



[Home](#) > [Between the Issues](#) > [Previous Editions](#) > [Articles](#) > Is It Better to Lease or Purchase an Automobile?

Is It Better to Lease or Purchase an Automobile?

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Executive Summary

Understanding the decision to lease or purchase an automobile requires knowledge of the interrelated factors, both qualitative and quantitative, that influence each alternative. The quantitative analysis involves solving for the breakeven ownership period. Qualitative factors are often equally important in the decision-making process.

- The lease and subsequent buyout option can be a very viable solution, both from a financial and qualitative perspective.
- The lease-versus-buy decision is vehicle specific. Each option requires analysis of the actual expected variables, dealers may incentivize a lease or purchase.
- With consideration to the previous point, a potential vehicle purchaser should generally commit to an ownership period of one and a half lease terms or longer if the vehicle-specific maintenance costs later in the vehicle's life are above average.
- A potential vehicle lessee should understand that the decision to repeatedly lease vehicles is generally a lifestyle solution as opposed to a financial solution. He or she should seek a vehicle that maintains its value well over the lease term and generally negotiate a longer lease term.
- In assessing the lease-versus-buy decision, several seemingly significant variables are actually fairly inconsequential to the analysis, including: explicit and inherent financing costs, lease acquisition fees, incremental lease taxes and vehicle price inflation.

Auto purchase and lease incentives have become widespread in the midst of the ever-changing landscape of the auto industry. Auto discounting has been even further amplified in light of the recent recession and downturn in consumer spending. These incentives have created a great opportunity for potential buyers and lessees. But are the opportunities better for the potential lessee or purchaser?

These circumstances have reinvigorated the often debated question: Is it better to lease or purchase an automobile? Traditional reasoning may lead one to the conclusion that purchasing an automobile is the financially responsible decision. Likewise, an overly simplified analysis might lead one to believe that auto leasing is a practical solution.

Similar to most any other piece of advice that can be given by financial planners, the proper automobile acquisition solution for a client depends solely upon the client's facts and circumstances. However, it is certain that an understanding of the detailed complexities of the decision to lease or purchase an automobile is necessary to provide the best possible advice.

The Question Before the Answer

As with any problem-solving activity, the first step in assessing the lease-versus-buy decision is to define how to compare the options available. From a quantitative perspective, an automobile lease is comprised of monthly payments (of

depreciation and other charges) for an infinite term. Alternatively, an automobile purchase is comprised of a capital out (or financed transaction) to acquire a depreciating asset with a definite life. Therefore, the appropriate comparison of these two options is the present value of all costs in each scenario, measured over the useful life of the vehicle. However, in this analysis, the useful life of the vehicle is more appropriately defined as the ownership period. The longer a vehicle owned (and usable), the more likely the present value cost of the continuing lease payments will exceed the present value cost of the capital outlay in a purchase transaction. Therefore, the question to answer is, "How long must I own a vehicle to justify purchasing it?"

The Mechanics of an Automobile Lease

Figure 1 illustrates the calculation of the monthly payment in an automobile lease. Additionally, Figure 2 shows the calculation of the finance charge inherent in the lease payment. While much of these calculations may be common knowledge, there are some important aspects of the lease mechanics that are less than obvious.

Figure 1

Calculation of Lease Payment
<p>Capitalized Cost</p> <p>Plus: Incremental Lease Costs</p> <p>Less: Lease Cash Incentives</p> <p>Less: Down Payment/Trade-In</p>
<p>Net Capitalized Cost</p> <p>Less: Estimated Residual Value</p>
<p>Depreciable Amount</p> <p>Plus: Total Finance Charge</p>
<p>Base Payments</p> <p>Plus: Lease Tax</p>
<p>Total Payments</p> <p>Divided By: Lease Term</p>
<p>Monthly Payment</p>

Figure 2

Calculation of Finance Charge
<p>Net Capitalized Cost</p> <p>Plus: Estimated Residual Value</p>
<p>Finance Base</p> <p>Divided By: Two</p>
<p>Average Amount Financed</p> <p>Multiplied By: Applicable APR</p>
<p>Annual Finance Charge</p>

Multiplied By: Lease Term (years)
Total Finance Charge

Capitalized cost: The capitalized cost in a lease transaction is the equivalent of an agreed upon purchase price. The capitalized cost should be negotiated in the same manner as a purchase transaction. Third-party pricing sources and invoice prices can be used as relevant and effective tools to negotiate the capitalized cost.

Calculation of finance charge: The finance charge inherent in a lease is usually calculated in a manner that differs from standard purchase financing transactions and defies, at least initially, common knowledge. Contrary to a purchasing financing transaction (in which finance charges are based upon the amount purchased), the finance charges inherent in lease are based upon both the amount of the lease payments (i.e. depreciation over lease term) and the estimated residual value at the end of the lease. In essence, the finance charges are calculated on the entire cost of the vehicle, even though the lessee will only be paying the depreciation over the lease term. While possibly counter-intuitive, this does make sense because it appropriately reflects the use the financier's capital for the entire vehicle over the lease term.

Average amount financed: Also contrary to a standard financing transaction, the finance charges in a lease are generally not calculated based upon a declining monthly balance or standard amortization method. Instead, in an automobile lease the finance charges are calculated based upon a simplified average outstanding balance method. Therefore, the finance charges are based upon the average of the beginning outstanding amount (capitalized cost) and the ending outstanding amount (estimated residual value).

Money factor: Figure 3 indicates the calculation of the money factor. This is a common term used in lease financing arrangements. The money factor can be used (and is used by dealers) as an alternative method to calculate the monthly finance charge. The money factor can be applied directly to the finance base (noted in the calculation of the finance charge) to determine the monthly finance charge. Note that the division by 2,400 is to reflect the averaging of the finance base (division by 2), conversion to a monthly amount (division by 12) and conversion of a percentage to a decimal (division by 100).

Figure 3

Calculation of Money Factor
Applicable APR
Divided By: 2,400
Money Factor

Performing the Analysis

To begin developing conclusions on the lease-versus-buy decision, it is useful to start with an analysis of actual lease offers. Since lease economics vary among vehicles, this initial analysis was performed on an economic coupe, a mid-size family sedan and a luxury sport utility vehicle. Performing multiple analyses will help identify consistent themes and potential differences across vehicle classes. Below is a discussion of the numerous variables that are part of the breakeven analysis of the recently offered leases. As we will see later, only a few of these variables strongly influence the conclusion.

Investor opportunity cost: This is the assumed post-tax return forgone by the purchaser or lessee. A purchase transaction, whether for cash or financed, requires more immediate use of capital; the opportunity cost represents the return a lessee would earn on upfront and/or monthly savings. In selecting the opportunity cost rate of return, similar to the assessment of investor risk tolerance, term is an important factor. The term is complicated as "investments" are made each month and the breakeven analysis is performed each month, creating multiple beginning periods and a variable ending period. However, in a breakeven analysis, the breakeven range is an appropriate investment ending term. The breakeven range is then adjusted downward to account for the multiple beginning periods. Therefore, the yield on short- to intermediate-term municipal bonds could be considered an appropriate proxy; a post-tax opportunity cost of 3 percent is a reasonable starting point.

Incremental lease costs: In most any lease, there will be a fee paid to the lessor at inception. This fee is in excess of ar costs associated with a purchase or purchase finance transaction. Often, this is called a lease acquisition fee and in certain circumstances may be negotiated. Typically this fee ranges from \$200 to \$900; it will generally be more for high-priced vehicles. This was the case for the vehicles in this analysis, in which the lease acquisition fee varied from \$550 for the economic coupe to \$750 for the luxury SUV (see Figure 4).

Figure 4

	Economic Coupe	Mid Size Family Sedan	Luxury SUV
Lease Inception Fee	\$550	\$595	\$750
Residual Value %	53.0%	62.0%	65.5%
Inherent APR	1.0%	1.9%	5.3%
Breakeven Month	54	62	50
# of Lease Terms	1.5	1.7	1.4

The lessee will incur other additional fees, such as title and plate, with each lease subsequent to the initial one. These fees are only incurred once by the vehicle purchaser. However, these fees are generally minimal. For purposes of this analysis, these fees are assumed to be approximately \$200, and are inflated slightly with each additional lease.

The intra-lease treatment of the lease acquisition fee is a complicated factor in the monthly breakeven analysis. This fee gives the lessee the right use the vehicle for a monthly cost; a right the comparable vehicle purchaser would not have after selling the vehicle (as is assumed in the monthly breakeven analysis). To handle this in a judicious manner, the analysis assumes that, while paid up front, the lease inception fees are only incurred pro-rata over the lease term. This pro-rata recognition of the lease inception fees permits us to perform the breakeven analysis monthly, as opposed to at the end of each lease term.

Vehicle depreciation: The rate and amount of vehicle depreciation will impact the analysis in two manners. First, depreciation will impact the calculation of the lease payment. This initial analysis uses actual lease payments, and therefore actual expected depreciation over the lease term. Because the lease payment is primarily the payment of depreciation, a vehicle that experiences slower depreciation in early years (i.e. the lease term) will have a lower lease payment. This depreciation can vary significantly among vehicles; in this analysis, the depreciation during the initial three-year lease term varies from 35 percent to 47 percent (see Figure 4).

In examining this aspect of depreciation, it does not appear the dealer would have an incentive to significantly misrepresent expected depreciation. An over-estimation of depreciation would create sales disincentive (a higher lease payment), as well as an incentive for buyout at the end of the lease for the estimated residual value, which would be less than the actual value of the vehicle. The dealer would not necessarily profit further from this buyout, assuming the consumer fully understands this option and is willing to exercise it (which may be a big assumption). An underestimation of initial depreciation would cause underpayment by the lessee during the term of the lease.

The second manner in which depreciation impacts the analysis is depreciation of the purchased vehicle over its ownership period (i.e. the value of the purchaser's asset). This subsequent depreciation decreases the value of the purchaser's asset. This analysis first uses the dealer calculated residual value as the depreciated value at the end of the initial lease term (year three), and subsequently 15 percent¹ per year (of the beginning of year depreciated value). Additionally, it assumes the resale value is 80 percent of the depreciated value, to reflect the difference between the dealer sales price and the trade-in value.²

Inflation of vehicle prices: Inflation of vehicle prices will impact the cost of subsequent leases beyond the initial lease term. The lessee will be impacted by vehicle price inflation while the purchaser will not. Price inflation will impact the capitalized cost of subsequent leases, but not necessarily the percent depreciation each year. Therefore, it is reasonable to assume that all components of the lease payment expressed in dollar terms (depreciation, finance charge, and sales tax) would increase in proportion to vehicle price inflation. This initial analysis utilizes an annual vehicle price inflation rate

of 2.5 percent for all vehicles. It is important to note that the lessee will have a new vehicle with potential quality enhancements.

Incremental vehicle maintenance cost: The cost of vehicle maintenance will be greater for the vehicle purchaser after the term of the initial lease. During the term of the initial lease, the maintenance cost will hypothetically be the same for both the purchase and lease transactions. After the term of the initial lease, the lessee will get a new vehicle while the owner in the purchase transaction will still have the same vehicle. This incremental cost of maintaining the purchased vehicle will become even greater further into the ownership period of the purchased vehicle. This is perhaps one of the most difficult variables to quantify. This initial analysis assumes an incremental annual vehicle maintenance cost of 10 percent³ of the difference between the depreciated value of the purchased vehicle and the un-inflated, depreciated value of the leased vehicle. Therefore, for a vehicle originally purchased for \$30,000 with a year three residual value of \$20,000, the incremental maintenance cost for a vehicle purchaser in year four would be 10 percent of the difference between \$30,000 and \$20,000, or \$1,000. The use of this type of calculation also recognizes the fact that incremental maintenance will generally be higher for higher priced vehicles.

Incremental lease taxes: In many tax jurisdictions, the tax associated with an automobile lease will differ from the sales tax related to a vehicle purchase. The lease tax is applied to the entire base monthly payment, including inherent financing charges (while the sales tax only related to the vehicle purchase price). In the jurisdiction of the actual leases analyzed there is a 3 percent spread of lease tax over sales tax (10 percent lease tax, 7 percent sales tax).

Lender/lessor cost of capital: As noted in the review of the *Mechanics of an Automobile Lease* section above, there is a financing cost inherent in an auto lease. The relationship of the purchase financing cost of capital to the cost of capital inherent in the lease finance charge will obviously impact the analysis. Theoretically, the cost of capital should be comparable. One could contend the cost of capital inherent in a lease should be lower, because of the dealer's incentive for additional profit due to the lease acquisition costs and multiple leases over the course of the useful life of a vehicle. However, this logic does not necessarily hold true in reality, as dealers and marketing departments work together to maximize profits. The inherent financing rate varied among the actual leases in this analysis from 1 percent (economic coupe) to more than 5 percent (luxury SUV). This variance is similar to observed purchase financing rates, which are generally higher for luxury vehicles.

The First Conclusion

If one was to purchase (for cash) the vehicles in this initial analysis, he or she would have to commit to an ownership period of 54 to 62 months for the present value of the lease payments and costs to exceed the present value of the purchaser's cost (see Figure 4). This equates to approximately 1.4 to 1.7 lease terms. Leasing is advantageous throughout the term of the first lease. It is not until about halfway through the second lease that the economics of purchasing a vehicle begin to make sense. Therefore, for these particular leases, given the noted assumptions: ***It makes sense to purchase a vehicle if you commit to an ownership period greater than one and a half lease terms.***

More Conclusions

Understanding the impact, or lack thereof, of the key factors of this analysis leads to more conclusions. Since many of the required assumptions will never actually be known until after a decision is made, it is important to understand which variables move the needle.

As was evident in the review of the actual leases (see Figure 4), the type and make of vehicle will have an overarching impact on the analysis, affecting many of the other variables. It is also apparent that many of these variables are interrelated. For example, the economic coupe had the lowest lease inception fee and inherent financing rate. However its residual value percentage was significantly less than the other vehicles reviewed. Conversely, the residual value percentage of the luxury SUV was the highest of the three vehicles. However, similar to many purchase transactions for luxury vehicles, the inherent financing rate was significantly higher than the other vehicles. This cost contributed to the luxury vehicle being the least advantageous leasing option, despite its high residual value. Therefore, understanding the variables, their relative importance and interrelation will allow an adviser to develop the best possible vehicle acquisition solution for a client's particular situation.

Term of the lease: In each of the varying leases examined, the breakeven point was approximately one and a half lease terms, regardless of the term of the lease. This was also the case in hypothetical tests using varying lease terms. In other words, a four year lease will generally break even in year six. This implies that a longer lease term, if it can be negotiated, would be very advantageous to the lessee. Theoretically, a longer lease term will lower the monthly lease payment because the most (in dollar terms) depreciation is recognized in the first year of a vehicle's useful life. This, however, is an assumption, and will not always hold true. In fact, for certain luxury vehicles, a four year lease, monthly payment can actually be greater than a three year lease monthly payment. This is undoubtedly due in part to manufacturers and dealers adjusting the estimated residual value or inherent financing rate to incentivize the lease term.

that will be the most profitable overall arrangements. However, in general terms, a longer lease will lower the lease payments creating a more advantageous arrangement for the lessee.

Depreciation: Lease term depreciation (and related residual value) measure a new car's ability to retain its value, and can be used as one of the key decision-making factors. It is evident in the initial analysis that the breakeven point moves significantly (8 months) in favor of leasing, when comparing the economic coupe with a 53 percent residual value, to the mid-size family sedan with a 62 percent residual value. This is despite the fact that the inherent financing rate doubles the mid-size family sedan. In comparing similar vehicles with the same financing rate, a 10 percent increase in lease term depreciation reduces the breakeven point 6 months; a 25 percent increase reduces the breakeven point 12 months. With smaller changes in lease term depreciation do not substantially change leasing guidelines, a vehicle that does not hold value well would be a poor choice for a lease. Obviously, the best relative choice for a potential lessee is a vehicle that holds its value well during the lease term.

Depreciation beyond the initial lease term is a different story. An increase in this depreciation rate will actually impact the purchaser negatively. Examining this variable is more useful to account for the fact that this depreciation factor is an estimate that will vary. Even a significant 25 percent increase in this variable does not significantly alter the breakeven point (increases by 4 months).

While it is likely that both of these depreciation rates are at least somewhat correlated, the depreciation during the initial lease term is the only variable that substantially impacts this analysis.

Incremental vehicle maintenance cost: Incremental vehicle maintenance cost (beyond the initial lease term) is important to understand because of its potential for significant variability. Using the mid-size sedan analysis as a baseline, a 50 percent increase in this cost only increases the breakeven point by 5 months. However, a more significant increase is not unreasonable. If this cost were to double (approximately \$1,600 for the mid-size sedan in the first year after the initial lease), the breakeven point increases by 17 months. The same conclusion is evident for any type or make of vehicle; however, higher maintenance costs are more evident in the luxury vehicles. Therefore, a vehicle that is relatively less costly to maintain will favor a purchaser, and vice versa.

Investor opportunity cost: The post-tax return of 3 percent used in the initial analysis could be disputed from multiple perspectives. One could contend that the time horizon for opportunity cost should be greater due to the expected useful life of an automobile, or lower to reflect a cash-like return to take a more practical view of this analysis. Fluctuations of this variable are mostly moot. An increase in investor opportunity cost to 4 percent (33 percent increase) post-tax only yields an additional 3 months to the breakeven point. It is relevant to note that an opportunity cost of zero moves the breakeven significantly (10 months earlier). Therefore, it is evident that earning some return on the cost savings is of significance for the lessee; a lease should not be used to achieve affordability.

Lender/lessor financing rate: It would appear from the three leases analyzed that this variable is relatively meaningful. However, it is actually inconsequential from both a practical perspective and stress test analysis. In a lease transaction, the inherent financing rate is relevant in relation to a potential arbitrage with the investor opportunity cost. If a negative arbitrage exists (where the cost of capital exceeds the investor opportunity cost), the lessee can generally use a one-pay lease to eliminate this situation. In this scenario, the lessee pays the entire cost upfront, avoiding the inherent financing rate. With the availability of one-pay leases (an option comparable to purchasing a vehicle outright), the arbitrage in the lease-buy analysis is reduced to the difference between the purchase financing rate and inherent lease financing rate; in many cases, these rates will be similar. Further, in the absence of comparable rates, a stress test of the lender/lessor cost of capital reveals that a 25 percent change only moves the breakeven point a couple months (this is examined further in the purchase financing section below).

Several other variables that are seemingly important to the analysis are actually of little consequence. Incremental lease costs, while important to be aware of, do not significantly impact the analysis; increasing these fees by 25 percent only changes the breakeven point by 1 month. Likewise, incremental lease taxes have little impact on the analysis; neither doubling nor eliminating the spread of the lease tax over the sales tax changes the breakeven point more than two months. Finally, inflation of vehicle prices has very little impact on the analysis; neither doubling nor completely eliminating this variable changes the breakeven point more than a couple months.

Outside the Box: Purchase Financing

The frequently used alternative of purchase financing changes the analysis somewhat. Purchase financing brings into consideration two relationships among variables: the cost of capital spread between lease financing and purchase financing; and, the purchase financing rate relative to investor opportunity cost.

In looking at the initial analysis, the mid-size sedan had a 60 month purchase financing available rate moderately different (3.9 percent) than the inherent lease financing rate (1.9 percent). Using this purchase financing, the cost of

capital spread increased the breakeven point 3 months. It is apparent that beyond some minor advantages to low-cost purchase financing, the conclusions do not change for a financed purchase transaction unless the dealer has heavily (more than 1.9 percent versus 3.9 percent) incentivized its cost of capital for either potential lessees or potential purchasers. Additionally, the purchase financing term is only truly relevant in comparing purchase options (not lease versus purchase).

Lease buyout provision: The option to purchase a vehicle at its residual value (plus sales tax) at the end of a lease is an interesting and quite viable option. From a quantitative perspective, a lease and subsequent buyout can be very comparable to an outright purchase (see Figure 5), depending on the vehicle and economic viability of the lease. For example, the lease and subsequent buyout of the economic coupe is actually more advantageous over any ownership period. The lease-buyout of the mid-size sedan is less than \$100 more expensive over the entire ownership period. And compared to long-term purchase financing, the lease and buyout of this vehicle is advantageous over any ownership period. However, for the most expensive vehicle and least advantageous lease, the lease-buyout is approximately \$4,000 more expensive over the ownership period. It is important to note that this vehicle is over three times more expensive than the economic coupe (and a less advantageous overall lease).

Figure 5

	Economic Coupe	Mid Size Family Sedan	Luxury SUV
<u>Buyout</u>			
Month	35	35	36
Advantage	Lease	Purchase	Purchase
Advantage Amount	\$219	\$96	\$4,000
<u>7 Year Ownership</u>			
Advantage	Lease	Purchase	Purchase
Advantage Amount	\$247	\$108	\$4,510

The buyout option also allows a lessee to mitigate the risk surrounding the residual value. If the dealer sets the residual too high, the lessee walks away having paid below-market lease payments; if the residual is too low, the lessee gets the "bargain" buyout. The lessee can also avoid paying multiple dealer profit margins with this option. From a qualitative perspective, the lease buyout can also be quite appealing. It creates a great degree of flexibility for a lessee to reassess his or her facts, circumstances, wants and desires in the future. A lessee contemplating a buyout should be aware of potential fees associated with the buyout, but these will not significantly impact the financial propriety of the buyout decision. A lessee should also have funds available to pay for the buyout, as financing the buyout will generally be an unfavorable option.

Other Considerations

There are a number of other considerations in assessing the lease-versus-buy decision. Generally, these factors are less quantifiable, but still necessary to consider:

- "New car every three years" factor
- Mileage in excess of lease allowances
- Automobile enhancements, such as technology, fuel efficiency, quality, etc.
- Business tax deductions and limitations

Basic economics will also impact the viability of the lease. For example, it was evident in the leases in this analysis that higher demand for luxury vehicle leases can make the lease (and potential buyout) less advantageous. Likewise, if the lessees of more economic vehicles are less likely to buyout at the end of the lease, this option will likely become more favorable. These types of factors will become evident in the individual lease analysis.

Thoughts for Driving Off the Lot

For some people, purchasing a vehicle and "riding it out" will make sense; for others a lease with a potential future buyout will be the best option. In all scenarios, it will be advantageous to run the numbers to understand the vehicle-specific analysis and any behavior a dealer may be incentivizing. For the vehicles in this analysis, a purchaser should generally commit to an ownership period of at least one and a half lease terms. The purchaser should understand the vehicle-specific expected maintenance costs in the later years of ownership; if these costs are abnormally high, he or she should consider another vehicle or be willing to commit to a longer ownership period.

Finally, and most importantly, the potential purchaser should understand that a lease and future buyout must be just as, if not more, financially responsible than a purchase, in addition to the degree of flexibility that it affords.

A vehicle lessee should understand it may be more advantageous to purchase over the longer term and consider a buyout at the end of the lease. He or she should look for a vehicle that holds its value well over the lease term, which will lower the lease payment. In most circumstances, the lessee should attempt to negotiate a longer lease. Finally, the lessee should not be upgrading to an otherwise unaffordable vehicle.

Endnotes

¹ This rate of depreciation is based on a review of the actual vehicles used in the analysis, using annual depreciation estimates at autos.aol.com and actual market prices of older models of the vehicles using data at kbb.com.

² The ratio of dealer sales price to trade-in value was estimated by comparing the suggested retail prices and trade-in values of older models (3 to 9 years) of the vehicles used in the analysis, using data at kbb.com.

³ This estimate was created using the maintenance and repair costs for the actual vehicles used in this analysis, as estimated by autos.aol.com.