



Super-green car premium behind 1 out of 3 plug-in hybrid cars in Sweden

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In order to reduce fossil dependence of the transport sector and to promote the development and distribution of electric and hybrid cars, various types of government-financed subsidy programs have become commonplace in the Nordic countries.

Researchers at IVL Swedish Environmental Research Institute and University of Gothenburg have managed to isolate the effects of the super green car premium, introduced in Sweden in 2012, from the effects of other policy instruments in use at the same time.

The study finds that the super-green car premium lies behind 1 out of 3 registered plug-in hybrid cars registered during the period 2012 – 2015. The remaining 2 out of 3 plug-in hybrid cars that received the premium during the period 2012 - 2015 cannot be explained by the premium.

The results bring new light on the effects of subsidies for promoting new transport technologies and provide insight to effective future designs of policy instruments such as the new bonus-malus system in Sweden.

Key findings

- The super green car premium caused the purchase and registration of 1 out of 3 plug-in hybrid cars with emissions below 50 grams CO₂/km.
- 2 out of 3 plug-in hybrid cars that received the premium would have been purchased and registered even without the super green car premium.
- Most of the cars that received the premium were company cars.
- The super green car premium partly overlapped with several other policy instruments that were in use in Sweden at the same time also affecting the number of registered plug-in hybrid cars. This reduced the effectiveness of the super green car premium.
- To prevent ineffectiveness, it is important to fully understand the effects from each policy instrument also during its development.





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Several policy instruments were in use in Sweden during the period 2012–2015 that, intendedly or unintendedly, affected the number of registered plug-in hybrid cars with emissions below 50 grams CO₂/km.

When several policy instruments are contributing to the same target it becomes even more important to isolate

the effects from each policy instrument in the evaluation of policy instruments. By using advanced econometrics and micro-level data, our focus has been to isolate the effects of the super green car premium from the effects of other policy instruments on registered plug-in hybrids in Sweden during the period 2012–2015.

Our methodological approach addresses this problem by formulating the following hypothesis: If the super green premium had a stimulation effect in the car market, a “disturbance” should take place in the statistical distribution of registered cars from 2012 and on. Specifically, from 2012 and on there should be a discontinuity in the distribution of registered vehicles with emissions just below 50 grams CO₂/km and comparable vehicles with emissions just above 50 grams CO₂/km. If this proves to be the outcome, and such a discontinuity also proves to be statistically significant, we have found evidence of a local causal effect of the super green car premium on the number of registered super green cars.

On the other hand, if the super green car premium did not have a stimulation effect on the registered super green cars, there should be no “disturbance” in the distribution - the distribution of registered vehicles with emissions just below 50 grams CO₂/km and the distribution of comparable registered vehicles with emissions just above 50 grams CO₂/km should not statistically differ.

About the study

Isolating the effects of policies

Reducing fossil dependence of the transport sector by promoting electric and plug-in hybrid cars is essential for achieving the targets of climate change policy. Various types of government-financed subsidy programs have therefore become commonplace in the Nordic countries.

In Sweden, such a subsidy was offered for the first time during the period 2007–2009 to newly registered cars with emissions of a maximum of 120 grams of carbon dioxide (CO₂) per kilometre.

In 2012, a subsidy program, the so-called super green car premium, was introduced, with higher premium amounts by targeting cars with emissions of a maximum of 50 grams CO₂/km, which in practice were only electric cars and plug-in hybrid cars. The super green car premium was in operation until 2018 when it was replaced by the bonus-malus system.

Researchers at IVL Swedish Environmental Research Institute and University of Gothenburg have for the first time managed to isolate the effects of the super green car premium from the effects of several other instruments operating during the same period.

The results bring new light on the effects of subsidies for promoting new transport technologies and provide



Findings and conclusions

A reminder to policy makers to coordinate instruments

Our results show that a significant discontinuity in the distribution of plug-in hybrid cars took place corresponding to 2 760 plug-in hybrids cars out of 8 139 plug-in hybrids cars registered during the period 2012 – 2015 and that were still registered in the vehicle registry in January 2018. This means that the super-green car premium lies behind 1 out of 3 registered plug-in hybrid cars registered during the period 2012 – 2015.

The results imply that 2 out of 3 plug-in hybrid cars that received the premium would have been purchased and registered even without the super green car premium. That corresponds to premiums paid to the value of almost SEK 0.25 billion during the period 2012 - 2015 for which we cannot show any effect on the registration of plug-in hybrid cars. Most of the cars that received the premium were company cars. The reduced effectiveness also undermined the instrument's cost efficiency since the number of registered super green cars explained by the premium was reduced while the public expenditure for the premiums was the same.

The introduction of super green car premium implied the introduction of a new label - "super green cars" - on the market which could have had an informational effect on buyers' decisions. We could hypothesize that the introduction of the label "super green cars" would increase the overall emissions awareness also among buyers of cars other than super green cars. For instance, a buyer that was imagining buying a car with emissions 120 grams CO₂/km could buy a car with somewhat lower emissions as a result of an overall increased emissions awareness following the introduction of the concept of "super green cars" on the market.

If that is the case, we should expect to find differences also in the statistical distributions of registered cars around emissions levels other than the limit 50 grams CO₂/km. While there are downward movements of the means of the distributions across the entire scale of emissions levels during the period as a result of several policy instruments in use, none of these changes in the distributions can be statistically connected to the super green car premium. Hence, we find no evidence that the super green car premium did have a global information effect reducing the overall emission levels of car fleet. We conclude that its effect on plug-in hybrid cars was local around the limit 50 grams CO₂/km and explaining

1 out of 3 registered plug-in hybrid cars with emissions below 50 grams CO₂/km during the period 2012 – 2015.

When two or more instruments overlap in effects, their effectiveness in terms of changing behaviour is reduced. The results in this study remind policy makers about the importance of coordinating policy instruments to prevent that their effects overlap. Overlapping effects reduce the effectiveness of instruments in terms of their effects on actors' decisions. The results show that even when instruments partly overlap in their effects, the losses in effectiveness can be substantial. Because of the loss in effectiveness, cost efficiency is also impeded. To prevent ineffectiveness, it is important to understand and isolate the effects from each policy instrument already in the analysis during development of new policy instruments, and in the evaluation of policy instruments while they are in use.

The analysis is corrected for the electric car procurement that was in use at the time. However, there were likely overlaps with other instruments that were in operation during the same period and that reduced the efficiency of the super green car premium. For instance, the changes in the rules for reducing the benefit value for environmental cars, which favoured electric cars and plug-in hybrid cars compared to other cars. Another example is the super credits in EU legislation 443/2009 which from 2012 provided incentives for car manufacturers to market cars with emissions less than 50 grams CO₂/km to buyers in the EU market. To identify and isolate the effects also of these instruments are left for future research.

References

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