

# TOTAL COST OF OWNERSHIP ANALYSIS FOR PASSENGER CARS IN TURKEY

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## Overview

Being a developing country, the number of vehicles in the stock and vehicle ownership per person is increasing rapidly over the last few years in Turkey. In Turkey, the one-time purchase taxes implemented on vehicles are significantly high (up to 189% of the purchase price without tax), which might affect the choice of vehicle powertrain. Furthermore, the fuel price levels are one of the highest in the world due to the implemented fuel taxes especially for gasoline and diesel. As a result of these taxation policies, 42% of the current vehicle stock is powered by liquefied petroleum gas (LPG) fuel, which is the highest LPG share in the world. Therefore, it is of highest interest to analyse the cost structure of Turkish passenger car sector.

The factors affecting vehicle ownership in Turkey are investigated in several studies such as Codur and Tortum (2008) and Ogut (2006). In Erdem et al. (2010), willingness to pay for alternative powertrains investigated keeping the focus on hybrids and giving policy recommendations by reasoning LPG trend in Turkey. A detailed analysis of motor fuels in Turkey along with prices, taxes and demand elasticity is made by Erdogdu (2014). However, cost of owning a vehicle in Turkey has not been analysed in detail before. Although there are increasing number of studies considering the cost of vehicle ownership in the US and Europe, to the best of our knowledge, there is no work that investigated Turkish vehicle market from a total cost of ownership (TCO) perspective.

The aim of this study is to develop a TCO model for Turkey's passenger car sector. The model includes different powertrains (Gasoline, Diesel, and LPG); different vehicle segments (A, B, C, D, and E) and is applicable to different annual mileages.

## Model

A vehicle's ownership cost includes; initial purchase cost, fuel expenses, motor vehicle tax, maintenance cost, and insurances. All of those cost components varies along ownership period, mileage and technical specifications of the vehicle. In this study, 71 different vehicle models were analyzed, taking vehicle sales figures into consideration, over which representative vehicles were specified for each segment and powertrain by median function. Then, a detailed data collection and analysis were made to determine ownership costs for each vehicle segment and powertrain separately. Furthermore, annuity factors were utilized over those variable costs throughout the ownership period. Resale values of vehicles were also considered in different cases.

## Results

The results show that the TCO in Turkey for conventional vehicles (including LPG) is dominated by taxes. Figure 1 expresses TCO per km for each cost component and also TCO per km after the resale of vehicle (after 4 years) for the case class C with an annual 8000 km mileage. In this case; 43% of ownership cost for gasoline vehicles is due to different taxes, whereas the ratios are 40% and 39% for diesel and LPG vehicles respectively. Due to the high automobile purchase taxes, it is observed that the ratio of taxes to sum of TCO for class E vehicles increases up to 55% whereas ownership cost per km rises up to 6 TRY<sub>2014</sub>/km.

The results reveal that for the case of class C with 4 years of ownership with resale, LPG becomes more advantageous over gasoline after 7,500 km annual mileage, whereas the diesel vehicles become economically feasible after 20,000 km annual mileage over LPG vehicles.

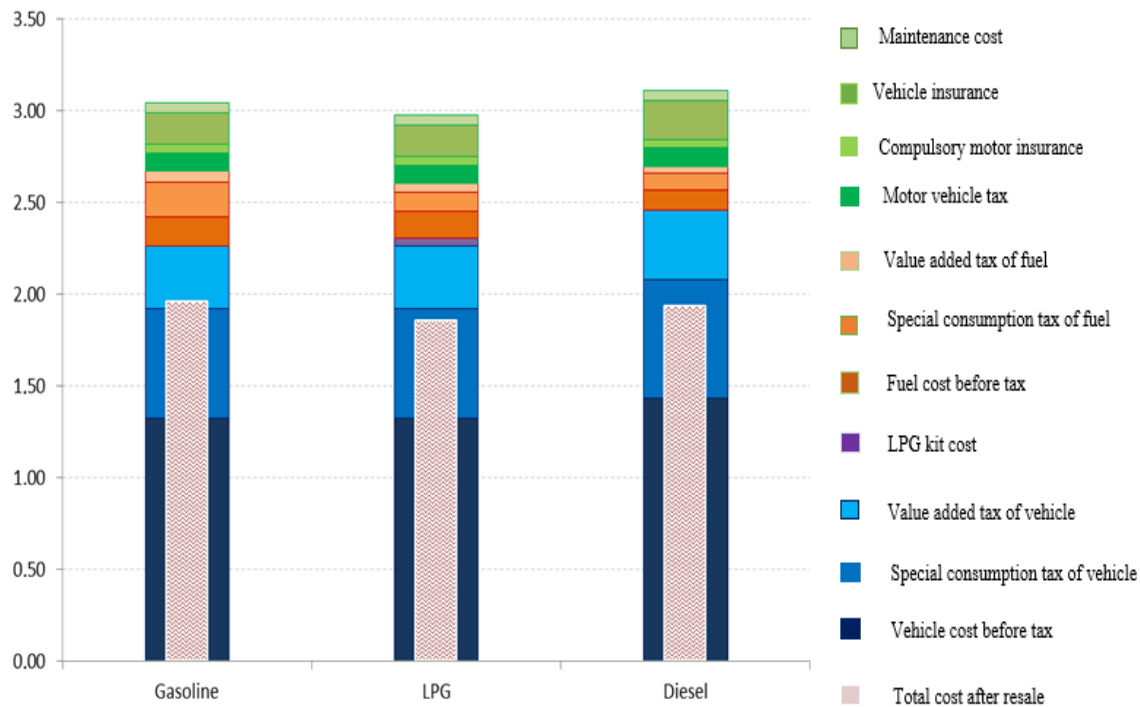


Figure 1: Comparison of TCO (in TRY<sub>2014</sub>/km) for different powertrains with an annual mileage of 8000 km and resale after 4 years in Turkey for C class vehicles.

## Conclusions

A TCO model was developed for Turkish passenger cars from the customer perspective. The uniqueness of Turkish vehicle market structure and different taxation policy both in vehicles and fuels make Turkish vehicle market an interesting research area. The results were illustrated in TCO per km and TCO scale for various cases.

TCO for medium segment vehicles is lower than half of the ownership cost for large segment vehicles due to the high taxes. This taxation policy might explain the tendency towards smaller vehicles in Turkish market. Furthermore, for a customer with an average mileage, LPG vehicles have the lowest costs. Considering the results for different mileages and ownership periods, LPG powered and small segment vehicles seem to dominate the market for a significant time.

In the future, the developed model will be extended to include electrified powertrains. With the extended model, the economic advantages or disadvantages of alternative powertrains in Turkish vehicle fleet might be observed.

## References

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