

Motorcycle?

TL;DR

Motorcycles are not an effective general solution to transportation. They can in some cases be an effective auxiliary transportation tool, and they can be a hell of a toy, albeit an expensive one.

Objective

The purpose of this document is to lay out the advantages and disadvantages of a motorcycle and to derive from that when it does and does not make sense to acquire and maintain one, primarily for our own reference the next time we're bitten by the idea that maybe one would make sense.

Motorcycles as Transit

For better or worse, cars are the de facto standard transit solution for most Americans, so we will use them as our baseline for evaluating the desirability of motorcycles from a purely utilitarian perspective.

Comparison

We'll start with the advantages that motorcycles enjoy over cars:

1. Reduced capital expenditure. The sticker on a low-end, highway-capable bike like Honda's CB300R should sit around 5k USD. The MSRP on a Honda Civic, meanwhile, will be in the range of 20-25k USD. Of course, we also need to factor in the cost of riding gear to the motorcycle, but even with this the initial investment remains considerably lower.
2. Lane splitting. *Assuming* lane splitting is permitted where you live (at time of writing, CA is the only US state that explicitly permits it), and you live in an area prone to traffic congestion, then the option of splitting lanes can provide considerable time savings on a commute.
3. Easy parking. Bikes are smaller than cars. In places with limited street parking, this can be a meaningful advantage.

Next, things that are a bit of a toss-up, or depend on specific context:

1. Operational expenditure. Motorcycle maintenance schedules are more aggressive than for cars, most notably tires. But, these maintenance operations tend to be cheaper than their more spaced-out equivalents for cars, so conventional wisdom is it's a bit of a wash. More importantly, motorcycle insurance can be quite expensive or relatively inexpensive.

Most of the liability from operating a motorcycle is to the rider's life and limb, so if you are comfortable riding with limited injury coverage (and you are legally allowed to do so), then the cost of the motorcycle insurance may be low. Otherwise, it can be quite substantial.

And last, places where a bike falls down:

1. Personal hazard. By the numbers, motorcycles are **massively more dangerous** than cars. This can be mitigated via religious use of protective gear and avoidance of impairments while riding, but the fundamental fact remains that motorcyclists are more vulnerable, less visible, and operating a more volatile machine than their car-bound peers.
2. Attention requirements. Cars take care of a lot of things for you. They have a wide base and a low center of gravity, so you don't have to think about balance. They have an abundance of traction, so you don't have to worry about braking inside of a turn. They almost always run on an automatic transmission these days, so you don't have to think about popping a clutch in and out and matching engine speed to road speed. This is in contrast to a bike, where all of these things have to be handled by the operator, and what's more, the consequences of screwing it up tend to be more severe than in a car. The end result of this is a different bar for what constitutes impairment. It's a bad idea to drive if you've had a few drinks. It's a bad idea to ride if you've had a long, hard day. If one is looking to safely operate a motorcycle as a commuting device, that's a *serious* drawback.
3. Cargo and Convenience. Motorcycles have very limited cargo capacities compared to cars, even with saddlebags attached. This makes running an errand like grabbing a large load of groceries... challenging. Additionally, motorcycles require you to wear a considerable amount of gear if you are going to operate them safely. There is a fair bit of "incognito" gear on the market which can double as street-wear reasonably well, but depending on what activities you're doing at your destination, you may still find yourself changing into and out of your riding clothes to go to and from, and needing to find a place to store it while. This is possibly a problem and probably at least a nuisance.
4. Environmental externalities. Motorcycles, being very light, tend to burn relatively little gasoline per mile. Going back to the CB300R/Civic comparison, and using their EPA estimates (**CB300R**, **Civic**) for mileage, we expect to burn about 1.4 gallons of gasoline to move the bike 100 miles, but will spend just under twice that, ~2.8 gallons, to move the car. Additionally, the motorcycle is simply less to manufacture and transport, so the CO2 cost to "birth" the bike should be lower as well. Things look good for the bike, but closer analysis shows a serious problem in two parts. First, there are local environmental concerns that deserve consideration, and which have nothing to do with CO2 emissions. This is the "every kid who grew up in LA east of I-405 has asthma" problem, and the exhaust out of a bike is much worse in this arena than what comes out of a car. Second, CO2 is far from the

only molecule that can exhibit greenhouse behavior. Unfortunately for motorcycles, their exhaust is also chock full of more potent greenhouse gases, to the point where their exhaust's GHG-equivalent **can easily be worse** than a car's. A small silver lining for motorcycles: if and when electric motorcycles become mainstream, their inefficient exhaust-cleaning stops being an issue and they come out on top again.

Verdict

The challenges outlined in the previous section, especially the lack of cargo space and the attention requirements necessary to safely operate a motorcycle, suggest to us that a motorcycle is a poor 100% transit solution. In many cases, that simply means that a motorcycle doesn't make sense as a transit solution at all (if you need to buy a car in addition to your bike you've lost most of the advantage of the bike). Nevertheless, there do exist circumstances where adding a motorcycle (or scooter) to a transportation portfolio may make practical sense. For instance, if you are married and already have one car between you, and just need a second vehicle so both of you can commute to work in the morning.

Motorcycles as Toys

Now, many people own and operate motorcycles not because they're practical, but because they're *fun*. It must be recognized that these are expensive toys, but if we compare them to their natural competitor, the sports car¹, they fairly well dominate.

Comparison

They win on price: a new Suzuki Hayabusa can be had for ~20k USD, while you're not walking off the lot with a new 'vette for less than 60k USD.

They provide similar-to-better performance (unless we get into true supercar range, where traction advantages in cars can overcome the weight advantage the bike enjoys). Once more, **Hayabusa** vs **Corvette**.

Lastly, the real speed and performance of a sports vehicle is actually not the important thing²; it's really about how fun they are to operate. Motorcycles, being less shielded from the environment than cars, generally provide a greater sensation of speed than a car moving at a similar pace, a point in their favor.

¹Motorcycles are involved in off-road motorsports as well, but we're going to focus on track sports.

²Unless you are a professional racer, or your goal is simply to brag about your fancy car to the people you're with. If the former, your choice of vehicle has already been made. If the latter, we strongly advise looking for a more interesting crowd to associate with and/or being more interesting yourself.

Then there's the fact that motorsports isn't just about experiencing speed and acceleration (roller coasters would completely outcompete it were that so), it's about controlling that speed and acceleration. This the core reason why it is sacrilegious to install an automatic transmission in a sports car³. So where in a transit context it was a serious disadvantage that going from a car to a motorcycle is like going from an automatic to a manual transmission five times over, in the context of a motorsport toy it is a tremendous advantage.

Verdict

In sum, a sportsbike can provide similar or better real performance than a sportscar at a much lower price point, and its perceived performance should only amplify the gap. Motorcycles, then, are the natural platform for those interested in making the (not insignificant) investments necessary to engage in motorsports.

³And why, in our opinion, extraordinary EV performance numbers such as those claimed by Tesla's roadster models are technically impressive but ultimately pointless.