Paper Assignment:

Light-Duty Elective Vehicle Tax Credits

Linus Ghanadan

AREC481: Environmental Economics

April 26, 2023

Introduction

In August 2022, President Biden signed into law the Inflation Reduction Act, which his Administration has claimed to be the most important climate legislation in United States history.[1] One specific policy provision put forth in the IRA is the extension of the light-duty electric vehicle tax credit through 2032.[2] This tax credit allows consumers purchasing a new EV to obtain a federal tax credit of at least $2,500 and up to $7,500, depending on the EV's battery capacity.[3] The most significant change to the light-duty EV tax credit from the IRA is that it gets rid of the cap of 200,000 vehicles per automaker that can be eligible for the tax credit.[4] Under the previous policy, new EVs made by Tesla and General Motors had become ineligible for federal tax credits for this exact reason. However, the elimination of this cap in the IRA means that new Tesla and General Motors EVs will now qualify for the tax credit through 2032, and other automakers who were previously approaching the 200,000 vehicle cap no longer need to worry about losing tax credit eligibility. In addition, another major change to the light-duty EV tax credit put forth was the introduction of an income cap restricting consumer eligibility, meaning households and individuals that earn above a certain income threshold are no longer eligible for the tax credit.[5] This income cap is $300,000 for married couples filing jointly, $225,000 for heads of households, and $150,000 for all other filers.[6]

Economic Analysis

---

[1] *Inflation Reduction Act Guidebook*. (January 2023). The White House. Retrieved April 27, 2023, from https://www.whitehouse.gov/cleanenergy/inflation-reduction-act-guidebook/
[2] *Inflation Reduction Act Impacts on Electric Vehicles*. (n.d.). Electrification Coalition. Retrieved April 27, 2023, from https://electrificationcoalition.org/work/federal-ev-policy/inflation-reduction-act/
[3] Ibid.
[4] Ibid.
[5] Ibid.
[6] *Credits for New Clean Vehicles Purchased in 2023 or After*. (April 2023). Internal Revenue Service. Retrieved April 27, 2023, from https://www.irs.gov/credits-deductions/credits-for-new-clean-vehicles-purchased-in-2023-or-after

The federal tax credit policy is likely to accomplish its objective of lowering U.S. greenhouse gas emissions from light-duty vehicles, which accounted for over 15% of total U.S. greenhouse gas emissions in 2020.[7] The idea behind the light-duty EV tax credit is that it will provide an incentive for Americans who would otherwise buy a new gasoline-powered vehicle to instead buy an EV, which typically generates less emissions. Under the new incentives put forth in the IRA, a report from the International Council on Clean Transportation estimates that between 56% and 67% of new light-duty vehicles purchased in the U.S. will be EVs in 2032.[8] In contrast, without IRA incentives, the same report estimates that only about 40% of new light-duty vehicles in the U.S. would be EVs in 2032.[9] In the years before 2032, the difference between the two scenarios is even more stark. For example, in 2027, between 32% and 42% of new light-duty vehicles purchased in the U.S. are projected to be EVs under the IRA incentives, as opposed to just 22% in the counterfactual scenario.[10] Furthermore, the U.S. Energy Information Administration projected in 2021 that the total light-duty vehicle stock for countries within the Organization for Economic Cooperation and Development (OECD), such as the United States, will remain about the same over the next decade, before beginning to gradually decrease.[11] If this projection is correct in regards to the United States, there will be about the same number of total light-duty vehicles in the United States, and since a larger share will be

---

[7] *Fast Facts on Transportation Greenhouse Gas Emissions*. (July 2022). United States Environmental Protection Agency. Retrieved April 27, 2023, from https://www.epa.gov/greenvehicles/fast-facts-transportation-greenhouse-gas-emissions

[8] Slowik, P., Searle, S., Basma, H., Miller, J., Zhou, Y., Rodríguez, F., Buysse, C., Minjares, R., Kelly, S., Pierce, L., Orvis, R., & Baldwin, S. (January 2023). Analyzing the impact of the Inflation Reduction Act on electric vehicle uptake in the United States. *The International Council on Clean Transportation*. Retrieved April 27, 2023, from https://theicct.org/publication/ira-impact-evs-us-jan23/

[9] Ibid.

[10] Ibid.

[11] Dwyer, M. (October 2021). EIA projects global conventional vehicle fleet will peak in 2038. *United States Energy Information Administration*. Retrieved April 27, 2023, from https://www.eia.gov/todayinenergy/detail.php?id=50096

EVs, the total U.S. greenhouse gas emissions from light-duty vehicles would decrease substantially.

The main efficiency cost that results from the light-duty EV tax credit policy is that it incentivizes there to be more total cars on the road than is socially optimal. The key reason that this occurs is because the policy does not explicitly incentivize consumers to buy fewer new gasoline-powered light-duty vehicles. Instead, the tax credit only incentivizes consumers to buy more new light-duty EVs. Due to the fact that light-duty EVs are a substitute good for gasoline-powered light-duty vehicles, the policy still results in fewer gasoline-powered vehicles, and thus, there is a reduction in deadweight loss resulting from the negative externality posed by greenhouse gas emissions from gasoline-powered light-duty vehicles. However, the efficiency of the policy at achieving this deadweight loss reduction is at least partially offset by increasing the deadweight loss that results from the adverse incentive to purchase more new light-duty EVs, as opposed to just fewer gasoline-powered light-duty vehicles. For example, a family that would have previously bought one light-duty vehicle may now buy two light-duty vehicles because the tax credit makes doing so more affordable. As a result, there are increases in the deadweight loss from traffic congestion and accidents, as the cost resulting from both of these externalities increases when there are more cars on the road, regardless of whether the cars are electric or gasoline-powered.

Furthermore, despite EVs generally being more environmentally friendly than gasoline-powered vehicles, driving EVs still has some external environmental costs that are not internalized by the consumer under the tax credit policy. This adverse incentive is potentially made worse because of how the federal tax credit policy operates on the assumption that the environmental benefit from driving an EV is not dependent on one's location within the country.

While it is true that EVs driven in the U.S. are on average more environmentally-friendly than comparable gasoline vehicles, the benefits vary significantly depending on location. For example, a 2016 study published in the journal *American Economic Review* found that the environmental benefit of EVs ranged from $1.86 per mile in California to -$3.31 per mile in North Dakota.[12] In this study, environmental benefit per mile was calculated as *damage per mile (gasoline) - damage per mile (electric)*, and the authors found that for over 35 U.S. States, driving an EV was actually worse for the environment than driving a comparable gasoline vehicle due to carbon-intensive electricity sources.[13] Unlike California, U.S. States like North Dakota are significantly more reliant on carbon-intensive electricity sources, making driving EVs in these States much more damaging to the environment. Under the federal tax credit policy, this poses an efficiency cost because it results in many instances where the incentive does not match up with the actual environmental benefit coming from the car purchase. However, it is worth noting that the 2016 study from *American Economic Review* was based on the U.S. electricity grid from 2010 to 2012.[14] Since then, U.S. electricity production has become substantially less carbon-intensive, and this trend is likely to only accelerate in the next decade. Nonetheless, the federal tax credit still fails to take into account any regional differences when determining the level of incentive, which means these incentives will not necessarily correspond to real environmental benefits.

Moreover, automakers, particularly those that are on the forefront of EV technological innovation, gain the most from the federal tax credit policy. This tax credit to consumers benefits automakers because it lowers the cost of their light-duty EVs without having any impact on the

---

[12] Holland, S.P., Mansur, E.T., Muller, N.Z., & Yates, A.J. (2016). Are There Environmental Benefits from Driving Electric Vehicles? The Importance of Local Factors. *American Economic Review*, 106(12), 3700-3729. http://dx.doi.org/10.1257/aer.20150897

[13] Ibid.

[14] Ibid.

profit margins they receive from the transaction. Thus, consumers will demand a higher quantity of new light-duty EVs than they otherwise would in the absence of the tax credit, and the cost to automakers of supplying these additional EVs will essentially be provided to them through federal government funding. Conversely, the public at large loses the most from the tax credit policy. While the public does gain from the overall decrease in greenhouse gas emissions, they also bear the efficiency costs of the policy, namely the increase in traffic congestion and accidents.

In terms of how the federal tax credit impacts people of different income levels, the policy is quite equitable, especially following the IRA's implementation of an income cap. Prior to the IRA, many people argued that the subsidy was just an extra gift to wealthy people who were already well-off enough to afford a luxury EV, such as the Tesla Model S. While it is true that luxury EVs were the first to be marketed and sold at a large scale in the United States, traditional economic theory seems to suggest that, if anything, a uniform federal tax credit for light-duty EVs would provide a more significant benefit to those with lower incomes. This is because people in lower income groups tend to spend a larger share of their income on transportation costs than those with higher incomes, and thus, the uniform federal tax credit goes further in helping someone with a low income pay their transportation costs than it does someone with a high income. Thus, the light-duty EV tax credit was always a reasonably equitable policy, but with the addition of an income cap, the policy is now particularly equitable in allocating government spending to those who benefit from it the most.

Implications & Conclusion

The federal tax credit for light-duty EVs is very likely to succeed at decreasing U.S. greenhouse gas emissions from light-duty vehicles, but there are substantial efficiency costs that

at least partially offset the societal benefits of fewer greenhouse gas emissions, resulting from adverse incentives regarding traffic congestion, accidents, and in some cases even environmental damage. Ultimately, the light-duty EV federal tax credit likely has more social benefits than costs. However, there are other policy options that would achieve the same reduction in emissions with significantly lower efficiency costs. For example, implementing a higher gasoline tax that corrects for the social cost of greenhouse gas emissions represents a policy choice that would be more efficient. In addition, instituting tighter fuel efficiency standards and allowing trading among automakers based on the efficiency of their vehicles would also be more efficient. The reason why both of these policies would be more efficient is because there would be no adverse incentive for there to be more than the socially optimal number of vehicles on the road. In fact, both of these policies would actually encourage there to be less total vehicles on the road. This means that there would be a decrease in the deadweight loss posed by traffic congestion and accidents, which would increase the net efficiency of either policy beyond just its environmental benefits. Alas, economic analysis suggests that society would be better off with one of these two policies, but at the same time, politicians appear extremely averse to these options.

Bibliography

Credits for New Clean Vehicles Purchased in 2023 or After. (April 2023). Internal Revenue Service. Retrieved April 27, 2023, from https://www.irs.gov/credits-deductions/credits-for-new-clean-vehicles-purchased-in-2023-or-after

Dwyer, M. (October 2021). EIA projects global conventional vehicle fleet will peak in 2038. *United States Energy Information Administration*. Retrieved April 27, 2023, from https://www.eia.gov/todayinenergy/detail.php?id=50096

Fast Facts on Transportation Greenhouse Gas Emissions. (July 2022). United States Environmental Protection Agency. Retrieved April 27, 2023, from https://www.epa.gov/greenvehicles/fast-facts-transportation-greenhouse-gas-emissions

Holland, S.P., Mansur, E.T., Muller, N.Z., & Yates, A.J. (2016). Are There Environmental Benefits from Driving Electric Vehicles? The Importance of Local Factors. *American Economic Review*, 106(12), 3700-3729. http://dx.doi.org/10.1257/aer.20150897

Inflation Reduction Act Guidebook. (January 2023). The White House. Retrieved April 27, 2023, from https://www.whitehouse.gov/cleanenergy/inflation-reduction-act-guidebook/

Inflation Reduction Act Impacts on Electric Vehicles. (n.d.). Electrification Coalition. Retrieved April 27, 2023, from https://electrificationcoalition.org/work/federal-ev-policy/inflation-reduction-act/

Slowik, P., Searle, S., Basma, H., Miller, J., Zhou, Y., Rodríguez, F., Buysse, C., Minjares, R., Kelly, S., Pierce, L., Orvis, R., & Baldwin, S. (January 2023). Analyzing the impact of the Inflation Reduction Act on electric vehicle uptake in the United States. *The International Council on Clean Transportation*. Retrieved April 27, 2023, from https://theicct.org/publication/ira-impact-evs-us-jan23/