Buying a New Car

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When comparing the cost of ownership between two vehicles, it is useful to make sense of algebraic formulas to understand the differences between the two models. Model A costs $16,500 and gets 25 miles per gallon, with insurance premiums of $250 per year. Model B costs $24,500 and gets 40 miles per gallon, with $450 in insurance premiums per year. If we estimate approximately 40,000 miles per year with fuel costs fixed at $3 per gallon we are able to make some interesting comparisons.

**Comparisons**

1. We are able to create a formula that expresses the total cost of ownership for Model A where the number of years one owns the car is represented by x using the formula:

Total Cost to Own = Cost of Car + (Insurance \* Years) + (Fuel Cost \* 40000 \* Years)

Cost A = 16500 + 250x + 40000/25) \* 3 \* x

Cost A = 16500 +250x + 4800x

**Cost A = 16500 + 5050x**

1. Using the same formula as above, we can make a straightforward comparison with vehicle model B using the formula:

Cost B = 24500 + 450x (40000/40) \* 3 \* x

Cost B = 24500 + 450x + 3000x

**Cost B = 24500 + 3450x**

1. The total cost to own each vehicle for the first five years is as simple as solving when x=5.

Cost A = 16500 + (5050 \* 5) = $41750

Cost B = 24500 + (3450 \* 5) = $41,750

1. If we plan to keep the vehicle for four years each using the same formula as above, Model A works out to $36,700 and Model B works out to $38,300, Model A is the less expensive choice. Whereas if we were to keep the vehicles for six years, Model A would cost $46,800 and Model B would cost $45,200, Model B is the less expensive choice.
2. The number of cars in which the cost will be the same is five years.
3. If the number of years when there is no discernible difference between the cost of ownership between Model A and Model B is 5 years, 12 months \* 5 years = 60 months is the point where there is no discernable cost of ownership
4. If the cost of gasoline to double, the cost of ownership of both models of vehicles would be impacted as described by simply changing the $3 fuel cost multiplier to six dollars. For example Model A with 5 years of ownership and fuel costs $6 instead of $3:

Cost A = 16500 + (250 \* 5) + (40000/25) \* 6 \* 5 = $77,000

Cost B = 24500 + (450 \* 5) + (40000/40) \* 6 \* 5 = $56,750

It is easy to see why the more fuel-efficient Model B would be less expensive if fuel costs

were to increase substantially.

1. If one could sell the car for 40% of its value at any time, we can see how it would change our calculations, let’s use the example of selling the car after 5 years:

Cost A = 16500 + (5050 \* 5) = $41750 - (0.4 \* 16500) = $35,150

Cost B = 24500 + (3450 \* 5) = $41,750 - (0.4 \* 24500) = $31,950

We can see that with $9,800 in resale vale compared to $6,600, Option B works out to be the less expensive choice.

**Conclusion**

Using just the simple equation shown above where we can reduce the total cost of ownership down to single variables such as the time planned to own the vehicle and the expected cost of gasoline. Real-life is somewhat more complicated with financing and maintenance costs, however it seems trivially simple to amend our formula to more closely match real-world circumstances. It turns out that there are lots of useful calculations that can be used to determine the cost of a vehicle (usd113.org, n.d.). The prudent budgeter would be well advised to give the list a once-over before making any purchase decisions for a newly acquired vehicle.

References

Usd113.org. (n.d.). Business Math with Algebra. Retrieved July 19, 2020, from <https://www.usd113.org/vimages/shared/vnews/stories/47cc35008c476/Business%20Math%20with%20Algebra.pdf>