensive cap-and-trade system aimed at curbing U.S. greenhouse gas emissions.

A key feature of any cap-and-trade program is the way emission allowances are distributed. Lawmakers generally face two options: allowances may be either auctioned or distributed freely to companies and organizations. Most economists agree that auctioning is a superior approach, for many of the same reasons that they view an emissions tax to be a superior—although more politically treacherous—approach to cap-and-trade with full auctioning. As with an emissions tax, auctioned emission allowances help limit the potential for political abuse by ensuring the right to emit regulated gasses goes to firms that value them most, rather than firms favored by lawmakers. Additionally, auctions generate revenue that governments can use to offset the costs of the program to low- and middle-income households through marginal tax-rate reductions or other fiscal mechanisms.

Against the advice of policy experts across the political spectrum—including Greenpeace[2], Friends of the Earth[3], and even former Congressional Budget Office Director Peter R. Orszag—the Waxman-Markey bill distributes the overwhelming majority of emission allowances free of charge to various industry groups, state-local government agencies, and others. This aspect of the bill is hard to defend on either fairness or efficiency grounds, as it would establish a system that would transfer hundreds of billions of dollars from American consumers, taxpayers, and non-favored industries into the hands of a select group of politically favored firms and organizations for decades.

In this study, we explore the economic consequences of this free distribution of allowances under Waxman-Markey. Specifically, we analyze two aspects of the bill: (1) how the household costs of the bill are made more regressive toward low- and middle-income families by free distribution of allowances and (2) how free allowances generate large and unearned ("windfall") economic profits for politically favored industries at the expense of consumers and other non-favored industries.

The goal of this study is to illustrate to lawmakers the cost that U.S. households will bear if Congress enacts the existing Waxman-Markey bill.

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[1] See H.R. 2454, "American Clean Energy and Security Act of 2009."

[2] See "Greenpeace Opposes Waxman-Markey," Green Peace press release dated June 25, 2009, available at www.greenpeace.org/usa/press-center/releases2/greenpeace-opposes-waxman-mark.

[3] See "Waxman-Markey Gives Big Bucks to Polluters," Friends of the Earth website article, accessed September 2, 2009, available at www.foe.org/waxman-markey-gives-big-bucks-polluters.

***Overview of the Legislation***

The Waxman-Markey bill would establish a federal cap-and-trade system that places annual limits on greenhouse gas emissions. The program is a hybrid between "upstream" and "downstream" systems, capping downstream emissions from major U.S. sources, such as electric utilities and natural gas distributors, and capping upstream emissions from fuel producers only. The program would launch in 2012 with the goal of reducing U.S. greenhouse gas emissions to 17 percent below 2005 levels by 2020 and a dramatic 80 percent below 2005 levels by 2050. The bill also allows the EPA administrator to modify these limits as deemed appropriate.

To achieve these goals, the bill establishes quantities of emission permits or "allowances" for each year between 2012 and 2050. This is the "cap" portion of the bill. Each allowance grants the right to emit one ton of carbon dioxide equivalent during the corresponding period. Once allowances are established, companies may buy and sell them on the open market. This is the "trade" portion of the bill. By allowing firms to sell unused allowances, cap-and-trade provides financial incentives to cut emissions, as every unused allowance can be sold for a windfall profit to another carbon-emitting firm or organization.

Over the objections of most economists—and despite the negative European experience with providing free emission allowances—Waxman-Markey would distribute the vast majority of allowances free to various industries in the early years of the program. Beginning in 2012, the bill distributes roughly 70.4 percent of allowances free. This percentage hovers between 82.5 percent and 83.5 percent through 2020 and slowly declines thereafter through 2050. Revenues from the small portion of allowances not given away freely are used to fund, among other items, rebates to some taxpayers to mitigate the economic costs of the bill, compensation for workers displaced by the bill's impacts, and tree-planting and other carbon-mitigation programs in other countries. As discussed in Sections II and III below, the large number of freely distributed allowances in the bill has many negative consequences and is a feature that is hard to defend on either fairness or efficiency grounds.

Despite these limitations, the U.S. House of Representatives narrowly approved the Waxman-Markey bill on June 26, 2009. Chairwoman Barbara Boxer of the U.S. Senate Environment and Public Works Committee has announced plans to hold hearings on climate legislation and is expected to introduce draft legislation with a tentative markup date of mid-October.[4] Climate change legislation may be voted on in the U.S. Senate in fall 2009, prior to the December United Nations Climate Change Conference in Copenhagen[5], although Senate Majority Leader Harry Reid indicated in September that the Senate may not act until 2010 due the chamber's busy fall schedule.[6]

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[4] Darren Samuelsohn, "Boxer Readies for Bill Introduction, Mid-October Markup," (September 21, 2009), *E&E Daily*.

[5] Additional background on the United Nations Climate Change Conference is available online at www.en.cop15.dk.

[6] Noelle Straub, "Reid Says Cap-and-Trade Bill May Wait Till 2010," (September 15, 2009), *E&E Daily*.

Table 1 summarizes the key provisions of the cap-and-trade portion of H.R. 2454, the "American Clean Energy and Security Act of 2009."

**TABLE 1.** KEY PROVISIONS OF THE WAXMAN-MARKEY CAP-AND-TRADE BILL (H.R. 2454)

| |
|---|
| **Emission Reductions**<br>• Caps overall greenhouse gas emissions from electricity, oil, gas, and other carbon-intensive industries.<br>• Emissions reductions begin in 2012; the bill specifies annual emission targets through 2050.<br>• Aims to reduce U.S. greenhouse gas emissions to 3 percent below 2005 levels in 2012, 17 percent by 2020, 42 percent by 2030, and approximately 80 percent by 2050.<br>• Roughly 80 percent of allowances are distributed freely to industries and others in the early years of the program, with the percentage declining in later years. |
| **Carbon Offsets**<br>• Regulated firms may purchase "carbon offsets" to meet a portion of their required emission cuts—both in the U.S. and in foreign countries. |
| **Renewable Energy**<br>• Creates renewable electricity standards that require large utilities to produce an increasing share of electricity from renewable sources. |
| **New Energy-Efficiency Rules**<br>• Establishes new energy-efficiency standards for lighting products, furnaces, and various other appliances. |
| **Aid to Displaced Workers**<br>• Increases funding for the "Energy Worker Training Program," which provides aid to workers displaced by the new emissions regulations. |
| **Promotion of "Green" Vehicles**<br>• Provides vouchers to consumers for trading in older, less fuel-efficient vehicles and includes various provisions to support electric cars and plug-in hybrids. |

Source: H.R. 2454, "American Clean Energy and Security Act of 2009."

# II. ECONOMIC THEORY OF CLIMATE POLICY

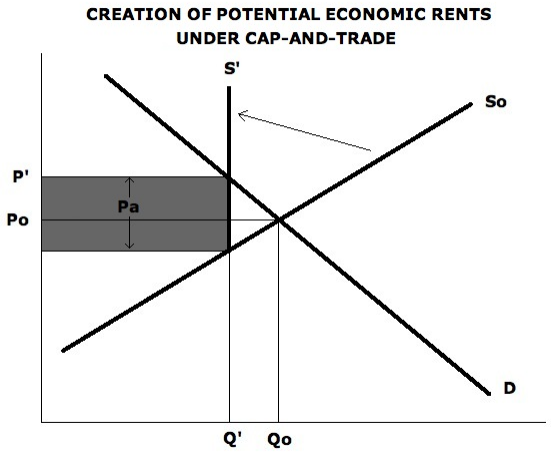
As with all U.S. regulatory policy, the ultimate cost of cap-and-trade is borne by households. In this section we briefly review the economic theory of how cap-and-trade affects prices and wages throughout the economy and provide a critique of recent Congressional Budget Office estimates of the household cost of Waxman-Markey. Based on this analytical framework, in Section III we present new distributional estimates of the household cost of the Waxman-Markey bill.

## A. IMPACT OF WAXMAN-MARKEY ON MARKETS

The primary goal of a cap-and-trade system is to reduce the economy's greenhouse gas emissions. The Waxman-Markey bill would achieve this by charging U.S. companies a price for each ton of carbon dioxide emitted during the production process. In the language of supply and demand, the bill would reduce the supply curve for carbon-intensive products. This would have two important effects on markets. First, it would raise consumer prices for carbon-heavy products such as electricity, gasoline, natural gas, and any product using these energy sources as inputs. Second, by creating an artificial scarcity, it would create a new valuable commodity—emission allowances—that lawmakers would be required to distribute.

Figure 1 illustrates the basic economic impact of Waxman-Markey on prices and quantities in the market for carbon-intensive products. Before cap-and-trade, the U.S. market for carbon-intensive products is in equilibrium where the supply curve $S_o$ and demand curve $D$ intersect. At that point, the economy produces $Q_o$ amount of carbon-intensive products at an average price of $P_o$.

**FIGURE 1.** SHORT-RUN IMPACT OF WAXMAN-MARKEY ON THE MARKET FOR CARBON-INTENSIVE PRODUCTS




Source: Chamberlain Economics, L.L.C.

Under cap-and-trade, lawmakers cap annual greenhouse gas emissions to a specified level. In Figure 1, the capped quantity established by the bill is labeled *Q'*. In effect, cap-

and-trade functions as a quantity restriction, transforming the supply curve for carbon-heavy products into the vertical line labeled *S'* in the figure, reducing output and raising prices. Under the bill, prices for carbon-intensive products rise to *P'*. These price increases are referred to as the "gross burden" of cap-and-trade, as these costs are ultimately passed forward onto households in the form of higher consumer prices. In Section III, we present estimates of these gross burdens from the Waxman-Markey bill.

A secondary effect of cap-and-trade is that it creates a new valuable commodity in the form of tradable emission allowances. As with all valuable commodities, companies and others have competed to obtain them from lawmakers. Firms lucky enough to have received allowances freely from lawmakers will enjoy what economists call "economic rents," or windfall profits, from them.

These potential windfall profits to companies are also illustrated in Figure 1. At the capped quantity of *Q'*, any company holding an allowance can sell its carbon-intensive products at a price of *P'*, but can produce them for the lower price given by the height of the supply curve at *Q'*. The vertical distance between the two—labeled $P_a$—is the pure economic profit the marginal firm can earn by holding a valuable emission allowance. As a result, the market price of allowances will stabilize at $P_a$ dollars in the marketplace. At that price, a cap-and-trade system creates a total value of allowances equal to the grey-shaded rectangle in Figure 1. Under Waxman-Markey, this value corresponds to between $74 billion and $141.6 billion per year between 2012 and 2020.

In effect, cap-and-trade presents lawmakers with a daunting task: dividing the value of the grey-shaded rectangle in Figure 1, corresponding to hundreds of billions of dollars over the life of Waxman-Markey, among companies, households, and others in the economy. From this perspective, it is hardly surprising that profit-seeking firms vigorously compete to obtain free emission allowances. And as they are successful in doing so, the value of the grey-shaded rectangle in Figure 1 is converted into windfall profits for shareholders of those companies.

***Impact of Cap-and-Trade on Federal Revenue***

How lawmakers choose to distribute emission allowances has a dramatic impact on federal revenue. If allowances are auctioned, the federal treasury collects revenue from the sale. If 100 percent of allowances are auctioned, federal revenue will be equal to the grey-shaded rectangle in Figure 1. These auction proceeds can then be used for a variety of purposes, including cutting distortionary income or payroll taxes, increasing low-income transfer payments, or helping finance congressional priorities such as federal health care reform or reducing the federal deficit.

If allowances are distributed freely, the federal government receives no initial revenue. However, it will recapture a portion of lost allowance values through increased corporate income tax collections. To understand why, recall that companies that receive free allowances can either use them to emit greenhouse gasses or resell them for a profit. Either way, free allowances create one-time windfall profits for companies fortunate enough to be given them. These profits from free allowances are ultimately reflected in

higher stock prices for these companies, increasing the value to shareholders throughout the economy.

Because of the various federal, state and local corporate and personal income taxes, governments would recapture approximately 40 percent of these extra company profits created by free allowances (to the extent they are not reinvested or otherwise recommitted).[7] The remaining 60 percent would ultimately accrue to shareholders. In effect, free distribution is equivalent to selling 100 percent of allowances via auction and then distributing the proceeds directly back to shareholders of covered carbon-emitting companies in the form of a windfall profit. For this reason, free allowances are generally characterized as a choice by lawmakers to ease the burden of cap-and-trade regulations on shareholders at the expense of other households in the economy.[8]They also are viewed as an alternative to politically risky direct emissions taxes that provide lawmakers with an opportunity to reward certain constituencies while obscuring the economic costs borne by others.

### B. Critique of Recent Congressional Budget Office Estimates

In June 2009 and September 2009, the CBO released separate analyses of the cost of the Waxman-Markey bill to households.[9]The June analysis concluded that the cap-and-trade portion of the bill alone would impose an average gross cost of $770 per household per year, with the September analysis slightly higher at $900 per year. On a net basis—that is, when all government benefits given back to households are also counted—the June analysis estimated households would pay an average of $175 per year, with households in the bottom quintile actually profiting by $40 on a net basis. The September analysis came to a similar conclusion, with households paying $160 per year on a net basis and the nation's poorest households profiting by $125 per year. These analyses were the basis for the talking point that the cap-and-trade provisions of the bill would cost households the equivalent of "a postage stamp per day."

The basic problem with the CBO analyses is that both rely on an assumption about the impact of free emission allowances on households that is not supported by the microeconomic theory of regulated public utilities. Specifically, they assume that what

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[7] The Congressional Budget Office assumes governments recapture 45 percent of economic rents from free allowances. According to the Organization for Economic Cooperation and Development (OECD), the combined U.S. top marginal corporate tax rate is closer to 40 percent, which is the figure used in this study.

[8] In an attempt to limit windfall profits to shareholders, Waxman-Markey stipulates that electricity and gas utilities must use allowances "for the benefit of" ratepayers. That is, the law assumes perfect regulatory oversight of local utilities. As discussed in Section II(B) of this study, this provision does not appear to be consistent with the microeconomic theory of how regulated public utilities are likely to behave under freely distributed emission allowances.

[9] See U.S. Congressional Budget Office, "The Estimated Costs to Households From the Cap-and-Trade Provisions of H.R. 2454." Letter to the Honorable Dave Camp. (June 19, 2009); and "The Economic Effects of Legislation to Reduce Greenhouse-Gas Emissions." CBO Publication No. No. 4001 (September 2009).

economists call the "legal" incidence of the distribution of free allowances under Waxman-Markey will be the same as the actual "economic" incidence.[10] Because the text of H.R. 2454 stipulates that electricity and natural gas utilities must utilize free emission allowances "for the benefit of" ratepayers, the CBO analyses assume consumers will in fact benefit from these allowances. However, economic theory suggests otherwise.

Just as with state and local tax laws that forbid companies from passing certain types of business taxes onto consumers—despite widespread evidence that firms do in fact shift them forward in the form of higher prices—there is no necessary relationship between the legal and economic incidence of free emission allowances specified by lawmakers. Lawmakers may establish whatever legal incidence they choose in the text of legislation, but they do not control the actual economic incidence of policy. The economic incidence of policy is instead determined by the interplay of supply and demand in the private marketplace.

In this section we discuss a key conceptual problem with the recent CBO analyses of Waxman-Markey: the poor microeconomic foundations underlying the assumption that utility ratepayers, rather than utility shareholders, will benefit from free emission allowances.

***Poor Microeconomic Foundations***

The CBO analyses assume that electricity and natural gas consumers, rather than shareholders, will benefit from free emission allowances given to utilities under Waxman-Markey. This assumption has a dramatic impact on CBO's distributional estimates of the cost of the bill to households.

Under CBO's assumption, Waxman-Markey appears to be generally progressive across income groups, as most of the benefits of free allowances appear to accrue to low- and middle-income households that spend a large fraction of their incomes on electricity and natural gas. In contrast, if utility shareholders are assumed to benefit from free allowances—a likelihood made manifest by the aggressive lobbying by these firms for the free allowances—Waxman-Markey appears to be a highly regressive policy. Because most shareholders reside in the nation's top two income quintiles, under this assumption the bill would appear to transfer billions of dollars per year from low- and middle-income families to the wealthiest households in the U.S. For this reason, the question of what economists call the "economic incidence" of free allowances is a central question when judging the fairness and true costs of the Waxman-Markey bill.

Economic theory helps shed light on whether the CBO's assumption that utility ratepayers will benefit from free allowances is reasonable. According to the basic economic theory of regulated public utilities, municipal regulators will set rates equal to

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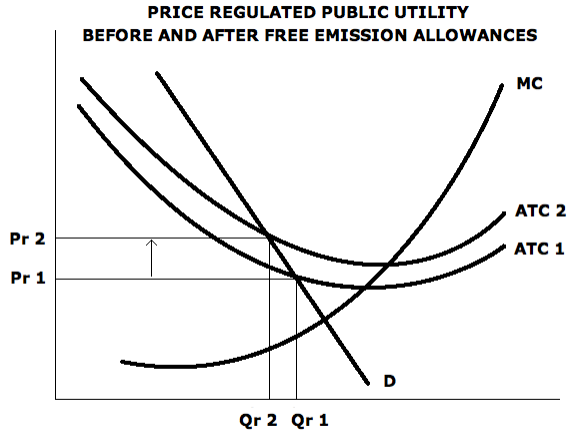
[10] For a discussion of the distinction between the "legal" and "economic" incidence of policies, see Andrew Chamberlain and Gerald Prante, "Economic vs. Legal Incidence: Comparing Census Bureau Figures with Tax Foundation Tax Burdens." *Tax Foundation Fiscal Fact No. 59*. (June 9, 2006). Available online at www.taxfoundation.org/publications/show/1656.html.

the utility's average total cost of production.[11] In municipal public finance, this rate-setting approach is known as "full cost recovery" and is a common regulatory framework used throughout municipal utility regulation.[12]

Figure 2 illustrates the microeconomic impact of free allowances on such a regulated utility. Before cap-and-trade, the firm's average total cost curve is labeled *ATC 1*. Under this cost structure, the utility will choose to produce *Qr 1* units of output, corresponding to the intersection of the average total cost curve and the market demand curve *D*. At this level of output, regulators will set the utility's price equal to their average total cost, or *Pr 1*.

**FIGURE 2.** MICROECONOMIC IMPACT OF CAP-AND-TRADE ON A PRICE-REGULATED PUBLIC UTILITY




Source: Chamberlain Economics, L.L.C.

Under cap-and-trade, the utility's average total cost curve shifts upward to *ATC 2*. This occurs regardless of whether the utility is required to purchase allowances via auction or is given freely by lawmakers. Under auctioned allowances, the firm's costs rise by the amount of the allowances purchased. Under free allowances, if the firm chooses to hold them rather than sell them on the open market, it incurs an opportunity cost equal to the value of the allowances received.

To understand why, imagine that a utility has been given a free allowance that has a market value of $35. The utility can choose to restrict its electricity output enough to reduce emissions by one ton and then sell this allowance for $35. To maintain the same

[11] Strictly speaking, regulators first-best option is to set prices equal to the utility's *marginal* cost of production, not average total cost. However, in practice marginal-cost pricing is extremely rare for two reasons. First, it imposes very high information requirements on regulators. Second, it would require that money-losing utilities be subsidized with tax revenue, which is impractical in most local fiscal systems.

[12] See for example, Government Finance Officers Association, "GFOA Recommended Practice: Setting of Government Charges and Fees." (January 2001).

level of electricity output, the utility must sacrifice that potential $35; therefore, its cost shave risen. In either case, the firm's average total cost curve shifts upward to *ATC 2*.

Following the increase in the utility's costs from cap-and-trade, the firm will reduce output to *Qr 2*. If regulators follow a consistent price-equal-to-average-costs rate-setting rule, regulated utility prices will rise to *Pr 2*—even if allowances are distributed freely. Broadly speaking, this corresponds to the actual experience of European electricity ratepayers who experienced significant rate increases under the European Union Emission Trading System (EU ETS) despite the large number of allowances distributed freely to electricity firms.[13]

The text of Waxman-Markey instructs regulators to not allow utilities to pass forward the opportunity cost of free allowances to consumers. But as Figure 2 illustrates, regulated electricity and gas utilities will face powerful microeconomic incentives to push costs forward onto consumers. And to the extent that utilities' generation costs rise in response to increased consumer demand for low-emission energy sources, these incentives to recoup costs through rate adjustments will be even stronger. As is well known in regulatory literature, utilities frequently respond in complex, unpredictable ways to regulatory constraints, adjusting on non-price margins, inflating production costs, adjusting product quality, varying product reliability, cutting ancillary customer services, or shutting down altogether.

In an idealized diagram like those above, it is easy to pinpoint the "true" cost of a utility's production compared to the opportunity cost from free allowances under cap-and-trade. But in the actual regulatory world, it almost certainly will not be obvious to utility regulators whether a cost increase submitted as part of a routine proposal for rate adjustments is due to ordinary changes in business costs or to the impact of the new cap-and-trade scheme.

The CBO analyses do not specify the microeconomic foundations of the assumption that utility ratepayers will enjoy the benefits of free allowances. And while the text of H.R. 2454 generally specifies that allowances must be used "for the benefit of" ratepayers, it does not specify the mechanism by which these benefits are to be transferred to consumers rather than shareholders. As the argument above makes clear, there are strong reasons—derived from both economic theory and the actual history of emission regulation—to doubt the ability of regulators operating under a full-cost-recovery framework to force benefits onto consumers and away from shareholders, as CBO assumes.

In Section III, we provide alternative estimates of the distributional impact of the Waxman-Markey bill under the more conventional and theoretically plausible assumption that utility shareholders, rather than electricity and natural gas ratepayers, will be the primary beneficiaries of the bill's freely distributed emission allowances.

[13] For an overview of the impact of free allowances on utility rates under the EU ETS system, see Box 1.

**BOX 1. LEARNING FROM THE EU: WILL ELECTRICITY RATES RISE EVEN WITH FREELY DISTRIBUTED EMISSION ALLOWANCES?**

The Waxman-Markey bill stipulates that electricity and gas companies must use the value of the free allowances "for the benefit of" ratepayers. As discussed in Section II of this study, economic theory suggests this will be difficult for regulators to enforce. The experience of the European Union Emissions Trading System (EU ETS)—which also distributed large numbers of allowances freely to electric utilities—sheds light on how regulated utilities are likely to actually behave under cap-and-trade.

A recent *New York Times* examination of the impact of free allowances under the EU ETS system illustrates the problem of distributing free allowances in the hope that consumers will ultimately benefit:

> "The European Union started with a high-minded ecological goal: encouraging companies to cut their greenhouse gases by making them pay for each ton of carbon dioxide they emitted into the atmosphere.
>
> "But that plan unleashed a lobbying free-for-all that led politicians to dole out favors to various industries, undermining the environmental goals. Four years later, it is becoming clear that system has so far produced little noticeable benefit to the climate — but generated a multibillion-dollar windfall for some of the Continent's biggest polluters. …
>
> "Beseeched by giant utilities and smokestack industries that feared for their competitiveness, the European Union scrapped the idea of forcing industries to buy their permits, with the money going to public coffers. Instead, governments gave out the vast majority of the permits for nothing. …
>
> "After the system kicked off, in 2005, power consumers in Germany started to see their electrical bills increase by 5 percent a year. RWE, the power company, received 30 percent of all the permits given out, more than any other company in Germany.
>
> "The company said its price increases from 2005 to 2007 predominantly reflected higher costs of coal and natural gas. But the company acknowledged charging its customers for the emission permits, saying that while it may have received them free from the government, they still had value in the marketplace. …"

*Source: James Kanter and Jad Mouawad, "Money and Lobbyists Hurt European Efforts to Curb Gasses." New York Times. (December 11, 2008).*

# III. DISTRIBUTIONAL ESTIMATES OF THE COST OF WAXMAN-MARKEY TO U.S. HOUSEHOLDS

In this section we present estimates of the cost of Waxman-Markey to households as an alternative to recent Congressional Budget Office estimates discussed in Section II. Rather than following the theoretically problematic assumption that utility ratepayers will enjoy the benefit of free emission allowances, we follow the more conventional assumption that shareholders of recipient utilities will ultimately profit from the free allowances granted under Waxman-Markey.

Table 2 provides an overview of the basic assumptions underlying the distributional analysis in this section. As with the CBO's June 2009 estimates, we model the household impact of the Waxman-Markey bill in the discrete year 2020, which is in fact before many of the bill's costs are fully felt. All figures are expressed in 2006 dollars, the latest available year for the income and consumption data used for this analysis. Estimated market prices for allowances in each year are drawn from CBO estimates, and quantities of allowances issued are drawn from the text of H.R. 2454.

**TABLE 2.** OVERVIEW OF COST ESTIMATES MODELED IN THIS STUDY

| | |
|---|---|
| Year modeled | 2020 |
| Year results presented in | 2006 |
| Quantity of emission allowances | 5,056,000,000 |
| Estimated allowance price | $28 per ton of $CO_2$ |
| Total allowance value | $141,568,000,000 |
| Total allowance value in 2006 dollars | $105,961,331,959 |
| Percentage freely distributed | 82.5% |
| Percentage sold via auction | 17.5% |

Source: Chamberlain Economics, L.L.C.

The gross burden estimates are generated using a standard input-output model of the U.S. economy. The net burden estimates are developed by subtracting from these gross burdens the value of various provisions that will return dollars to U.S. households in the form of increased government transfer payments, lower consumer prices, or higher shareholder profits. The methodology of the input-output model and the various incidence assumptions for the bill's spending provisions are detailed in Section IV. In this study, we analyze only the distributional impact of the H.R. 2454's emission allowances, which are the core of the cap-and-trade system.

Because we do not analyze the broader set of economic issues explored by the CBO—including the household impact of domestic emission offsets, federal income tax savings from inflation-adjustments in the tax code due to cap-and-trade-induced price increases, the resource costs of adjusting household behavior under cap-and-trade, and other ancillary issues—the overall figures presented here are not strictly comparable to CBO estimates. Instead, they are designed to provide an order-of-magnitude illustration of how the bill's free allowances affect the regressivity of the bill and therefore worsen the already disproportionate impact of cap-and-trade on low- and middle-income households.

### A. GROSS BURDENS BY INCOME GROUP

A well-known aspect of cap-and-trade is that the price increases caused by the system—known as "gross burdens"—are regressively distributed across households. That is, lower-income households tend to spend a larger fraction of their income on carbon-intensive products like fuel and electricity than higher-income households. As a result, the price increases caused by cap-and-trade tend to impose the heaviest relative burden on households least able to bear them.

This study confirms that finding. Table 3 presents estimates of the annual gross burden from Waxman-Markey by income quintile. As is clear from the table, middle- and higher-income groups will bear the largest dollar burden from the legislation, while lower-income groups will bear the largest burden as a percentage of household income.

**TABLE 3.** GROSS ANNUAL BURDEN FROM WAXMAN-MARKEY BY INCOME QUINTILE (2006 DOLLARS)

| | | Quintiles of Cash Income Before Taxes, Equal Number of Households | | | | |
|---|---|---|---|---|---|---|
| | All Households | Lowest 20 Percent | Second 20 Percent | Third 20 Percent | Fourth 20 Percent | Highest 20 Percent |
| Lower Bound of Household Income | n/a | n/a | $18,370 | $35,095 | $56,222 | $88,774 |
| Gross Annual Burden from Waxman-Markey | $892 | $451 | $631 | $805 | $1,038 | $1,531 |
| Gross Burden as a % of Income | 1.5% | 4.5% | 2.4% | 1.8% | 1.5% | 1.0% |
| Aggregate Burden ($ billion) | $106.0 | $10.7 | $15.0 | $19.1 | $24.7 | $36.4 |

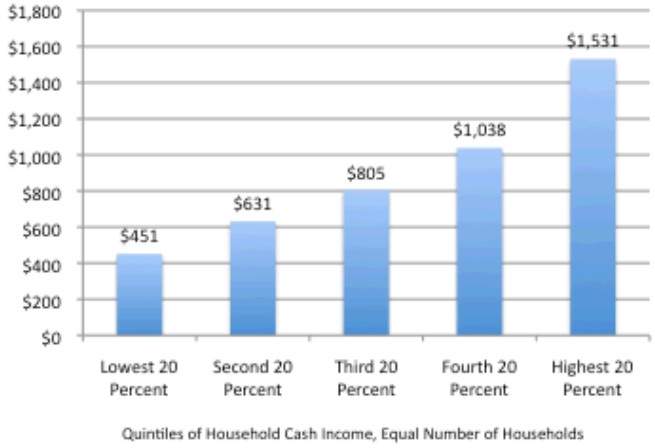
Source: Chamberlain Economics, L.L.C.; U.S. Bureau of Labor Statistics' "Consumer Expenditure Survey"

In total, Waxman-Markey would impose a gross burden of roughly $141.6 billion on households in 2020. Expressed in 2006 dollars, that amounts to a total burden of $105.96 billion, for an average of $892 per U.S. household.

Households in the highest-earning quintile—those earning more than $88,774 in cash income—would bear an annual gross burden of $1,531 per year or 1.0 percent of household income. Households in the middle quintile earning between $35,095 and $56,222 would pay an annual burden of $805 or 1.8 percent of income. And households in the lowest-earning quintile—those earning less than $18,370 per year—would pay $451 per year or a substantial 4.5 percent of income.

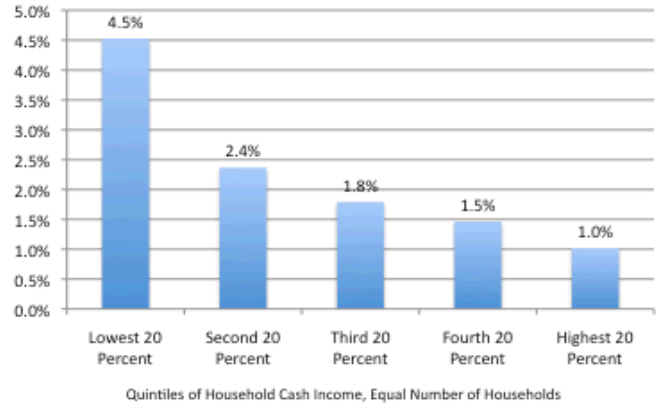
Figures 3 and 4 present the figures from Table 3 graphically. Figure 3 illustrates the gross annual household dollar burden from Waxman-Markey by income quintile, and Figure 4 presents gross annual burdens as a percentage of household cash income. As expected, as income and consumption rise, households bear a larger dollar burden under Waxman-Markey. However, as a fraction of income the lowest-earning households in the nation bear the heaviest up-front cost for policies aimed at curbing greenhouse gas emissions. On a gross basis, lower-income households are disproportionately taxed for the cost of Waxman-Markey's provisions.

**FIGURE 3.** GROSS ANNUAL HOUSEHOLD BURDEN FROM WAXMAN-MARKEY BY INCOME QUINTILE (2006 DOLLARS)




Source: Chamberlain Economics, L.L.C.

**FIGURE 4.** GROSS BURDEN FROM WAXMAN-MARKEY AS A PERCENTAGE OF HOUSEHOLD INCOME




Source: Chamberlain Economics, L.L.C.

## B. GROSS BURDENS COMPARED TO OTHER MAJOR TAXES

The previous section presented gross household burdens from Waxman-Markey by income quintile. In this section, we place those burdens into a broader context by comparing them to the annual cost of other existing federal, state and local taxes currently borne by U.S. households.

Table 4 presents a comparison of the gross burden from Waxman-Markey to the burden of other existing federal and state-local taxes. The household tax burden estimates by income quintile are derived from a comprehensive 2007 study of U.S. tax burdens from

the Tax Foundation,[14] and all figures are inflation-adjusted into 2006 dollars to be comparable with other figures in this study. As is clear from the table, the gross burdens households can expect to pay under Waxman-Markey would represent a considerable tax increase that is comparable to many existing tax burdens.

**TABLE 4.** GROSS HOUSEHOLD BURDENS FROM WAXMAN-MARKEY COMPARED TO OTHER EXISTING TAXES PAID BY U.S. HOUSEHOLDS (2006 DOLLARS)

| | Quintiles of Cash Income Before Taxes, Equal Number of Households | | | | |
|---|---|---|---|---|---|
| | Bottom 20 Percent | Second 20 Percent | Third 20 Percent | Fourth 20 Percent | Top 20 Percent |
| Gross Annual Burden from Waxman-Markey | $451 | $631 | $805 | $1,038 | $1,531 |
| Federal Tax Burdens | | | | | |
| Income | $71 | $947 | $2,817 | $6,737 | $27,066 |
| Payroll | $656 | $2,829 | $5,835 | $9,951 | $18,405 |
| Corporate Income | $183 | $817 | $1,514 | $2,609 | $6,361 |
| Gasoline | $61 | $123 | $187 | $273 | $493 |
| Alcoholic Beverages | $33 | $45 | $70 | $95 | $151 |
| Tobacco | $50 | $66 | $79 | $76 | $63 |
| Diesel Fuel | $7 | $31 | $57 | $98 | $239 |
| Air Transport | $17 | $46 | $70 | $120 | $316 |
| Other Excise | $40 | $62 | $83 | $115 | $189 |
| Customs, Duties, etc. | $90 | $138 | $187 | $257 | $422 |
| Estate & Gift | $0 | $0 | $0 | $0 | $1,155 |
| State-Local Tax Burdens | | | | | |
| Income | $35 | $389 | $1,071 | $2,274 | $6,803 |
| Corporate Income | $32 | $144 | $267 | $460 | $1,121 |
| Personal Property | $12 | $33 | $47 | $61 | $115 |
| Motor Vehicle License | $60 | $100 | $133 | $160 | $186 |
| Other Personal Taxes | $7 | $17 | $28 | $45 | $96 |
| General Sales | $753 | $1,371 | $1,953 | $2,952 | $4,910 |
| Gasoline | $85 | $171 | $262 | $381 | $688 |
| Alcoholic Beverages | $18 | $25 | $38 | $52 | $82 |
| Tobacco | $86 | $115 | $136 | $131 | $109 |
| Public Utilities | $119 | $164 | $199 | $234 | $298 |
| Insurance Receipts | $59 | $102 | $129 | $158 | $237 |
| Other Selective Sales | $113 | $174 | $235 | $323 | $531 |
| Motor Vehicle (Business) | $6 | $25 | $47 | $81 | $198 |
| Severance | $20 | $37 | $53 | $75 | $139 |
| Property | $876 | $1,609 | $2,373 | $3,512 | $7,120 |
| Special Assessments | $17 | $32 | $47 | $69 | $140 |
| Other Production Taxes | $36 | $161 | $298 | $514 | $1,254 |
| Estate & Gift | $0 | $0 | $0 | $0 | $268 |

Source: Chamberlain Economics, L.L.C. calculations based on Chamberlain and Prante (2007).
Note: All figures in 2006 inflation-adjusted dollars.

For households in the lowest-earning quintile, the $451 cap-and-trade burden represents a significant annual cost. Among all federal taxes, the gross burden of Waxman-Markey would exceed the burden of every other tax paid these households except the federal payroll tax, which costs an average of $656 per year. In essence, Waxman-Markey would have an equivalent gross impact to a 69 percent increase in the federal payroll tax on these households. Similarly, the gross burden of Waxman-Markey would be equivalent to a 60 percent increase in state-local sales taxes, a 52 percent increase in property taxes, or

[14] See Chamberlain and Prante (2007). Figures in the published study present tax burdens in quintiles with equal numbers of individuals. However, the underlying microdata model allows the presentation of tax burdens in quintiles with equal numbers of households, which is the quintile definition used in this study. These figures in quintiles with equal numbers of households serve as the basis for the tax burden figures in Table 4.

a three-fold increase in the combined federal and state-local gas taxes paid by the nation's lowest-income households each year.

For America's "middle class" households—those residing in the middle 20 percent of the income spectrum—the gross burden of Waxman-Markey would also represent a significant tax increase. The $805 annual burden on households in the middle quintile would be roughly equivalent to an 80 percent increase in the state and local income taxes paid by these families, each year, of $1,071. The gross burdens from the bill faced by households in the middle quintile are also comparable to a 34 percent increase in state and local property taxes, a 29 percent increase in federal income taxes, or a roughly doubling of the combined federal and state-local gas taxes paid by these households each year.

For households in the highest-earning quintile, the $1,531 gross annual burden from Waxman-Markey appears modest in comparison to the existing large federal, state and local taxes currently paid by these households. Gross burdens for this group are equivalent to a 6 percent increase in federal personal income taxes, a 22 percent increase in state and local property taxes, or a 31 percent increase in state and local sales taxes paid by these households. Surprisingly, the $1,531 annual gross burden of Waxman-Markey for the nation's highest-earning households would exceed the $1,423 average burden of the controversial estate and gift taxes paid by these households each year by more than $100 per household.

### C. NET BURDENS BY INCOME GROUP

In addition to imposing gross burdens in the form of higher consumer prices, Waxman-Markey also distributes some benefits to households. For example, the bill specifies that 15 percent of emission allowances be auctioned with proceeds to low-income households, that 0.5 percent be auctioned with proceeds going to worker assistance and retraining, and so on.

Tables 5 and 6 provide estimates of the net household burden of Waxman-Markey under two alternative assumptions. Table 5 provides estimates under the CBO assumption that utility ratepayers will benefit from free emission allowances given to electric and natural gas utilities. By contrast, Table 6 provides estimates under the more theoretically plausible assumption that company shareholders will be the primary beneficiaries of free allowances. This latter scenario is labeled as the "baseline" assumption in this section.

The two estimates present sharply contrasting views of the distributional fairness of Waxman-Markey. Under the CBO assumption, the bill appears to be generally progressive across income groups. In Table 5, households in the bottom quintile actually benefit on net by $177 per year under the bill, a figure broadly comparable to the CBO's June estimate of $40 per year in net benefits, and their September estimate of $125 per year. The remaining middle- and upper-income households would bear a net burden of between $39 and $358 per year under this assumption, with the heaviest burdens borne by households in the fourth income quintile. Overall, these estimates are broadly

consistent with the magnitude of CBO's more comprehensive distributional analyses of the bill.

**TABLE 5.** NET HOUSEHOLD BURDENS FROM WAXMAN-MARKEY UNDER THE CBO ASSUMPTION OF RATEPAYER BENEFITS FROM FREE ALLOWANCES

| | Quintiles of Cash Income Before Taxes, Equal Number of Households | | | | |
|---|---|---|---|---|---|
| | Lowest 20 Percent | Second 20 Percent | Third 20 Percent | Fourth 20 Percent | Highest 20 Percent |
| Gross Annual Burden from Waxman-Markey | $451 | $631 | $805 | $1,038 | $1,531 |
| Less: | | | | | |
| Auction revenue to low-income households | $341 | $174 | $68 | $52 | $20 |
| Auction revenue to workers | $0 | $2 | $3 | $5 | $11 |
| Consumer rebates for home heating oil | $8 | $10 | $11 | $15 | $21 |
| Lower prices for electricity consumers | $204 | $262 | $299 | $340 | $425 |
| Lower prices for natural gas consumers | $47 | $66 | $74 | $89 | $117 |
| Higher shareholder profits | $28 | $79 | $148 | $180 | $824 |
| Net Household Burden from Waxman-Markey | ($177) | $39 | $202 | $358 | $112 |

Source: Congressional Budget Office; Chamberlain Economics, L.L.C.

In Table 6, we present estimates of net household burdens from Waxman-Markey under the more realistic assumption that utility regulators will be unable (or unwilling) to prevent profit-seeking utilities from passing on the cost of allowances to consumers. In this scenario, company shareholders are assumed to be the primary beneficiaries of freely distributed emission allowances. Under this assumption, the Waxman-Markey bill appears to be a sharply regressive policy toward the nation's low- and middle-income households and primarily benefits households in highest one-fifth of the income distribution.

**TABLE 6.** NET HOUSEHOLD BURDENS FROM WAXMAN-MARKEY UNDER THE BASELINE ASSUMPTION OF SHAREHOLDER PROFITS FROM FREE ALLOWANCES

| | Quintiles of Cash Income Before Taxes, Equal Number of Households | | | | |
|---|---|---|---|---|---|
| | Lowest 20 Percent | Second 20 Percent | Third 20 Percent | Fourth 20 Percent | Highest 20 Percent |
| Gross Annual Burden from Waxman-Markey | $451 | $631 | $805 | $1,038 | $1,531 |
| Less: | | | | | |
| Auction revenue to low-income households | $341 | $174 | $68 | $52 | $20 |
| Auction revenue to workers | $0 | $2 | $3 | $5 | $11 |
| Consumer rebates for home heating oil | $8 | $10 | $11 | $15 | $21 |
| Higher shareholder profits | $70 | $199 | $373 | $454 | $2,082 |
| Net Household Burden from Waxman-Markey | $31 | $246 | $349 | $512 | ($604) |

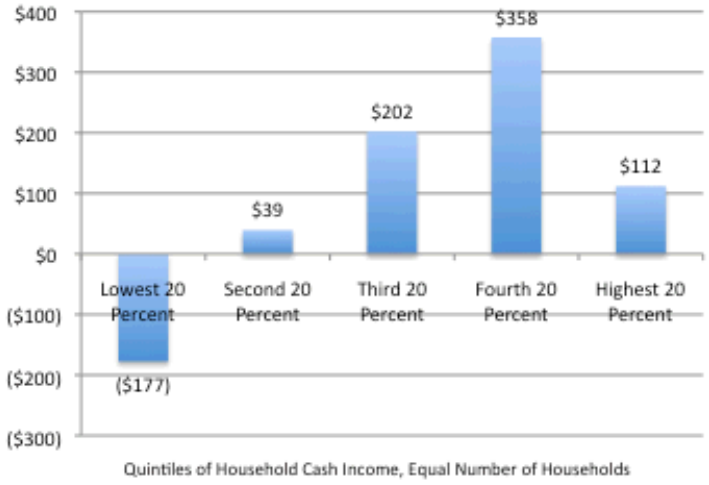
Source: Chamberlain Economics, L.L.C.

Under the assumption that company shareholders will enjoy the benefit of free allowances under Waxman-Markey, households in the nation's highest-earning quintile would profit by $604 per year on a net basis from the legislation. In contrast, the lowest-earning 80 percent of households would bear net burdens of between $31 and $512 per year, with the heaviest burdens borne by the three middle quintiles that broadly constitute the nation's "middle class." Under this assumption, the Waxman-Markey bill would effectively redistribute approximately $14 billion per year from the lowest-earning 80 percent of households to the highest-earning 20 percent of families in the nation.

Figures 5 and 6 present the net burden estimates from Tables 5 and 6 graphically. In Figure 5, the CBO assumption gives the impression that net burdens under Waxman-Markey would be reasonably equitable across income groups. Under this scenario, the lowest-earning households profit slightly from the system on net and are effectively

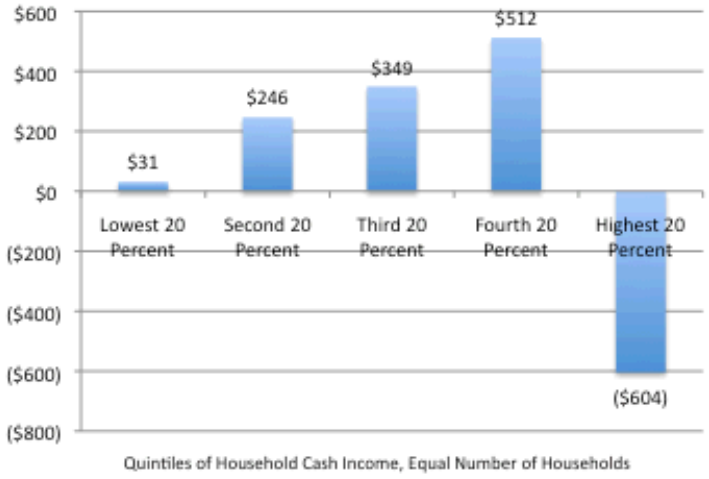
compensated by the positive net burdens paid by middle- and upper-income households. This generally corresponds to the popular media interpretation of the recent CBO analyses of the bill.[15]

**FIGURE 5.** NET HOUSEHOLD BURDEN FROM WAXMAN-MARKEY UNDER CBO ASSUMPTION OF RATEPAYER BENEFITS FROM FREE ALLOWANCES (POSITIVE AMOUNTS INDICATE NET COSTS; NEGATIVE AMOUNTS INDICATE NET BENEFITS)




Source: Chamberlain Economics, L.L.C.

**FIGURE 6.** NET HOUSEHOLD BURDEN FROM WAXMAN-MARKEY UNDER BASELINE ASSUMPTION OF SHAREHOLDER PROFITS FROM FREE ALLOWANCES (POSITIVE AMOUNTS INDICATE NET COSTS; NEGATIVE AMOUNTS INDICATE NET BENEFITS)




Source: Chamberlain Economics, L.L.C.

[15] See, for example, Catherine Rampell, "How Much Would Cap-and-Trade Bill Cost Families." (June 24, 2009). *New York Times* "Green, Inc." weblog. Available online at www.greeninc.blogs.nytimes.com/2009/06/24/how-much-cap-and-trade-bill-would-cost-families/.

Under the more conventional and theoretically plausible assumption that utility shareholders will profit from freely distributed allowances, Figure 6 illustrates the highly regressive nature of Waxman-Markey's free emission allowances. Because the majority of the nation's shareholders are clustered in the top two income quintiles, free emission allowances greatly exacerbate the already regressive gross burdens imposed by cap-and-trade.

As is clear from the figure, each of the bottom four quintiles bear a positive net burden under this assumption, with the heaviest costs falling on households in the middle three income quintiles. By contrast, households in the top quintile would not only bear zero net burden, but also effectively profit by more than $600 per year under the bill. Given the inequitable nature of burdens under this assumption, it is easy to understand why a broad consensus exists among economists in opposition to the freely distributed emission allowances in the Waxman-Markey bill.

# IV. ANALYSIS OF EMISSION ALLOWANCE DISTRIBUTIONS UNDER WAXMAN-MARKEY

A key feature of any cap-and-trade system is how lawmakers choose to distribute emission allowances. While allowance distributions do not affect overall climate goals—greenhouse gas emissions are capped regardless of who receives allowances, with the exception that generous "offset" schemes like those in the Waxman-Markey bill may obviate actual emission reductions—they have an enormous impact on the distributional fairness and broader economic costs of the policy.

The Waxman-Markey bill distributes the vast majority of emission allowances freely to companies and others in the early years of the program. In this section we review expert opinion on free allowances vs. auctioning of allowances and provide a detailed analysis of the bill's distribution of free allowances to various industries—a pattern that appears to reflect intense lobbying efforts on climate change by various industries in recent years.

## A. EXPERT OPINION ON FREE VS. AUCTIONED ALLOWANCES

Lawmakers that eschew more direct and efficient emissions taxes in favor of a cap-and-trade system—which functions as an indirect emissions tax—face two basic options for distributing emission allowances: free distribution or auctioning. Among economists, a broad consensus has emerged in recent years in favor of auctioned allowances. Auctioning enjoys two clear advantages over free allocation. First, if allowances are auctioned rather than distributed freely, auction proceeds can be used to improve the distributional fairness of Waxman-Markey to low- and middle-income households. Secondly, auctioning of allowances reduces the likelihood of political corruption of the regulatory system, discouraging economically wasteful rent-seeking behavior by companies and thus lowering the overall compliance costs of cap-and-trade. That is, auctioning avoids political allocation of a newly valuable commodity.

Economist Alan Viard recently summarized the overwhelming consensus among economists and others in favor of auctioned allowances.[16] The following statements from experts across the political spectrum illustrate the strength of expert opinion in opposition to free distribution of allowances:

- **Peter R. Orszag, Director, White House Office of Management and Budget (as Director of the Congressional Budget Office)**: "Because giving allowances to energy producers would disproportionately benefit higher-income households and would preclude the possibility of using the allowance value to reduce taxes on capital and labor, such a strategy would appear to rate low from both a distributional and an efficiency perspective."[17]

[16] Alan D. Viard, "Don't Give Away the Cap-and-Trade Permits!" *Tax Notes*. (May 4, 2009).

[17] Peter R. Orszag, Letter to Rep. Jeff Bingaman, (D-NM). (July 9, 2007).

- **Gilbert E. Metcalf, Professor, Tufts University**: "Policymakers have used the free allocation of permits for cap-and-trade programs. This practice comes at considerable distributional and efficiency costs… From a distributional perspective, free permits provide windfall profits to permit recipients. These windfalls show up as increases in equity value of the firms receiving permits. Since equity holdings tend to be concentrated in the upper part of the income distribution, this windfall transfer is quite regressive."[18]

- **N. Gregory Mankiw**, **Professor, Harvard University**: "Economists recognize that a cap-and-trade system [with free allowances to companies] is equivalent to a tax on carbon emissions with the tax revenue rebated to existing carbon emitters, such as energy companies. That is, Cap-and-trade = Carbon tax + Corporate welfare. If the public understood this theorem, the carbon tax alternative, with revenues rebated to households through lower payroll or income taxes, would attract a lot more interest."[19]

- **Robert Greenstein, Director, Center on Budget and Policy Priorities**: "Giving away a substantial fraction of emission allowances to existing energy producers would do almost nothing to compensate low- and moderate-income families for their losses. A very large percentage of the benefits of such a giveaway would go to shareholders of the energy companies, most of whom have high incomes."[20]

- **Ian W.H. Parry**, **Senior Fellow, Resources for the Future**; **Hilary Sigman**, **Professor, Rutgers University**; **Margaret Walls**, **Senior Fellow, Resources for the Future**; and **Roberton C. Williams**, **Professor, University of Texas**: "Freely allocated tradable emission permits may actually hurt the poor the most, as they transfer income to shareholders via scarcity rents created at the expense of higher prices. On the other hand, emissions taxes (or auctioned emission permits) offer the opportunity to offset regressive effects, if revenues are recycled to finance progressive changes to the tax system."[21]

As these excerpts help illustrate, there is broad agreement from experts across the political spectrum against cap-and-trade with freely distributed emission allowances. Free allowances weaken the distributional fairness of cap-and-trade, reward and further encourage wasteful industry rent-seeking efforts, and lead to higher economy-wide costs than would otherwise be the case under full auctioning of allowances. In addition, they

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[18] Gilbert E. Metcalf, "Environmental Taxation: What Have We Learned in this Decade?" in *Tax Policy Lessons from the 2000s*. (2009).

[19] N. Gregory Mankiw, "The Fundamental Theorem of Carbon Taxation." (August 2, 2007).

[20] Robert Greenstein, Testimony Before the Senate Committee on Finance. (April 24, 2008).

[21] Ian W.H. Parry, Hilary Sigman, Margaret Walls, and Roberton C. Williams III, "The Incidence of Pollution Control Policies," *National Bureau of Economic Research Working Paper* No. 11438 (June 2005).

require extensive government administrative planning, encourage gaming and corruption of the overall system, and otherwise carry higher costs than direct emissions taxes.[22]For these reasons, there is broad agreement regarding the superiority of auctioned allowances or direct emissions taxes versus free distribution.

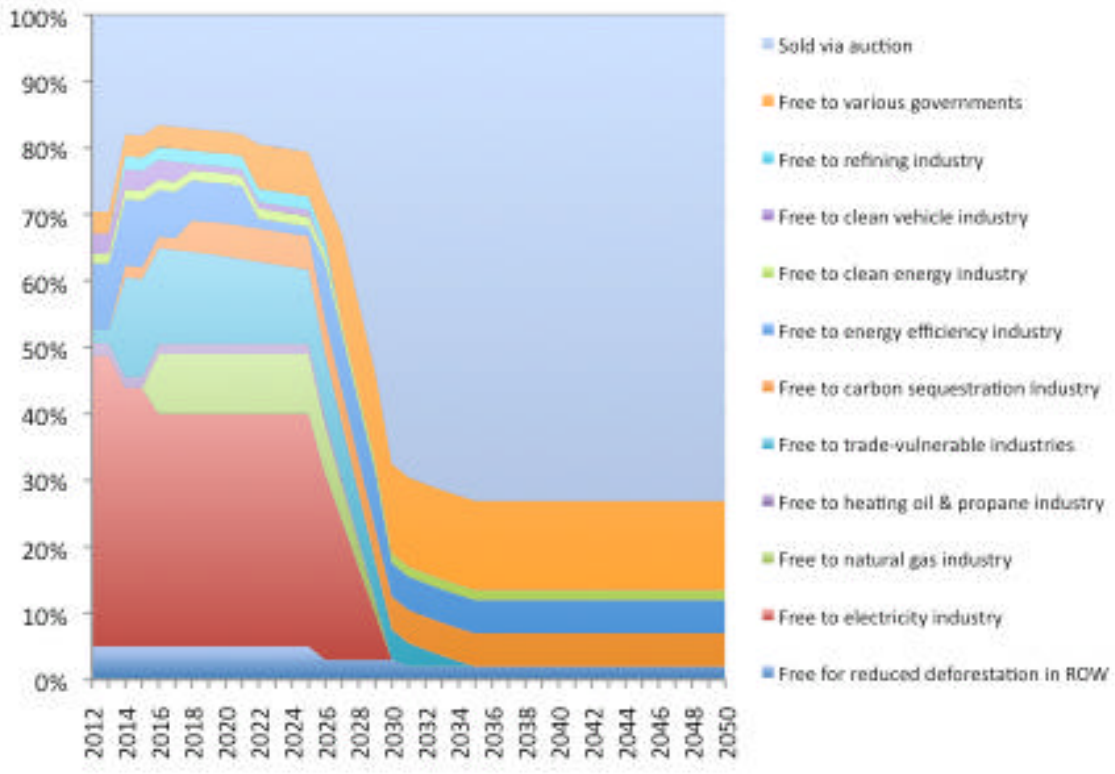
### B. ALLOWANCE DISTRIBUTIONS UNDER WAXMAN-MARKEY

Contrary to the advice of economists and others, Waxman-Markey would distribute a large share of emission allowances freely to various industries, government agencies and others. Beginning in 2012, the bill would auction less than 30 percent of allowances during the first two years of operation. The remaining 70 percent would be distributed freely to local distributors of electricity and natural gas, refining companies, "green" energy and vehicle producers, and others. By 2014, the share of free allowances would rise to 82.1 percent, with less than 18 percent auctioned. In total, between 2012 and 2025 roughly 80 percent of allowances would be distributed freely, with the remaining 20 percent auctioned.

Figure 7 illustrates the distribution of emission allowances under Waxman-Markey between industries, government agencies, and others over the complete lifecycle of the bill from 2012 to 2050.

[22] See, for example, the recent statement by Laurie Williams and Allen Zabel before the House Ways and Means Committee (February 25, 2009) available at www.waysandmeans.house.gov/hearings.asp?formmode=view&id=7641; the more extensive discussion paper is available at www.carbonfees.org/home/Cap-and-TradeVsCarbonFees.pdf.

**FIGURE 7.** DISTRIBUTION OF FREE VS. AUCTIONED ALLOWANCES UNDER WAXMAN-MARKEY, 2012-2050




Source: H.R. 2454, "American Clean Energy and Security Act of 2009".

Beginning in 2026, Waxman-Markey would slowly reduce the share of free allowances and increase the share sold via auction. By 2035, the split between free vs. auctioned allowances from the early years of the bill would be largely reversed, with 26.9 percent distributed freely and 73.1 percent auctioned. This pattern of allowance distributions then remains unchanged between 2035 and 2050.

***Lost Federal Revenue from Free Allowances***

So long as one accepts the necessity of such an emissions-control scheme, over the life of the bill Waxman-Markey's free distribution of allowances would represent a tremendous loss of revenue to the U.S. Treasury compared to a direct emissions tax or auctioned allowances. This foregone revenue is what economists refer to as the "opportunity cost" of free allowances. That is, from the standpoint of lawmakers who establish legislative priorities, free allowances are not actually free. Instead, they represent a foregone opportunity to generate revenue for other priorities, such as marginal tax rate reductions elsewhere or federal deficit reduction.

Table 7 presents the value of free allowances distributed by Waxman-Markey from 2012 through 2020. The calculations are based on the quantity of allowances specified by H.R. 2454, along with Congressional Budget Office estimates of allowance prices in various

years. As is clear from the table, the bill would distribute between $51.6 billion and $114.4 billion per year to various companies, state and local government agencies, and other organizations. In total, the bill's free allowances represent a gross loss of $777.6 billion in federal revenue between 2012 and 2020, nearly equivalent to the federal spending contained in the unprecedented 2009 "stimulus" bill.[23]

**TABLE 7.** VALUE OF ALLOWANCES DISTRIBUTED FREELY TO INDUSTRIES AND OTHERS BY WAXMAN-MARKEY, 2012-2020

| Year | Quantity of Free Allowances (Millions) | Estimated Allowance Price ($/Ton $CO_2$) | Value of Allowances Freely Distributed |
|---|---|---|---|
| 2012 | 3,225 | 16 | $51,600,000,000 |
| 2013 | 3,168 | 17 | $53,856,000,000 |
| 2014 | 4,144 | 18 | $74,592,000,000 |
| 2015 | 4,052 | 19 | $76,988,000,000 |
| 2016 | 4,530 | 21 | $95,130,000,000 |
| 2017 | 4,427 | 22 | $97,394,000,000 |
| 2018 | 4,325 | 24 | $103,800,000,000 |
| 2019 | 4,223 | 26 | $109,798,000,000 |
| 2020 | 4,086 | 28 | $114,408,000,000 |
| Total | 36,180 | n/a | $777,566,000,000 |

Source: H.R. 2454, "American Clean Energy And Security Act of 2009"; Congressional Budget Office.

To illustrate the magnitude of this foregone revenue—and thus the opportunity cost of free allowances compared with a direct emissions tax or full auctioning—this $777.6 billion gross cost is also:

- Greater than the cost of all proposed federal defense expenditures in 2010 ($707 billion).
- Greater than total proposed expenditures for Social Security in 2010 ($696 billion).
- Greater than the proposed combined cost of Medicare and Medicaid in 2010 ($742 billion).
- Equal to roughly 74 percent of the projected revenue from the federal individual income tax in 2010 ($1,051 billion).[24]

[23] Estimates of revenue "lost" represent the *gross* or initial revenue losses from distributing free emission allowances only. They do not include any potential revenue that is subsequently recaptured in the form of higher corporate income tax collections due to windfall profits obtained by recipient companies. Expressed on a *net* basis, revenue losses would equal roughly 60 percent of the gross figures reported in Table 7. See note 5 and the accompanying text for more detail.

[24] U.S. Office of Management and Budget. "Updated Summary Tables, Budget of the U.S. Government, Fiscal Year 2010." (May 9, 2009).

## C. BENEFITS TO SPECIFIC INDUSTRIES

The Waxman-Markey bill does not shower free allowances uniformly across U.S. industries. Instead, like any such scheme it singles out a select few for a particularly large share. In this section we examine the allowances granted to four industries: electricity generators and distributors, local natural gas distribution companies, "trade-vulnerable" industries, and "green" industries. Between 2012 and 2020, these four sectors would receive 86 percent of the total free allowances distributed under Waxman-Markey. In effect, these beneficiaries would receive hundreds of billions of dollars in wealth that has been transferred away from consumers and other industries that are net losers under the Waxman-Markey bill.

### *Electricity Industry*

The largest single recipient of free allowances is the electricity industry. The bill would distribute between 35 percent and 43.8 percent of total allowances to local electricity distribution companies and merchant coal generators between 2012 and 2020. Merchant coal generators would receive free allowances equal to 50 percent of the generator's emissions, slowly phasing out over time. Local electricity distribution companies would receive the balance of allowances set aside for the electricity industry, with instructions to utilize them "for the benefit of" local electricity ratepayers.

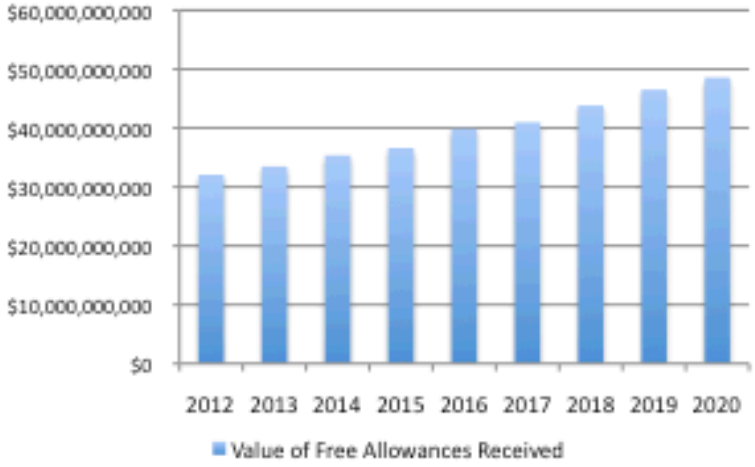
Table 8 and Figure 8 present estimates of the value of free allowances distributed to the electricity industry from 2012 through 2020. Under Waxman-Markey, the electricity industry would enjoy between $32 billion and $48.6 billion per year in free allowances, for a grand total of $357.2 billion over the period. This is a tremendous transfer of wealth to a single U.S. industry. Such a policy would be the equivalent of transferring roughly double the projected 2010 collections from the federal corporate income tax ($179 billion) to a single industry group.

**TABLE 8.** ELECTRICITY INDUSTRY: VALUE OF FREE ALLOWANCES RECEIVED UNDER WAXMAN-MARKEY, 2012-2020

| Year | Quantity of Free Allowances (Millions) | Value of Free Allowances Received |
|---|---|---|
| 2012 | 2,004 | $32,064,000,000 |
| 2013 | 1,968 | $33,456,000,000 |
| 2014 | 1,963 | $35,334,000,000 |
| 2015 | 1,926 | $36,594,000,000 |
| 2016 | 1,899 | $39,879,000,000 |
| 2017 | 1,862 | $40,964,000,000 |
| 2018 | 1,826 | $43,824,000,000 |
| 2019 | 1,789 | $46,514,000,000 |
| 2020 | 1,734 | $48,552,000,000 |
| Total | 16,971 | 357,181,000,000 |

Source: H.R. 2454, "American Clean Energy And Security Act of 2009"; Congressional Budget Office.

**FIGURE 8.** ELECTRICITY INDUSTRY: VALUE OF FREE ALLOWANCES RECEIVED UNDER WAXMAN-MARKEY, 2012-2020




Source: H.R. 2454, "American Clean Energy And Security Act of 2009"; Congressional Budget Office.

The Waxman-Markey bill stipulates that free allowances may be distributed only to regulated electric utilities that are required to use allowances "for the benefit" of ratepayers. However, as discussed in Section II, the microeconomic theory of how regulated public utilities are likely to respond to their receipt of free allowances casts serious doubt on whether the bill's requirement that benefits be passed on to ratepayers—as opposed to shareholders—will actually occur.

Setting these theoretical problems aside, there is another reason to doubt the claim that the bill's provisions are primarily designed to pass the value of free allowances on to ratepayers. Even if we assume perfect utility regulation, if lawmakers' goal were truly to channel allowance values to ratepayers, why not instead auction allowances and distribute cash proceeds to regulated utilities with instructions to pass funds directly on to ratepayers? Such a system would remove the perverse incentive of utility managers to pass forward the opportunity cost of free allowances to ratepayers and would ensure that consumers, rather than shareholders, receive the full cash value of emission allowances.

The fact that Waxman-Markey instead utilizes the more indirect and less transparent method of distributing free allowances to companies—an approach that was heavily lobbied for by the regulated firms themselves—speaks volumes about the electricity industry's own assessment of the gains it would stand to make under Waxman-Markey's freely distributed allowances.

***"Green" Industries***

The second largest recipient of largess transferred from consumers via the federal government under Waxman-Markey is a collection of firms designated as "green" companies—carbon capture and sequestration technology companies, energy efficiency and renewable energy producers, companies engaged in "clean" energy innovation, and "clean" vehicle technology companies. The bill distributes between 13.5 percent and 14.5 percent of total allowances each year free to these industries between 2012 and 2020.

Table 9 and Figure 9 detail the value of free allowances distributed to "green" industries. The bill would transfer between $10.6 billion and $18.7 billion per year to these firms, for a grand total of $135.3 billion between 2012 and 2020. The magnitude of this financial transfer would be equivalent to lawmakers' channeling approximately one-half of the total proposed 2010 federal spending on Medicaid ($290 billion) to a single sector of the U.S. economy.

**TABLE 9.** "GREEN" INDUSTRIES: VALUE OF FREE ALLOWANCES RECEIVED UNDER WAXMAN-MARKEY, 2012-2020

| Year | Quantity of Free Allowances (Millions) | Value of Free Allowances Received |
|---|---|---|
| 2012 | 664 | $10,624,000,000 |
| 2013 | 652 | $11,084,000,000 |
| 2014 | 820 | $14,760,000,000 |
| 2015 | 805 | $15,295,000,000 |
| 2016 | 719 | $15,099,000,000 |
| 2017 | 705 | $15,510,000,000 |
| 2018 | 691 | $16,584,000,000 |
| 2019 | 677 | $17,602,000,000 |
| 2020 | 669 | $18,732,000,000 |
| Total | 6,402 | $135,290,000,000 |

Source: H.R. 2454, "American Clean Energy And Security Act of 2009"; Congressional Budget Office.

**FIGURE 9.** "GREEN" INDUSTRIES: VALUE OF FREE ALLOWANCES RECEIVED UNDER WAXMAN-MARKEY, 2012-2020


Source: H.R. 2454, "American Clean Energy And Security Act of 2009"; Congressional Budget Office.

***"Trade-Vulnerable" Industries***

The third-largest recipient of free allowances under Waxman-Markey is a collection of industries designated as "trade-vulnerable" by lawmakers. These industry groups, including textiles, steel, and agriculture, generally face intense international competition in the marketplace. Because these industries are perceived as being less able to pass through price increases to consumers—in the language of economics, they face relatively elastic demand curves for their products—the bill confers special benefits on them.

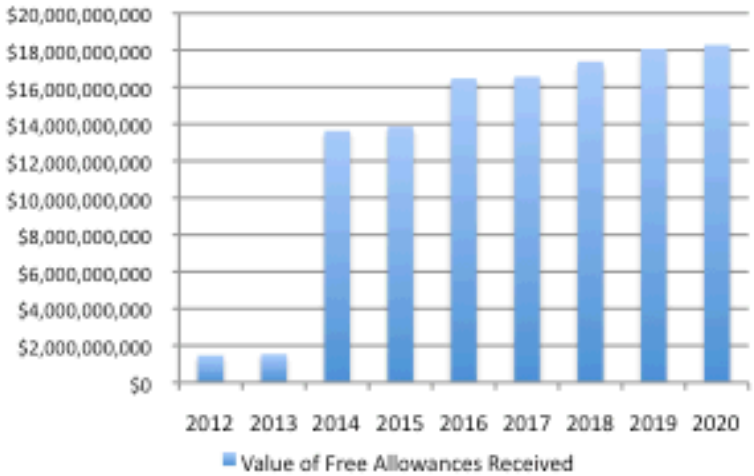
Table 10 and Figure 10 present the value of allowances that would be distributed freely to "trade-vulnerable" industries. Between 2012 and 2020, the bill would transfer between $1.5 billion and $18.3 billion per year to these companies, for a grand total of $117.2 billion over the period. That amounts to an industry subsidy roughly equal to three-fourths of the total amount spent by U.S. households on home electricity in 2007.[25]

**TABLE 10.** "TRADE-VULNERABLE" INDUSTRIES: VALUE OF FREE ALLOWANCES RECEIVED UNDER WAXMAN-MARKEY, 2012-2020

| Year | Quantity of Free Allowances (Millions) | Value of Free Allowances Received |
|---|---|---|
| 2012 | 92 | $1,472,000,000 |
| 2013 | 90 | $1,530,000,000 |
| 2014 | 757 | $13,626,000,000 |
| 2015 | 729 | $13,851,000,000 |
| 2016 | 784 | $16,464,000,000 |
| 2017 | 753 | $16,566,000,000 |
| 2018 | 724 | $17,376,000,000 |
| 2019 | 695 | $18,070,000,000 |
| 2020 | 653 | $18,284,000,000 |
| Total | 5,277 | $117,239,000,000 |

Source: H.R. 2454, "American Clean Energy And Security Act of 2009"; Congressional Budget Office.

**FIGURE 10.** "TRADE-VULNERABLE" INDUSTRIES: VALUE OF FREE ALLOWANCES RECEIVED UNDER WAXMAN-MARKEY, 2012-2020




Source: H.R. 2454, "American Clean Energy And Security Act of 2009"; Congressional Budget Office.

[25] U.S. Bureau of Labor Statistics, "Consumer Expenditures Survey," available online at bls.gov/cex/.

***Local Natural Gas Distribution Companies***

The final industry singled out for free allowances under Waxman-Markey is local natural gas distribution companies. In the early years of the program, the industry receives no special assistance from lawmakers. But beginning in 2016, the bill establishes a considerable subsidy that endures through 2029.

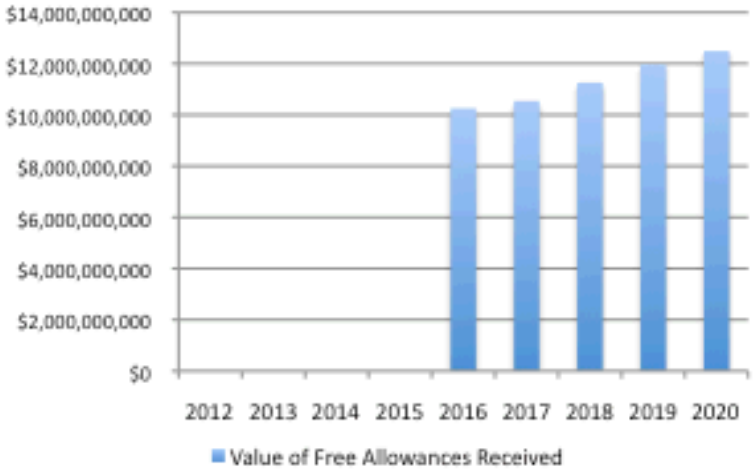
Table 11 and Figure 11present the value of allowances received freely by local natural gas distributors. Between 2016 and 2020, the bill distributes between $10.2 billion and $12.5 billion per year to these companies, for a grand total of $56.5 billion over the period. While this amount is relatively small compared to other industries singled out by the bill, it would still be equivalent to channeling nearly three times the entire 2010 collections from the federal estate tax ($20 billion) to natural gas distribution companies.

**TABLE 11.** LOCAL NATURAL GAS DISTRIBUTION COMPANIES: VALUE OF FREE ALLOWANCES RECEIVED UNDER WAXMAN-MARKEY, 2012-2020

| Year | Quantity of Free Allowances (Millions) | Value of Free Allowances Received |
|---|---|---|
| 2012 | 0 | $0 |
| 2013 | 0 | $0 |
| 2014 | 0 | $0 |
| 2015 | 0 | $0 |
| 2016 | 488 | $10,248,000,000 |
| 2017 | 479 | $10,538,000,000 |
| 2018 | 469 | $11,256,000,000 |
| 2019 | 460 | $11,960,000,000 |
| 2020 | 446 | $12,488,000,000 |
| Total | 2,342 | $56,490,000,000 |

Source: H.R. 2454, "American Clean Energy And Security Act of 2009"; Congressional Budget Office.

**FIGURE 11.** LOCAL NATURAL GAS DISTRIBUTION COMPANIES: VALUE OF FREE ALLOWANCES RECEIVED UNDER WAXMAN-MARKEY, 2012-2020




Source: H.R. 2454, "American Clean Energy And Security Act of 2009"; Congressional Budget Office.

# V. CONCLUSION

The goal of H.R. 2454, the "Waxman-Markey" cap-and-trade bill, is to reduce U.S. greenhouse gas emissions in a way that spreads the burdens of climate policy fairly across the nation's income groups and industry sectors. But as detailed in this study, the bill falls far short of that goal.

The Waxman-Markey bill distributes roughly $778 billion in free emission allowances to various politically favored industries and others between 2012 and 2020, at the direct expense of non-favored industries and U.S. consumers. The ultimate impact of this giveaway of emission allowances is to transform the already regressive gross burden of a cap-and-trade system into a highly regressive federal climate policy that effectively redistributes tens of billions of dollars per year from low- and middle-income households to high-income shareholders.

Contrary to recent CBO estimates that rely on a theoretically unsupported assumption about the economic impact of free allowances on U.S. households, we find that the lowest-earning 80 percent of families would bear the entire net burden of the Waxman-Markey bill, with the nation's highest-earning 20 percent enjoying a substantial annual profit on a net basis. This regressive impact is due almost entirely to the large fraction of emission allowances lawmakers chose to grant freely to various politically favored U.S. industries when drafting H.R. 2454.

# VI. METHODOLOGY AND DATA SOURCES

This section describes the methodology and data sources used for this study's distributional analysis of household burdens under Waxman-Markey.

## A. INPUT-OUTPUT MODELING

The distributional estimates of gross household burdens from Waxman-Markey are based on a standard Leontief input-output model developed by Chamberlain Economics, L.L.C. for use in modeling the impact of various climate policies on U.S. households. The model estimates the production relationships among133 U.S. economic sectors and consumer prices, both with and without a cap-and-trade system, based on the following equations:[26]

(1) Consumer Prices w/o Cap-and-Trade (Commodity Level): $P_c = Z' \cdot (I - A')^{-1} \cdot V$

(2) Consumer Prices w/ Cap-and-Trade (Commodity Level): $\hat{P}_c = Z' \cdot (I - A' \cdot T)^{-1} \cdot V$

Where $V$ is an $n \times 1$ vector of each industry's value added, $(I - A' \cdot T)^{-1}$ is the Leontief inverse matrix, $T$ is an $n \times n$ matrix with (1 + industry effective cap-and-trade burden*t*) along the diagonal and zeros elsewhere, and $Z$ isan $n \times m$ price transformation matrix that converts industry-level cap-and-trade burdens into commodity-level price impacts.

The data for the modelare drawn fromthe2002 benchmark input-output accounts from the U.S. Bureau of Economic Analysis (BEA), and incorporates consumer expenditure and other data from the Consumer Expenditure Survey (CEX) from the U.S. Bureau of Labor Statistics.For the model's complete methodology, see Chamberlain (2009).

## B. INCIDENCE ASSUMPTIONS

Estimates of net household burdens from Waxman-Markey require various assumptions about the economic incidence of the bill's freely distributed emission allowances. Table 12 presents a list of provisions allocated as benefits to households in the "baseline" scenario presented in Table 6 and Figure 6, along with the assumed economic incidence and the statistical allocators used to distribute these benefits to households.

The 2020 values of the bill's provisions are based on the quantity of allowances allocated by H.R. 2454 in that year and the 2020 emission allowance price forecasted by the Congressional Budget Office. The 2020 values of the various provisions are then deflated to 2006 dollars based on a long-term Consumer Price Index forecast provided by Conway Pedersen Economics, Inc.[27]These deflated 2006 amounts are then distributed to households on the basis of the statistical allocators listed in Table 12.

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[26] For the complete methodology, see Andrew Chamberlain, "Who Pays for Climate Policy? New Estimates of the Household Burden and Economic Impact of a U.S. Cap-and-Trade System," *Tax Foundation Working Paper No. 6*. (March 2009).

[27] Conway Pedersen Economics, Inc. "History and Ten Year Forecast." (June 2009). Available at www.economicforecaster.com.

**TABLE 12.** INCIDENCE ASSUMPTIONS FORTHE "BASELINE" ESTIMATES OF NET HOUSEHOLD BURDENS FROM WAXMAN-MARKEY

| Allowance Allocation from H.R. 2454 | Assumed Economic Incidence | Statistical Allocator | 2020 Share | 2020 Value | Value in 2006 Dollars |
|---|---|---|---|---|---|
| Supplemental Reductions | Does not accrue to U.S. households. | None. | 5.0% | $6,937,000,000 | $5,192,231,011 |
| Electricity Consumers | Shareholders of electricity utilities. | Dividends, interest and rental income | 35.0% | $48,559,000,000 | $36,345,617,075 |
| Natural Gas Consumers | Shareholders of natural gas companies. | Dividends, interest and rental income | 9.0% | $12,486,600,000 | $9,346,015,819 |
| Home Heating Oil and Propane Consumers | Consumers of home heating oil and propane. | Expenditures on fuel oil and other fuels | 1.5% | $2,081,100,000 | $1,557,669,303 |
| Low Income Consumers | Households based on reduction in purchasing power from regulation of GHGs and households participating in the Supplemental Nutrition Assistance Program. | Income from public assistance and food stamps | 15.0% | $20,811,000,000 | $15,576,693,032 |
| Trade-Vulnerable Industries | Shareholders of trade-vulnerable industries | Dividends, interest and rental income | 13.3% | $18,477,872,459 | $13,830,385,237 |
| Deployment of Carbon Capture and Sequestration Technology | Shareholders of energy companies engaged in carbon capture and sequestration. | Dividends, interest and rental income | 5.0% | $6,937,000,000 | $5,192,231,011 |
| Investment in Energy Efficiency and Renewable Energy | Shareholders of companies engaged in energy efficiency and renewable energy efforts. | Dividends, interest and rental income | 5.5% | $7,630,700,000 | $5,711,454,112 |
| Investment in Energy Efficiency and Renewable Energy | Shareholders of companies engaged in energy efficiency and renewable energy efforts. | Dividends, interest and rental income | 0.5% | $693,700,000 | $519,223,101 |
| Clean Energy Innovation Centers | Shareholders of companies engaged in clean energy innovation activities. | Dividends, interest and rental income | 1.5% | $2,081,100,000 | $1,557,669,303 |
| Investment in Clean Vehicle Technology | Shareholders of companies engaged in activities related to clean vehicle technologies. | Dividends, interest and rental income | 1.0% | $1,387,400,000 | $1,038,446,202 |
| Domestic Fuel Production | Shareholders of domestic refining companies. | Dividends, interest and rental income | 2.0% | $2,774,800,000 | $2,076,892,404 |
| Investment in Workers | Households earning wages and salaries. | Wage and salary income. | 0.5% | $693,700,000 | $519,223,101 |
| Domestic Adaptation | Does not accrue to U.S. households. | None. | 0.9% | $1,248,660,000 | $934,601,582 |
| Domestic Adaptation - Climate Change Health Protection and Promotion Fund | Does not accrue to U.S. households. | None. | 0.1% | $138,740,000 | $103,844,620 |
| Wildlife and Natural Resource Adaptation | Does not accrue to U.S. households. | None. | 0.4% | $534,149,000 | $399,801,788 |
| Wildlife and Natural Resource Adaptation - Natural Resources Climate Change Adaptation Fund | Does not accrue to U.S. households. | None. | 0.6% | $853,251,000 | $638,644,414 |
| International Adaptation | Does not accrue to U.S. households. | None. | 1.0% | $1,387,400,000 | $1,038,446,202 |
| International Clean Technology Deployment | Does not accrue to U.S. households. | None. | 1.0% | $1,387,400,000 | $1,038,446,202 |
| Other - Deficit Reduction | Does not accrue to U.S. households. | None. | 1.2% | $1,639,427,541 | $1,227,084,694 |
| Total | | | 100.0% | $137,100,572,459 | $102,617,535,520 |

Source: Chamberlain Economic, L.L.C.

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