

**EMGT 6225 ECONOMIC DECISION MAKING**  
**Section 05**  
**Financial Analysis Team Project**  
**Group 2**

**Helen Koukoulas**

**Jeremy Rubin**

**Vienna Chiu**

**Steve Jaison Meleth**

**Vishal Baliga Bantwal**

## Introduction

Personal automobiles are an important tool in the everyday life of most people. They are depended on to safely transport people to and from different locations, help purchase and transport goods, and provide an overall better quality of life. However, sometimes these vehicles that are heavily relied on need to be repaired, replaced, or upgraded, which frequently comes with a high price tag. The purpose of this project is to economically evaluate the different options that are available when considering the replacement of a personal automobile. The options that will be discussed include keeping and repairing the car, replacing the car with the most current model, or replacing the car with one of a different class, such as a coupe with a sedan. Each of these purchasing options comes with different payment options that will be discussed, such as a lump sum payment, financing, or leasing.

## Research

When deciding among the options of repairing and keeping the current vehicle, upgrading to the current year model or switching to a car of a different class, there are important differences to consider. Excluding payment options, these three car selections will have different costs associated with them. Fuel economy, on-board technology and insurance should all be taken into account, as these factors, among others, will impact the financials of each car.

Comparing a 2016 Toyota Camry, 2021 Toyota Camry and 2021 Toyota Highlander, all with LE trim, differences among starting retail price, fuel efficiency, depreciation, repairs and insurance are all apparent.

2016 Toyota Camry LE 4dr Sedan (2.5L 4cyl 6A) <a href="#">Choose style</a>	2021 Toyota Camry LE 4dr Sedan (2.5L 4cyl 6A) <a href="#">Choose style</a>	2021 Toyota Highlander LE 4dr SUV AWD (3.5L 6cyl 8A) <a href="#">Choose style</a>
5-Year Ownership Costs	5-Year Ownership Costs	5-Year Ownership Costs
True Cost to Own® \$20,622	True Cost to Own® \$34,587	True Cost to Own® \$44,936
Average Cost Per Mile \$0.39	Average Cost Per Mile \$0.46	Average Cost Per Mile \$0.6
Depreciation \$7,442	Depreciation \$12,267	Depreciation \$14,816
Financing \$2,759	Financing \$5,165	Financing \$7,835
Fuel \$5,720	Fuel \$5,005	Fuel \$6,958
Insurance \$4,830	Insurance \$4,880	Insurance \$5,025
Maintenance \$4,497	Maintenance \$3,124	Maintenance \$4,305
Repairs \$2,337	Repairs \$631	Repairs \$724
Tax Credit \$0	Tax Credit \$0	Tax Credit \$0

Figure 1: Average Cost Breakdowns for Various Categories Among 2016/2021 Toyota Camry and 2021 Toyota Highlander (Edmunds).

Outlined in Figure 1 above are the main costs associated with owning and maintaining a vehicle. These values are taken over the course of a 5 year period, close to the roughly 7 year average consumers tend to hold on to their cars for (Automotive News). Throughout this report, the cost categories highlighted in Figure 1 for each vehicle option will be compared and factored into the decision of either repairing the current car or buying a new one. Even if it may be cheaper in the short term to choose one option over the others, many of the costs associated with owning a car affect its financial burden in the long term. Because of this, it is important to evaluate each option over an extended period of time. Additionally, the variety of purchasing

options, which are discussed later in this report, will also play a large role in the decision making process, as these different options could be more financially sound depending on the needs of the consumer and the time they expect to hold on to their vehicle for.

### **Current Option**

The “current” car that is owned is a 2016 Toyota Camry 4-Door LE Sedan (2.5L 4cyl 6A). In 2016, this vehicle retailed for \$23,070 and the annual percentage rate or APR for financing was 2.99%, which represents the annualized interest rate (AutoBlog, Toyota). Toyota provides several options for the length of the financing period including 2, 3, 4, and 5 years. In 2021, a certified used version of this vehicle from the manufacturer retails for an average cost of \$14,500 (Toyota). The average annual maintenance cost for this vehicle is \$365, which can vary depending on age, mileage, location, and shop (RepairPal). The average annual insurance cost for this vehicle is \$1100, which can vary greatly depending on driving history, location, age, and other factors (Edmunds). The average annual fuel cost for this vehicle is \$1200 with 15000 miles driven per year, which can vary depending on local gas prices (Edmunds).

### **Alternative Options**

#### **Alternative Option 1: Replacing the car with the current (new) version of your car**

The 2021 Toyota Camry 4-Door LE Sedan (2.5L 4cyl 8A) is a newer and improved version of the 2016 Toyota Camry 4-Door LE Sedan (2.5L 4cyl 6A). It is named 2021’s best midsize car for its value and Toyota is continuously working on updating its technology. The MSRP range is around \$24,970 to \$35,545. Its true cost to own is \$41,185 and retailed at \$24,970 (Edmunds). The estimated 5 year total is \$41,185 and its entire cost is broken down based on its insurance, maintenance, repair, taxes & fees, financing, depreciation, and fuel costs (Edmunds). The total insurance cost by the end of 5 years is \$6,296, maintenance is \$3,128, repairs is \$560, taxes and fees is \$2,247, financing is \$6,181, depreciation is \$17,223, and fuel is \$5,550. However, these estimated costs all depend on the buyer’s financial circumstances. The upfront payments are the highest, but goes down to an average of \$7,452 over the years. There are two APR options depending on what the buyer can afford: 0.9% in 60 months versus 2.9% in 72 months (Toyota).

#### **Alternative Option 2: A car of a different class**

The car chosen as alternative option 2 is the 2021 Toyota Highlander LE (3.5L 6cyl 8AT). The Toyota Highlander is a mid-size crossover SUV produced by Toyota. It is built on the same platform as used on the Camry. The current retail price for this model is \$38,285. Toyota provides an option to either finance or lease the car with an APR of 2.9% for financing and 1.9% if the financing period is less than 5 years. The lease period can vary from 2 to 5 years. The average annual maintenance & repair costs for the car is approximately \$900 depending on the condition of the car and the location. The annual fuel cost for this car is around \$1500 (considering 15,000 miles driven per year). The average annual insurance cost is \$1200, which will vary depending on the driver’s age, driving history and a few other factors as well.

## **Financing Options**

### *Cash Payment:*

While this option will save the buyer thousands of dollars in interest and finance fees, it is exclusively for someone with the capacity of making a one-time payment. An upside of this option is that it makes selling/upgrading the car a lot easier. If the car is financed through a loan, the bank holds the title of the car and this makes selling the car complicated as the loan amount has to be repaid before the sale.

### *Leasing:*

The leasing option is recommended for someone who likes to have a new car every few years. Auto leasing options are offered by Auto companies, banks, credit unions and finance companies. At the end of the lease, the lessee has the option to either purchase the car or sign a new lease.

An upside to leasing is that the car is always under warranty. The monthly payment for a car under lease is lower when compared financing the purchase of the car. While tax deductions for a car under a loan have limitations, lease payments can be deducted from the taxes if the car is used for business purposes for more than 50% of the time. While the loan down payment typically hovers around 10-15%, the down payment on a leased car can be negotiated and more often than not, the lessee can also get a zero down payment option.

A downside of leasing a vehicle is that the lessee doesn't hold equity in the car, and will have to start over to acquire a new car.

While setting the leasing value on any car, the leasing companies use the residual value of the car - which is the estimated value of car at the end of the term. More often than not, leasing companies use highly inflated values. On many leases, there is a limit on the maximum usable mileage. Not adhering to these limits can result in heavy fines (Typically ranges from 10000 to 15000 miles per year). Typically leases prohibit any type of modifications to the car.

### *Financing:*

This is the go-to option for most Americans and like leasing, this option is offered by credit unions, banks, automakers, and finance companies. Many of the automakers also give zero interest loans which more or less results in paying the same amount as paying for the car up front. The availability of these low-interest, zero-interest loans depends on the credit score of the individual taking the loan. One has to understand that (s)he doesn't own the car outright until the entire payment is done. Selling the car under these circumstances can be difficult and involvement of the lender might be necessary. Unlike the leasing option wherein the downpayment is often zero, a substantial down payment is a must in this case and it ranges from 10% to 20%. Average car-loan period usually exceeds 60 months, which can lead to lower monthly payments. Typically one will have to shell out more money each month when compared to leasing but an advantage to this is that once the deal is over, the individual outright owns the car.

### Analysis

The current car, a new model of the current car, and a new car of a different class need to be compared using economic analysis methods to choose the best option. Each option will be evaluated under the three different payment types commonly used in the industry: lump sum payments, financing, and leasing. This evaluation will include other variable costs related to each car such as insurance, maintenance, gas costs, and salvage value. In order to make a justifiable choice for the best option and payment method, the payment methods across each option need to be compared under the same period of time, which is 3 years in this analysis. The interest for each option was assumed to be 7.5%.

#### *Current Option*

##### Lump Sum Payment

End of Year	Costs (\$)
0	<i>Purchase car: 14,500</i>
1	<i>Maintenance: 365 Insurance: 1,100 Gas: 1,200</i>
2	<i>Maintenance: 365 Insurance: 1,100 Gas: 1,200</i>
3	<i>Maintenance: 365 Insurance: 1,100 Gas: 1,200 Salvage Value: 10,000</i>

Converting the data into a CF table:

Year	Cash Flow (\$)
0	(14,500)
1	(2,665)
2	(2,665)
3	7,335

$$\text{Present cost of car} = 14,500 + (365 + 1100 + 1200)(P|A\ 7.5\%,\ 2) - 7335(P|F\ 7.5\%,\ 3)$$

$$\text{Present cost of car} = \underline{\underline{\$13,381}}$$

***Alternative Option 1: New model of current car***

**Lump Sum Payment**

End of Year	Costs (\$)
0	<i>Purchase car: 25,965</i>
1	<i>Maintenance: 413 Insurance: 1,123 Gas: 1068</i>
2	<i>Maintenance: 413 Insurance: 1,123 Gas: 1,068</i>
3	<i>Maintenance: 413 Insurance: 1,123 Gas: 1,068 Salvage Value: 17,500</i>

Converting the data into a CF table:

Year	Cash Flow (\$)
0	(25,965)
1	(2,604)
2	(2,604)
3	14,896

$$\text{Present cost of car} = 25,965 + (413 + 1123 + 1068)(P|A, 7.5\%, 2) - 14,896(P|F 7.5\%, 3)$$

$$\text{Present cost of car} = \underline{\underline{\$18,649.98}}$$

### Financing

End of Year	Costs (\$)
0	<i>Downpayment: 5,000</i>
1	<i>Annual car cost: 8,100 Maintenance: 413 Insurance: 1,123 Gas: 1,068</i>
2	<i>Annual car cost: 8,100 Maintenance: 413 Insurance: 1,123 Gas: 1,068</i>
3	<i>Annual car cost: 8,100 Maintenance: 413 Insurance: 1,123 Gas: 1,068 Salvage Value: 17,500</i>

Converting the data into a CF table:

Year	Cash Flow (\$)
0	(5,000)
1	(10,704)
2	(10,704)
3	6,796

*Present cost of car = 5000 + 10704(P|A, 7.5%, 2) – 6796(P|F 7.5%, 3)*

*Present cost of car = \$18,749.27*

### Leasing

End of Year	Costs (\$)
0	<i>Down payment: 5,000</i>
1	<i>Annual Lease Cost: 2,232 Maintenance: 413 Insurance: 1,123 Gas: 1,068</i>
2	<i>Annual Lease Cost: 2,232 Maintenance: 413 Insurance: 1,123 Gas: 1,068</i>
3	<i>Annual Lease Cost: 2,232 Maintenance: 413 Insurance: 1,123 Gas: 1,068</i>

Converting the data into a CF table:

Year	Cash Flow (\$)
0	(5,000)
1	(4,836)
2	(4,836)
3	(4,836)

*Present cost of car = 5000 + 4836(P|A, 7.5%, 3)*

*Present cost of car = **\$17,576.00***



***Alternative Option 2: Car of a different class***

***Lump Sum Payment***

End of Year	Costs (\$)
0	<i>Purchase car: 38,285</i>
1	<i>Maintenance: 900 Insurance: 1,200 Gas: 1,500</i>
2	<i>Maintenance: 900 Insurance: 1,200 Gas: 1,500</i>
3	<i>Maintenance: 900 Insurance: 1,200 Gas: 1,500 Salvage Value: 26,000</i>

Converting the data into a CF table:

Year	Cash Flow (\$)
0	(38,285)
1	(3,600)
2	(3,600)
3	22,400

$$\text{Present cost of car} = 38,285 + (900 + 1500 + 1200)(P|A\ 7.5\%,\ 2) - 22,400(P|F\ 7.5\%,\ 3)$$

$$\text{Present cost of car} = \underline{\underline{\$26,718}}$$

Financing

End of Year	Costs (\$)
0	Down payment - 5,000
1	Yearly payment - 11,424 Maintenance - 900 Fuel - 1,500 Insurance - 1,200
2	Yearly payment - 11,424 Maintenance - 900 Fuel - 1,500 Insurance - 1,200
3	Yearly payment - 11,424 Maintenance - 900 Fuel - 1,500 Insurance - 1,200 Salvage Value - 26,000

Converting the data into a CF table:

Year	Cash Flow
0	(5,000)
1	(15,024)
2	(15,024)
3	10,976

$$\text{Present cost of car} = 5000 + 15024(P|A 7.5\%, 2) - 10976(P|F 7.5\%, 3)$$

$$\text{Present cost of car} = \underline{\underline{\$23,141.00}}$$

### Leasing

End of Year	Costs (\$)
0	<i>Down payment - 5,000</i>
1	<i>Yearly payment - 3,588 Maintenance - 900 Fuel - 1,500 Insurance - 1,200</i>
2	<i>Yearly payment - 3,588 Maintenance - 900 Fuel - 1,500 Insurance - 1,200</i>
3	<i>Yearly payment - 3,588 Maintenance - 900 Fuel - 1,500 Insurance - 1,200</i>

Converting the data into a CF table:

Year	Cash Flow
0	(5,000)
1	(7,188)
2	(7,188)
3	(7,188)

$$\text{Present cost of car} = 5000 + 7188(P/A\ 7.5\%,\ 3)$$

$$\text{Present cost of car} = \underline{\underline{\$23,693.00}}$$

### **Final Decision**

The price of leasing, financing, or purchasing the vehicle was the first cost considered in this analysis because it is often the largest cost in acquiring a new vehicle across any option. However, maintenance, insurance, and gas costs were also factored into this analysis because they are frequent and large costs in owning a vehicle and they vary extremely based on different factors including but not limited to the age of the vehicle, model, driver history, and mileage. Lastly, if the car was purchased using the lump sum cash payment or financing option, a salvage value was included in the present value of the car because the vehicle is owned and can be sold to receive some return, unlike with the leasing option. There were no complications in the analysis as there was accurate information regarding the costs for each car option from the same

sources for each vehicle. After these costs were considered, the present value of owning each vehicle was calculated. The 3-year analysis included in this report yielded keeping the current model of the car as the best option, costing \$13,381.00. However, if the owner would prefer a new vehicle the leasing option for a new model of the current car would be the next best option at \$17,576.00. The 5-year analysis included in the excel file included with this report yielded keeping the current model of the car as the best option, costing \$19,710.00. However, if the owner would prefer a new vehicle the financing option for a new model of the current car would be the next best option at \$21,223. Overall, keeping the current vehicle is typically one of the lower cost options when considering replacing a car, but there are similarly priced options available if the owner wants a replacement.

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