The Economic Effects of Implementing Environmental Full Cost Accounting

New Mexico

Supercomputing Challenge

Final Report

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Executive Summary

The environmental full cost (EFC) of production is the monetarily quantifiable cost of damage of production to the environment. Environmental full cost accounting (EFCA) is a process that taxes companies based on the EFC of producing their products. Since taxing companies based on the full EFC could damage the economy, I made a program that can determine the percent of the EFC that could be taxed to companies without harming the economy. This program is limited to 10 companies and uses CO_2 emissions. The percent of the EFC that could be taxed without harming the economy was calculated to be 21%. This is higher than predicted, which may be due to the limited scope.

The Project

Introduction

This project aimed to find the maximum percent value of the EFC of company production that could be taxed to companies without devastating the economy. The EFC used in this experiment is based off of a study by Drew T. Shindell, which quotes the U.S. government explaining the factors of this cost as "intended to include (but not limited to) changes in net agricultural productivity, human health, property damages from increased flood risk, and the value of ecosystem services due to climate change." This basic principle of taxing companies for environmentally harmful actions is known as environmental full cost Accounting (EFCA). EFCA is one step environmental scientists have come up with to help prevent environmental degradation by disincentivizing environmentally degrading processes in production. This is important because our global environment is being pushed to its limits, causing damage to many species and many environmental processes. If action isn't taken soon, there may not be a choice to take action in the future, so this project intends to help this field with useful data that could be used to make logical arguments to help the lawmakers help the environment.

Description

In the limited time I had, I chose to focus solely on CO_2 emissions by natural gas and coal. I used data from the leading 10 retailers in the United States to calculate inflation rate with taxes at different percent values of the EFC. Since, according to an article on Investopedia be Marc Davis, "Controlled inflation, no higher than 6% and

perhaps somewhat lower, may have a beneficial impact on economic recovery, according to some economists," my goal was to find the percent of the EFC taxable to equal 6% of the current sales. Here, the tax is assumed to go directly to sales prices and profit is assumed to stay the same throughout. Then, taking into account the 2.5% average increase per year in inflation in the coming years according to Statista, 3.5% was the desired inflation rate. Finally, if coal and natural gas emissions make up 15% of environmental degradation, the desired inflation rate was 0.525%.

The program works by taking in data on the annual CO_2 emissions of the chosen businesses. It then multiplies each of these data by a conversion factor of 200 thousand dollars per gigawatt hour, which is the average EFC of coal and natural gas according to the study by Shindell. Finally, this cost for each business is multiplied by a chosen percent and the data is written to an xlsx spreadsheet.

Results

Using the 0.525% inflation rate, it turned out that a tax rate of 21% of the EFC per year would be the maximum rate at which corporations could be taxed without harming the economy. As can be seen in table 2 and graphs 4 and 5 in Appendix B, the annual EFC is miniscule in comparison to the annual sales and expenses. This shows that this 21% EFC tax would likely cause little financial harm to the companies.

Conclusion

This project determined that companies could be taxed at 21% of the EFC annually. This 21% EFC tax rate annually is higher than my 5%-or-lower prediction, which could be due to the limited scope as discussed previously. This could also be the correct value, but a much larger model would be needed to be sure of the results. When plugged in, the 21% EFC is calculated to be a small fraction of the company sales, as was expected, but with more environmental factors incorporated, this would rise, which would likely harm the economy more.

Recommendations

This data had a highly limited scope since there was only time to account for CO_2 emissions and only the top 10 retailers' data was used. Also, the EFC could be higher in some locations than others, which could devastate these areas economically.

Acknowledgements

I'd like to thank Todd Quinn, a UNM business librarian, for helping me look for economic models to fit my needs and ultimately helping me find resources with data that I could use in lieu of a model since no economic model was found.

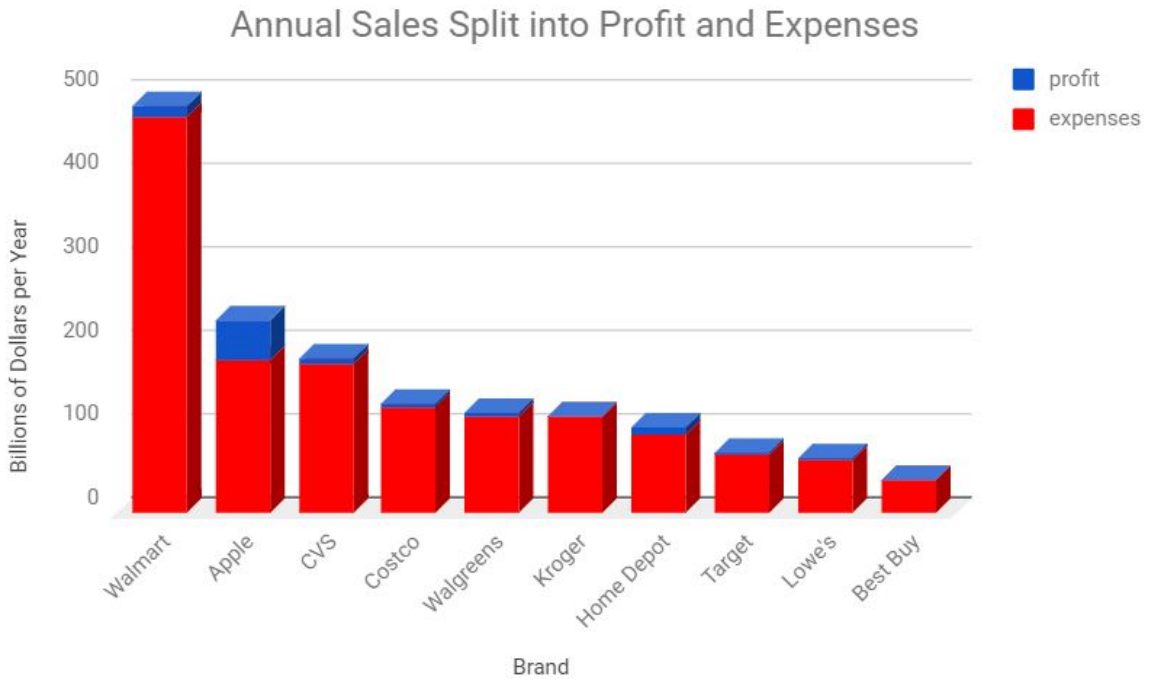
APPENDICES

Appendix A: Company Data

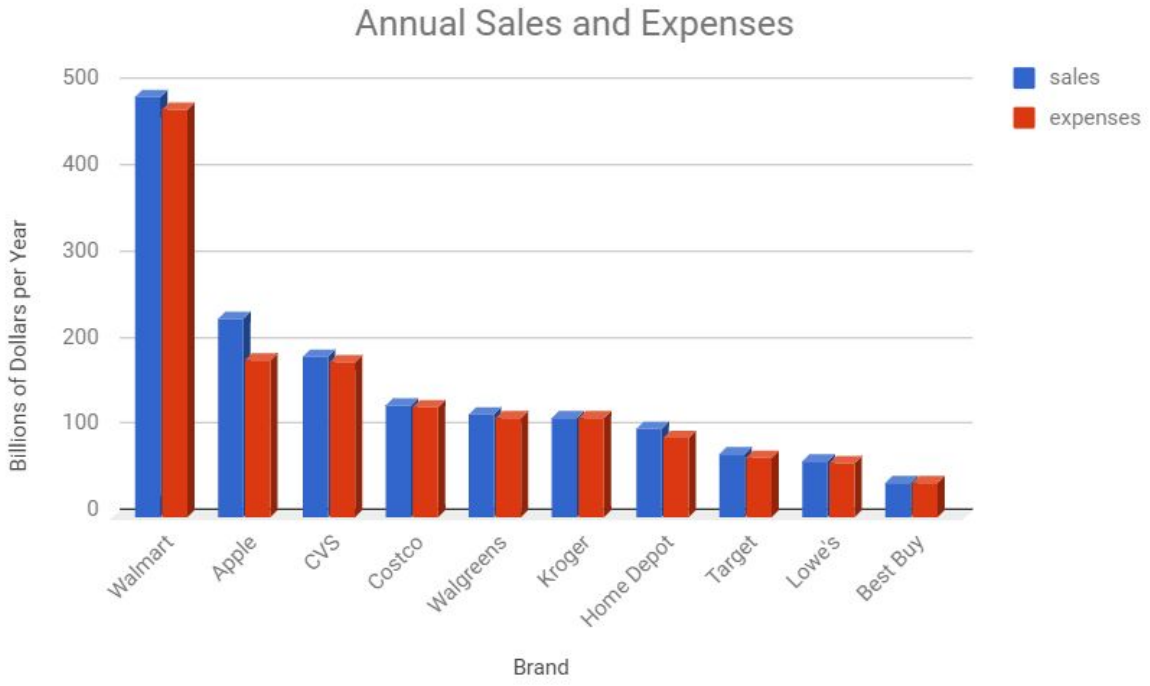
Table 1: Company Annual Unclean Energy Consumption, Sales, Expenses, and Profit

Company	Unclean Energy Consumption (GWh)	Sales (M$/yr)	Expenses (M$/yr)	Profit (M$/yr)
Walmart	34,000	485,873	472,230	13,643
Apple	4,600	229,234	180,883	48,351
CVS	12,800	184,765	178,143	6,622
Costco	13,500	129,025	126,346	2,679
Walgreens	19,100	118,210	114,130	4,080
Kroger	36,600	115,337	113,362	1,975
Home Depot	21,500	100,904	92,274	8,630
Target	24,100	71,879	68,945	2,934
Lowe's	17,100	65,017	61,924	3,093
Best Buy	5,800	39,403	38,175	1,228

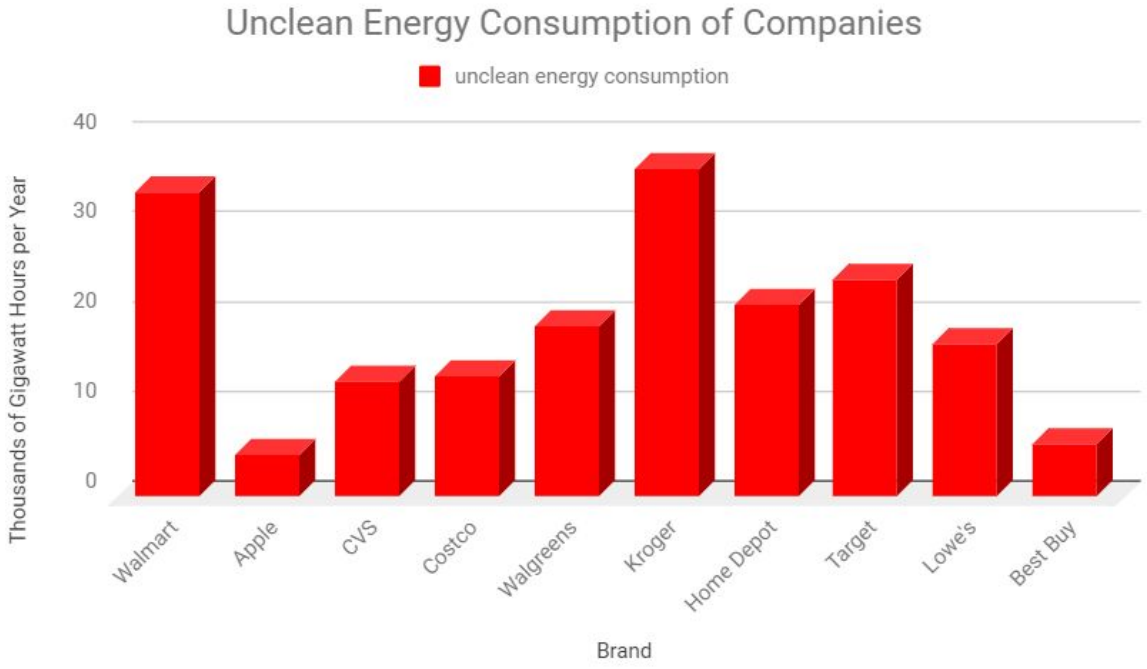
Graph 1



Graph 2



Graph 3

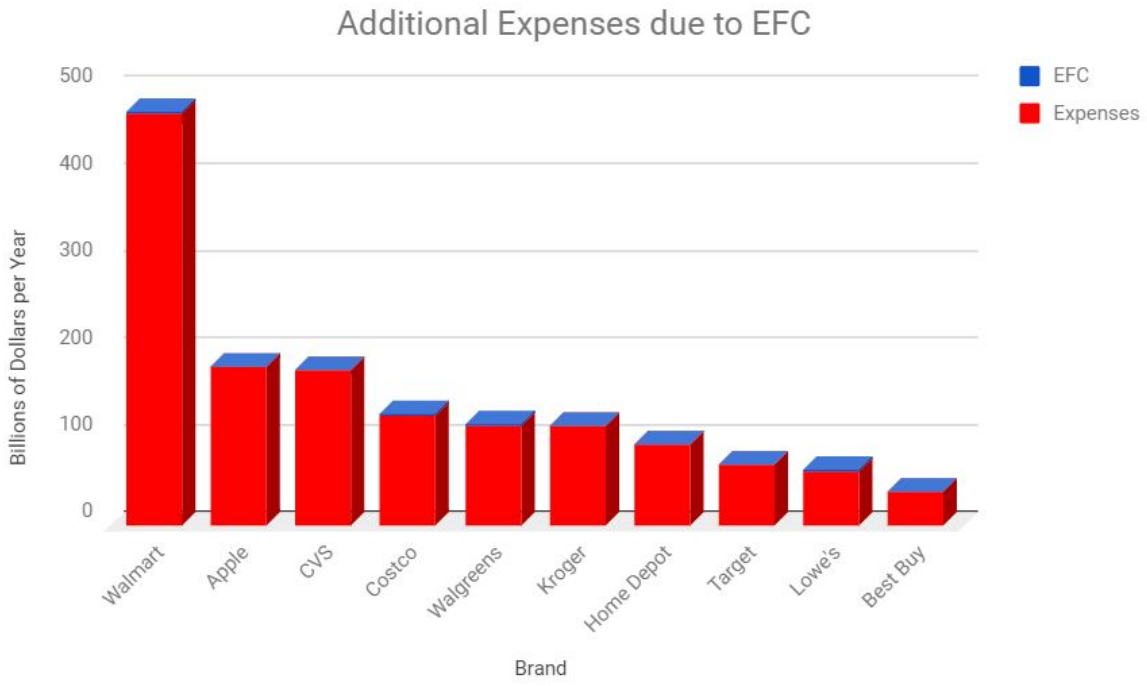


Appendix B: EFC Data

Table 2: Annual EFC Compared to Annual Company Expenses and Sales

Company	Sales	Expenses	EFC
Walmart	485,873	472,230	1,428
Apple	229,234	180,883	193
CVS	184,765	178,143	538
Costco	129,025	126,346	567
Walgreens	118,210	114,130	802.2
Kroger	115,337	113,362	1537.2
Home Depot	100,904	92,274	903
Target	71,879	68,945	1012.2
Lowe's	65,017	61,924	718.2
Best Buy	39,403	38,175	243.6

Graph 4



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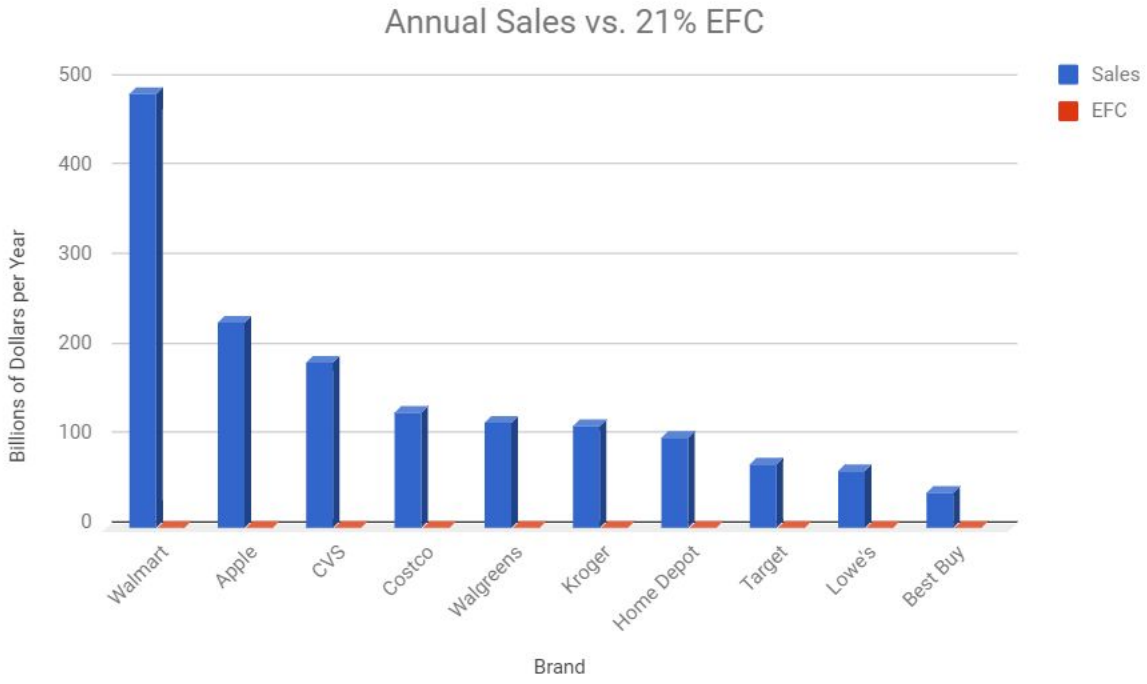
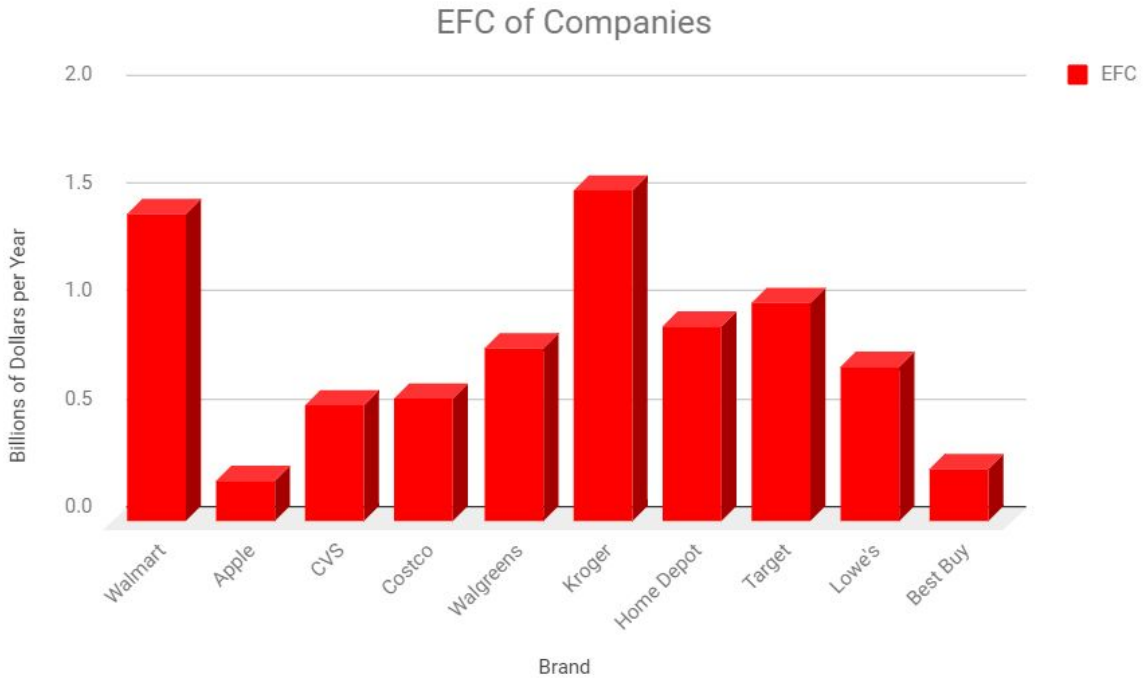


Graph 6



Resources

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