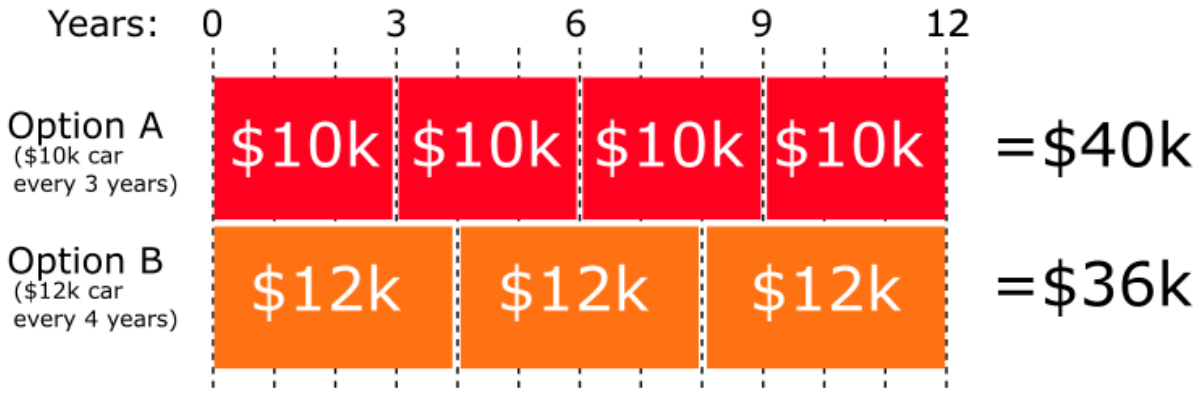
Comparative Auto Buying

Comparing the Price-per-Mile [driven] can be used as a basis of *comparison* between vehicles. This will not take into account certain aspects, for example, the insurance of a brand new Ferrari would be more than that of a 15-year-old Yugo, or the cost of fuel of a giant truck vs. a tiny two-seater, the *repair* costs of a very old or expensive vehicle, or the increased *registration* costs of a more expensive vehicle. These factors could be taken into account additionally, (but we'll get into some of these a bit later).

Even for "like" or "similar" vehicles – a cheaper vehicle is not necessarily the better *value*, meaning that it might not be necessarily cheaper over time. For example, buying a car for $12k may be "cheaper" in the long run than a car costing $10k – if indeed the $12k vehicle last *sufficiently* longer. Take the example below. If a $12k vehicle lasts 4 years, though a $10k vehicle light last 3 years – in the end, it is the better value to buy the more *expensive* car.



So in the case of looking at somewhat *like* vehicles – it can give us a great way to *compare* different vehicles and different deals. Even with unlike vehicles, it can serve as a point-of-reference as to the trade-offs and upsides/downsides of each.

The main question is: how much is this car costing you for *each mile you put on the car*?

Why is this important? Because the *price* of a car is not the only factor involved. For example, a *more expensive car* which you keep *longer* may be a better *value* than a *cheaper* car you keep for a *shorter* period of time. So you can also look at this as a ratio, like:

$$value = HowLongYoutHaveit : HowMuchItCosts$$

BUT - with few exceptions cars' lifespans aren't really measured so much in "years", as they are typically measured more in "miles". Weather a car is new, old, bought, leased, kept until it's dead or resold after a few years – how much a car is actually *costing* you can basically be looked at as:

$$\frac{Price}{Miles\ You\ Drive}$$

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Simple New Car

Let's start with the easiest example. You buy a brand new car and keep it until it's a worthless pile of rust. You can look at this with the following formula:

$$PricePerRemainingMile = \frac{MyCost}{YourTotalMilage}$$

"MyCost" is the price you would *buy* the car for.

"YourTotalMilage" is the total mileage for which you would use the car. For example, I usually keep a car until it has about 200,000 miles – afterwhich generally have it towed away to the dump or donated to charity.

So a couple examples. If I bought a shiny new Testla Model 3 for $37,000 – and threw it away after 200,000 miles, it would look like:

$$\$0.19 = \frac{\$37{,}000}{200{,}000}$$

Nineteen cents a mile. Whereas a $57,000 Lexus SUV might look like:

$$\$0.29 = \frac{\$57{,}000}{200{,}000}$$

So indeed the Lexus SUV is costing you 29-cents a mile, vs the Testla which is 19-cents a mile. So the Lexus is costing you more than the Tesla. You're probably thinking "I already knew that – its price is higher!" While this is true in this *simple case* of buying a new car – and keeping it "forever" – this isn't so obvious in other cases…

Buying a Used Car

Things start to get different in looking at *used* cars. A *used* car already has "aged" – i.e. it already *has* miles on it. So even if you're going to drive it until it reaches 200,000 miles, it might already *have* a bunch of miles on it. Thus you can only judge the value of the car based on the amount of miles *you* are going to put on it. So where for a new car we put in 200,000 for "YourTotalMilage" – we have to adjust this for a used car:

$$YourTotalMileage = EndOfLifeMilage - CurrentMilage$$

So if a car already has 90,000 miles on it (and you want to discard it at 200,000 miles) – "YourTotalMilage") would be 110,000 miles. We could rewrite the new-car equation to take this into account like this:

$$PricePerReaminingMile = \frac{MyCost}{EndOfLifeMilage - CurrentMilage}$$

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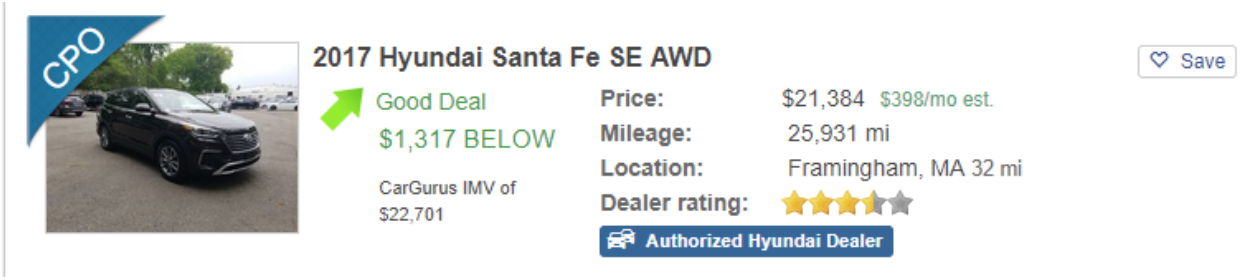
"MyCost" Your *cost* - is the price you would *buy* the car for

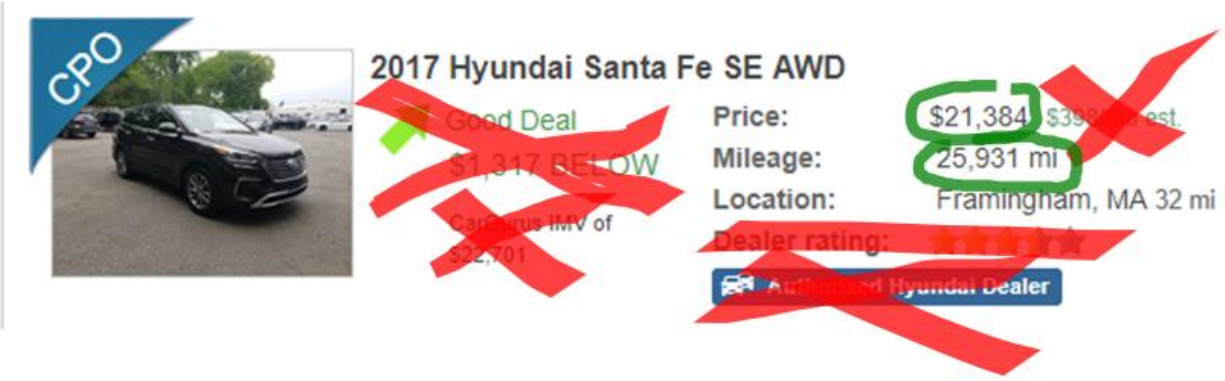
"EndOfLifeMilage" is how long you will keep the car.

"CurrentMilage" would be the *current* mileage of the car at time of purchase.

Let's say we look on the web and we've found a car we like:



What does this mean? First of all – *ignore* any gimmicks, sales tactics and marketing – stick to the formula!



Plug the numbers into the formula and we get:

$$\$0.12 = \frac{\$21{,}384}{200{,}000 - 25{,}931}$$

Twelve cents a mile. Is this good? Is this bad? What does it mean?? I don't know. *Yet.* The important point is that it is a basis of comparison to *compare* with other vehicles and other deals. When we start to compare this car with others – we'll begin to get a better picture if this is good or not.

Here's another car we like:

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At $19,000 t's a bit cheaper! How does it compare:

$$\$0.13 = \frac{\$19{,}000}{200{,}000 - 48{,}421}$$

13-cents per mile - which is higher than the previous car. Just because it was *cheaper* doesn't mean it was a *better value*. It had enough miles on it so that we'd be able to use it for a *shorter* period of time – and thus would cost us *more* in the end.

Trade-In Value

Up until now, we've been assuming you'd drive the car until it has 200,000 miles, is worthless, and is ready to be hauled-off to the dump. Like a lot of people – maybe you don't want to do this. Maybe your plan is to keep it for a few years. How much does that cost?

Let's say we plan on buying the first car we found above – and we want to keep it for – let's say 4 years. How can we factor that in?

Let's first start by getting an idea of what that car might be *worth* in 4 years. Let's shop around to get an idea. We'll try to narrow a web search to:

- This car, but *four years older*.
- What we would estimate the mileage of our car being in four years. 15,000 is a good, general estimate of how many miles an average person puts on an average car annually.

So as our car in-question is a 2017 Santa Fe with 25,000 miles, taking these two points into concideration – we will search for a 2013 Santa Fe with about (15,000 miles x 4 years) = 85,000 miles on it. So we do a web search. We can find a few cars and average them – but here's one:

2012 Hyundai Santa Fe 3.5L SE AWD

Fair Deal
$60 ABOVE

CarGurus IMV of $11,920

Price:	$11,980 $223/mo est.
Mileage:	86,561 mi
Location:	Tilton, NH 48 mi
Dealer rating:	

Judging from this – let's assume the car will be worth $12,000 when we go to sell it in 4 years.

We can plug numbers into the fomula like above – but we need one little change: Your true "cost" isn't just the purchase price – because you are going to be getting the $12,000 *back* when you resell the vehicle at the end of the 4 years. So taking this into account, it means:

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$$MyCost = PurchasePrice - ResellPrice$$

Plugging this into our formula above means that:

$$PricePerReaminingMile = \frac{PurchasePrice - ResalePrice}{EndOfLifeMilage - CurrentMilage}$$

And we plug in the numbers from above - same original car, but knowing that we are only keeping it for 4 years (60,000 miles) and will be getting about $12,000 back gives us:

$$\$0.15 = \frac{\$21{,}384 - \$12{,}000}{60{,}000}$$

Whaaat? The PricePerMile went *up?!* It used to be $0.12, but now when we factored in getting rid of it after 4 years it's more expensive? Why is this?

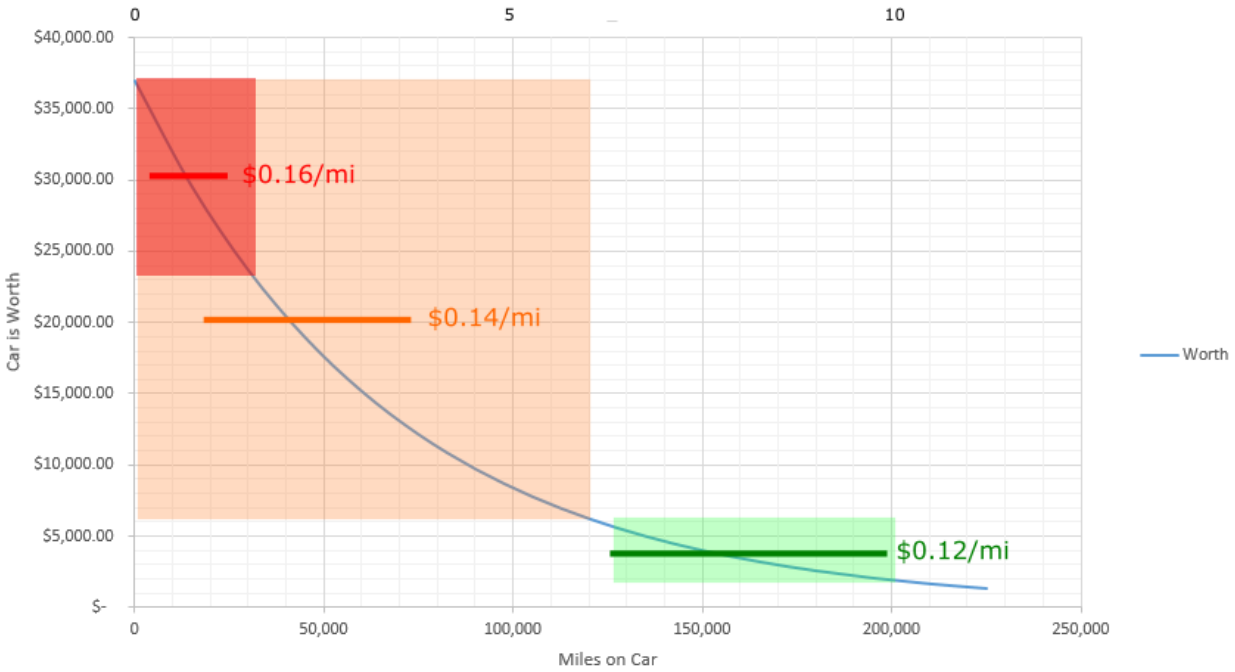
Basic intuition tells us it *is* true – it's more expensive to get a new[er] car every few years than to keep driving your old one until it dies.

Also – look at the price of that 2014 Sante Fe with 80,000 miles. If we ran our standard fomula on it – what is *it* worth?

$$\$0.10 = \frac{\$11{,}980}{200{,}000 - 86{,}561}$$

It's only worth *ten* cents a mile. This basically mean that a car is *worth more* when it's newer, and *worth less* when it gets older. (This makes sense). So if you are "using up the new part of the car" then getting rid of it, you're going to wind up paying more for it.

Take the following chart. The blue line shows hare the car depreciates in value over time (and mileage).



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So you can view the overall value as the average value during any time period. For example, the dark red area represents when the car is new (the first couple of years). Its value is higher during this period. The dark red line shows the *average* value during this time. The orange shows the same for a new car, but during a *longer* period of time. It *starts* new, and depreciates more as it gets even older, so its *average* value is lower. The green depicts the value of a car *only* during the final years of its life. It starts with little value, and loses it more gradually. Thus, the overall *average* in this area is lower.

So, an older cars worth less no surprise there. But it also tells us, for example, if you had a "newer" car, each mile you place on it is costing you more that it would than when that car was older.

Leases

So I see an add:

What do I do?! Plugging into our "new" car formula (let's simplify – and say we'll keep it forever) – cost would be:

$$\$0.20 = \frac{\$33{,}999}{200{,}000}$$

20 cents a mile for a *brand new* car. First off – I'm not saying "20 cents a mile is bad". Just saying that if you *wanted* a new car, you *are* paying a premium for it over a used one. So if you *do* want it – should you take the purchase or the lease? We can use a modified version of our "use" car formula to see what the value of the lease is:

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$$PricePerReaminingMile = \frac{DownPayment + (MonthlyPayment * Months)}{TotalMilageWellUse}$$

Notice the formula in the numerator. The numerator usually has "our cost" minus "what were getting back". In the case of a lease, our cost includes the down payment and all the monthly payments. Since at the end of a lease we give the car back *but get no money for it* – this formula is as such.

In the denominator always refects how many miles we'll put on it. We normally subtract the end number of miles from the starting mileage – but this is simpler with a lease. We can use the same basic "15,000 miles per year" rule for leases. This means we plug-in:

$$\$0.33 = \frac{\$3{,}995 + (\$309 * 36)}{45{,}000}$$

Thirty-Three Cents a mile!? That's like 50% more than on outright purchase a *new car*! Why is that?! Again – look at the chart above. You're taking all the value of the car when it's in that "red zone" – when it's newest, and worth the most. If you're the kind of person that *needs* to have a brand-new car every 3 years, then maybe that's the way to go for you.

Let's try one more thing – what if you *bought* that car new (for $33,995) and *sold it* after 3 years?

First – we find the TRADE-IN and PRIVATE SALE value of a 3 year old car with 45,000 miles – I search and find:

…meaning the resale value of my car can be estimated at $20,000. Let's plug that into the formula – i.e. I am *buying* at $33,995, selling it back at $20,000 and getting 45,000 miles out of it. It would look like:

$$\$0.31 = \frac{\$33{,}995 - \$20{,}071}{45{,}000}$$

What does this tell us? It tells us it's cheaper to buy a new car, keep it for 3 years and *sell* it than it would be to take this lease deal. Though it would be even cheaper to keep the car for longer (i.e. not replace it

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with a "new" $0.20/mile car) – unless of course you sold it, and replaced it with something with a *lower price per mile.* Granted, if the car is in great condition, and you try to sell it yourself, you could do a lot better than just turning it back in on a trade to a dealer.

How much is a "penny" really worth?

So one car is "one cent per mile" more than another? What does that really translate to?

$$Total = YourMilage * \$.01$$

So in the case above – a three-year lease vs. a new car ($0.33 vs $0.31 per mile) means the lease option would cost us…

$$\$900 = 45{,}000 * (\$0.33 - \$0.31)$$

…an extra $900, than it would if we just bout and resold the car.

Retail, Trade-In and Private Sale prices

I'd be remiss to mention on thing. There are *three* different prices you'll find for cars:

- "Retal" price – i.e. the price that *you* would pay a *dealer* for this car. All the prices I have listed here were done from quick web searches and are all retail prices.
- "Trade-In" price – i.e. the price a dealer would pay *you* for the car. This is considerably lower – because obviously the dealer is going to pay you less for a car they are selling back to someone else.
- "Private Sale" price – This is typically *between* the Retail and Trade-In price. It's the price *you would get* (or pay) in a transaction between two individuals. You can find better ideas of prices like this from things like Craigslist and Facebook Marketplace postings.

i.e. I have taken my "trade in value" guesses from "retail" listing, above. This is probably bad. Use "private sale" prices. There are sites like "Kelly Blue Book", "Edmunds" and other which will give you "Trade In" prices for vehicles – use those for references.

"Overshooting" a Lease

Loans, Interest and "Monthly Cost"

Vehicle Options

Other Costs and Fees

Fuel

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