

PUBLIC COMMENT, CITY OF BEND CITYWIDE TRANSPORTATION ADVISORY COMMITTEE

To: City of Bend Citywide Transportation Advisory Committee & CTAC Funding Work Group
Attn: Susanna Julber, Karen Swirsky, and Eric King
From: Steve Porter and Michelle Porter
Date: August 29, 2019

Public Comment:

Fuel Tax Arguments & Counterarguments

Dear Bend Citywide Transportation Advisory Committee & CTAC Funding Work Group:

Following submission of our public comment discussing a fuel tax in Bend, we were contacted by members of CTAC to discuss some of the comment's topics. In particular we were asked to address certain arguments/counterarguments that often arise when fuel taxes are proposed.

First, we were asked what our counterarguments would be to the claim that a fuel tax is unfair because it does not apply to electric vehicles (EVs). Second, we were asked about counterarguments to the claim a fuel tax is unfair because it does not apply to pedestrians or cyclists, and to the related claim that it is unfair to spend fuel tax revenue on pedestrian and cyclist infrastructure. We provided answers to these questions. This public comment organizes those responses in our conventional public comment format and includes additional notes and citations.

Our summarized counterarguments to the claim that EVs would be unfairly exempted from the fuel tax are:

- 1) The EV "exemption" is not a problem of substance because there are so few EVs on Bend's roads;
- 2) In any case, EVs should be incentivized/rewarded for their smaller negative externality footprints, and the fuel tax does that;
- 3) The amount of reward is less than a penny per mile, which is small relative to the value of EVs' CO2 savings alone; and
- 4) EV drivers would still pay for the transportation system so long as the fuel tax is not the sole funding tool - VMT fees/tools, parking fees, and vehicle registration fees perform particularly well as complements.

Our summarized counterarguments to the claims that pedestrians and cyclists would be unfairly exempted from the fuel tax and that it would be unfair to spend fuel tax revenue on pedestrian and cyclist infrastructure are:

- 1) Walking and biking should be encouraged because of their cost efficiencies and generation of positive rather than negative externalities, and a fuel tax does that;
- 2) The present transportation funding mix penalizes walking and cycling, and it subsidizes driving; this is socially damaging and creates structural funding shortfalls, while a fuel tax helps reverse this effect;
- 3) Spending fuel tax revenue for pedestrian and cyclist infrastructure is fair and efficient due to supply-induced demand effects that magnify the public benefits of a fuel tax, whereas spending fuel tax revenue on vehicle infrastructure would counteract the benefits; and
- 4) Spending fuel tax revenue on pedestrian and cyclist infrastructure is fair and efficient partly because so much pedestrian and cyclist infrastructure is needed only due to vehicle hazards and/or because that infrastructure contributes positively to vehicle transportation.

The Electric Vehicle “Exemption”

This section provides counterarguments to the notion that, because electric vehicles are exempted from paying a fuel tax, such tax is unfair.

1. The EV “Exemption” Is Not a Problem of Substance Because There Are So Few EVs

The EV exemption is a problem of optics but not substance because EVs comprise such a small proportion of vehicles on Bend’s roads. Bend’s DMV registration data show that EVs comprise under 0.20% of all Bend vehicles. Even if plugin-hybrid electric vehicles (PHEVs) are included, the figure remains well below one-half of one percent.¹

Because the exemption encompasses such a tiny sliver of vehicles, it is not a problem with the tax structure that EVs would not pay fuel taxes. Instead, it is a matter of perceived regressiveness due to connotations associated with electric vehicles. Teslas, for instance, are especially associated with high-income households.

Rather than a true structural flaw, therefore, the EV exemption presents a visual hitch: It appears wealthy Tesla drivers are being given a tax exemption, and this is easy to dislike because it seems somehow unfair.

While this may appear unsavory at first glance, the question remains whether it is in fact unfair - that is, whether it is truly a bad thing that Bend’s EV drivers would avoid paying the fuel tax. Upon inspection, it is not.

2. EVs Should Be Incentivized/Rewarded for Their Smaller Negative Externality Footprints, and the Fuel Tax Does That

Bend’s society benefits if more people switch from internal combustion engine (ICE) vehicles to EVs. It is accordingly fair for Bend to incentivize and reward switching via a fuel tax.

This is because EVs generate fewer negative externalities than ICE vehicles. Negative externalities are costs associated with private transactions that are borne by the public. One valuable role of taxes is to “privatize” these externalities by setting a price on them and then having the private parties pay that price via the tax. This aligns private and public incentives and contributes to general economic efficiency.

¹ Data from: Bend 2016 Community Greenhouse Gas Inventory (August 2018), p. 11.

EVs are associated with lower negative externalities than ICE vehicles because EVs generate:

- much smaller per-mile CO₂ and other greenhouse gas emissions, even accounting for the coal-fired plants in Bend's electricity mix as well as up-front and disposal considerations for batteries;²
- virtually nonexistent "evaporative emissions" and leaks of engine fluids (leaking oil alone from U.S. vehicles amounts to around 19 million gallons);
- significantly reduced noise pollution due to the absence of engine work;³ and
- essentially zero spillage waste/pollution associated with retail fueling (one study found that gasoline vapors from California gas stations exceeded 15,000 gallons per day; in addition, over 6 million gallons of fuel per year are lost via leakage in transport and distribution).⁴

Because EVs' negative externalities are smaller, it is at least directionally fair that fuel taxes reward EV adoption. This argument is similar in nature to the idea that a fuel tax provides a just incentive for migration to more fuel-efficient ICE vehicles, which generate lower CO₂ emissions, by enabling fuel-efficient drivers to pay less fuel tax on a per-mile basis.

While the directional usefulness of the tax is therefore clear, we still must address whether the incentive/reward is of appropriate size.

3. The Amount of Reward Is Below a Penny Per Mile, Which Is Small Relative to the Value of EVs' CO₂ Savings Alone

To evaluate whether the size of the EV exemption is fair, we must consider the specific fuel tax rates and also take into account the overall mix of funding tools used.

Regarding fuel tax rates, we can evaluate appropriateness of size as follows. Fleet average fuel efficiency is about 22 miles per gallon (MPG). At a \$0.144 per gallon average fuel tax, the average tax per mile for an ICE driver is less than \$0.007.⁵ Avoiding this tax is a very modest "reward" for EV drivers, and it is quantitatively fair given the reduced negative externalities of EVs.

² Union of Concerned Scientists Website, "How Clean Is Your Electric Vehicle" (accessed August 2019). The calculator provides CO₂ emissions figures on a zip code basis for electric vehicles. In zip code 97701, a 2018 Nissan Leaf (40kwh) emits about 102 grams of CO₂ per mile, roughly equivalent to a gas-powered car obtaining 107 miles per gallon. This EV efficiency is many times greater than Bend's fleet average fuel efficiency and does not account for the usage of home solar systems to charge EVs.. For additional information on battery manufacturing and disposal, see also: "Cleaner Cars from Cradle to Grave," Union of Concerned Scientists (2015).

³ Mitchell, "Speed and Road Traffic Noise," A Report Commissioned by the UK Noise Association (2009).

⁴ Data regarding evaporative emissions and other waste/pollution from: Margonelli. *Oil on the Brain*. Doubleday (2007).

⁵ Porter, "Transportation System Funding: Fuel Tax" (2019).

In fact, if the “social cost” of CO₂ alone is considered, the CO₂ saved per mile of EV usage is worth around \$0.05. The fuel tax could therefore rise to more than \$1.10 per gallon and still not be excessive with regard to the EV exemption, just considering CO₂.⁶ When other negative externality savings are accounted for, the margin widens.

4. EV Drivers Would Still Pay for the Transportation System So Long As the Fuel Tax Is Not the Sole Funding Tool - VMT Fees/Tolls, Parking Fees, and Vehicle Registration Fees Perform Particularly Well as Complements

Notwithstanding their advantages over ICE vehicles, EVs do still generate some negative externalities and consume public resources just like other vehicles. They:

- depreciate roads and consume road space;
- generate braking and tire particulate matter (PM);
- present potential collision and safety hazards to other transportation system users; and
- create wind- and tire-related noise pollution when traveling at higher speeds.

These externalities and public resource uses should be taxed as means of recompensing society, in much the same way that fuel usage’s externalities and public resource uses should be taxed. This is why it is important to take into account the overall funding mix when considering the fairness of the EV exemption. EV drivers should pay for the negative externalities they generate and avoid paying for the negative externalities they don’t.

The ideal mechanisms to price and tax these additional externalities are VMT fees/tolls, parking fees, and vehicle registration fees (ideally that scale with vehicle weight). All are “MPG-agnostic” and can tax EVs and ICE vehicles at identical rates. But all also directly link vehicle-related externalities to cost.

Modulating the sizes of these other fees against the size of the fuel tax can ensure the EV exemption is appropriately-sized given the overall scale of transportation system funding. In this way, EVs would not be taxed for CO₂ and other emissions they don’t generate (by avoiding the fuel tax), but they, along with all other vehicles, would pay directly for road depreciation, parking that they consume, and other externalities in proportion to their impacts.

While it would be ideal if VMT and parking fees were included in the mix along with vehicle registration fees that scale with vehicle weight (since road depreciation, PM pollution, and noise pollution are partial functions of vehicle weight), adoption of these tools is not necessary to ensure EV drivers pay a share of the funding under a fuel tax

⁶ Moore and Diaz, “Temperature Impacts on Economic Growth Warrant Stringent Mitigation Policy,” *Nature Climate Change* (2015). Harvey, “Should the Social Cost of Carbon Be Higher?” *Scientific American* (2017). Porter, “Evidence Demonstrating the Efficiency, Safety & Economic Benefits of 20mph Speed Limits (2018).

regime. Property taxes, transportation system development charges (TSDCs), and transportation utility fees (TUFs) also do so, though they do with far more waste.

Summary

In summary, our counterarguments to the claim that EVs are unfairly exempted from the fuel tax are:

- 1) The EV “exemption” is not a problem of substance because there are so few EVs on Bend’s roads;
- 2) In any case, EVs should be incentivized/rewarded for their smaller negative externality footprints, and the fuel tax does that;
- 3) The amount of reward is less than a penny per mile, which is small relative to the value of EVs’ CO2 savings alone; and
- 4) EV drivers would still pay for the transportation system so long as the fuel tax is not the sole funding tool - VMT fees/tools, parking fees, and vehicle registration fees perform particularly well as complements.

Pedestrian and Cyclist Considerations

This section provides counterarguments to two concepts. First, we address the idea that it is unfair to exempt pedestrians and cyclists from the fuel tax. Second, we address the notion that it is unfair to spend fuel tax revenue on pedestrian and cyclist infrastructure.

Again, it is appropriate to evaluate these issues through the lens of externalities and public resource use since these are the “market failures” that taxes can address correctively.

In order to generalize the discussion and extend it beyond fuel taxes, we restate the questions as follows: Is it fair to tax fuel usage (and/or VMTs, vehicle parking, vehicle registrations), without similarly taxing sidewalk or bike lane usage or other pedestrian/cyclist usage of the transportation system? And, is it fair to spend vehicle-related revenue (such as from fuel taxes, VMT fees, parking, and/or vehicle registrations) on pedestrian and cyclist-related infrastructure?

The answer to both questions is an unequivocal yes, and the reasons are myriad. We address several.

1. Walking and Biking Should Be Encouraged Because of Their Cost Efficiencies

We can begin with a cost accounting perspective. Vehicles depreciate/consume the transportation system on a per-mile basis about 26 and 133 times that of cyclists and pedestrians, respectively.⁷

Infrastructure consumption is a function of weight, size, and safety-related considerations (though vehicle tire studs to disproportionated harm).⁸ The difference in per-mile infrastructure consumption can accordingly be intuited by recognizing that a passenger vehicle weighs about 25 times what a pedestrian or cyclist does, and the additional cost increment comes from vehicles' large road and parking space requirements and significant implications for road user safety.

Therefore, from a transportation system cost perspective, it is wildly beneficial to migrate people from cars to bikes and sidewalks. The fuel tax (and similarly, VMT fees, parking fees, and vehicle registration fees) help this occur. Fees on cycling and/or walking would retard this beneficial effect and generate cost inefficiencies.

So it is fair and efficient to tax the most expensive uses of the transportation system (i.e., driving) to bring public cost considerations into private consumption decisions and, in this way, to reduce the total funding scale required for the system and thus reduce overall public tax burdens.

2. The Present Transportation Funding Mix Penalizes Walking and Cycling and Subsidizes Driving, Which Is Socially Damaging and Creates Structural Funding Shortfalls, While a Fuel Tax Helps Reverse This Effect

A fuel tax also helps the transportation system become more financially manageable and can help eliminate structural funding shortfalls.

⁷ Data can be found in: Litman, "Whose Roads?" Victoria Transport Policy Institute (2013). Litman, "Transportation Cost and Benefit Analysis II," Victoria Transport Policy Institute (2018). Porter, "Evidence Demonstrating the Efficiency, Safety & Economic Benefits of 20mph Speed Limits" (2018).

⁸ "Review of Studded Tires in Oregon," Final Report, SPR 304-671 (2014). "Highway Cost Allocation Study, 2017-2019 Biennium," ECONorthwest. This latter report outlines VMTs, vehicle weight, and external (i.e., social) costs as decisive in roadway cost generation. For completeness, we note our observation that the study's quantitative disregard for external costs is economically inappropriate and its highlighted reason for doing so entirely unsatisfactory. The report states: "The proponents of a cost-based approach argue that, to be consistent, a HCAS should include all costs that result from use of the highway system. They further argue that economically efficient pricing of highways requires the inclusion of all costs, and that failure to do so encourages over-utilization of highways. Including external costs adds to the breadth and completeness of the analysis and helps determine appropriate user charges necessary to reflect these costs. However, there are several disadvantages associated with including external costs. Although these costs represent real costs to society, they are decidedly more difficult to quantify and incorporate in the analysis than are direct highway costs. Inclusion of external costs therefore increases the data requirements and complexity of the studies, and could reduce their overall accuracy" (p.16). In effect, the report concedes that excluding external costs makes its findings inaccurate, but then argues that trying to include external costs could somehow reduce accuracy. This is nonsensical. It then indicates the underlying reason for this omission amounts to numerical complexity. But a numerical analysis is the very point of the study. In any case, good quantitative external cost analyses have been successfully conducted, which demonstrates the task is far from impossible. See, for example: Litman, "Whose Roads?" Victoria Transport Policy Institute (2013). Litman, "Transportation Cost and Benefit Analysis II," Victoria Transport Policy Institute (2018).

Bend, along with most places, presently faces a structural funding gap for transportation because the systems' infrastructures are designed to encourage the costliest types of usage (i.e., driving), and payments for the systems are based on mechanisms not directly tied to usage (e.g., property taxes or similar mechanisms, which, in Bend, include TSDCs). This generates a vicious cycle of over-utilization relative to payment. It thus ingrains funding gaps and quality deterioration.

By using funding tools like the fuel tax that link user payment with usage cost, the price-cost connection (known in economics as "price-signaling")⁹ is restored, and transportation system user patterns are reconciled with the costs of that usage. A fuel tax price-cost connection encourages walking and cycling, which carries a negligible cost impact on the system and therefore improves its overall financial viability.

These factors also explain how current transportation system funding is effectively a subsidization arrangement in which those who drive the least pay out the largest subsidies. And those who drive the most receive the largest subsidization. At present, the overwhelming majority of transportation system costs are paid via TSDCs (which are functionally similar to property taxes) and other fees that do not relate to individual usage decisions. These are paid by everyone (either directly or indirectly) regardless of their transportation habits. Meanwhile, the overwhelming majority of spending goes to vehicle infrastructure development and maintenance.¹⁰

Hence, very little money going into the system comes directly from driving, while most of the spending goes directly to driving. This amounts to a driving subsidy that, through several complementary mechanisms, encourages wasteful road usage and expansion. Perversely, the people who cycle and/or walk the most (who generate the lowest system costs) pay the largest subsidies to those who drive the most (who generate the greatest system costs). This is one reason why property taxes, TSDCs (particularly the way they are now calculated and paid), and similar funding tools are damaging, and it is an argument in favor of fuel taxes and similar funding tools that help reduce this wasteful subsidy.¹¹ The fuel tax does this via two simultaneous actions: 1) raising the cost of driving; and 2) improving the conditions for walking and cycling by reducing VMTs.

⁹ We find Wikipedia's definition of "price signal" to be helpful in this context: "A price signal is information conveyed to consumers and producers, via the price charged for a product or service, which provides a signal to increase or decrease quantity supplied or quantity demanded. The information carried by prices is an essential function in the fundamental coordination of an economic system..." Wikipedia, "Price Signal" (accessed August 2019).

¹⁰ Citywide Transportation Advisory Committee Funding Work Group Meeting #3 Presentation, Slide "Projected Allocation of Revenue Sources" (2018). Bend Metropolitan Transportation System Plan, Ch. 19, "Financial Analysis." Bend Urban Area Transportation System Plan, Section 7.

¹¹ This arrangement is a severely regressive welfare program for drivers that generates overpowering negative externalities and virtually zero positive results. Dutzik, et al., "Who Pays for Roads?" Frontier Group (2015). Bliss, "U.S. Transportation Funding Is Not Created Equal," CityLab (2017).

3. Walking and Biking Should Be Encouraged Because They Generate Positive, Rather Than Negative, Externalities

The benefits of migrating people from cars to sidewalks and bicycles do not end with transportation system costs. Increased rates of walking and cycling are associated with:

- Improved public health (especially reduced diabetes, obesity, and asthma);
- Enhanced social capital (i.e., better interpersonal connections among citizens);
- Reduced crime;
- Elevated education attainment;
- Diminished traffic congestion;
- Increased innovation rates and patenting; and
- Beneficial local shopping habits, to name a few.¹²

These are examples of positive externalities. When people substitute travel from vehicle to walking or biking, they simultaneously reduce their cost footprints on the transportation system and replace negative externalities (like CO₂, noise, and particulate matter pollution as well as public safety harms) with positive externalities including those listed above.

Thus, there is a strong public and social incentive to help people get around by bike and foot rather than vehicle. Taxing fuel helps achieve this, and because the benefits are public and well-distributed, imposing fuel taxes (and other similar fees) on driving but not walking or biking is fair and efficient.

4. The Use of Fuel Tax Revenue for Pedestrian and Cyclist Infrastructure Is Fair and Efficient Due to Supply-Induced Demand Effects That Magnify the Public Benefits of a Fuel Tax, While Using Fuel Tax Revenue on Vehicle Infrastructure Would Counteract the Benefits

At least a portion of fuel tax revenue should be spent on facilities that encourage pedestrian and cyclist activity rather than vehicle usage in order to secure the benefits of the fuel tax.

In part, this is because of supply-induced demand effects: If more vehicle infrastructure is built, more driving occurs that offsets at least some of the benefits of the fuel tax or similar funding tools.¹³ However, if more facilities

¹² For a good summary of empirical literature on these points, see: Speck. *Walkable City*. North Point Press (2012).

¹³ Porter, "Evidence & Implications of Supply-Induced Demand in Transportation Systems" (2018). The summary of this text reads: "Induced traffic is roadway that is self-generated by road capacity expansion. Induced traffic consumes an average of 78% to 94% of any added road capacity and, depending on the particulars of expansion, induced traffic can consume more than 100% of new capacity. Because of the induced traffic effect, new road capacity does not decrease traffic congestion, reduce travel times, enhance travel time reliability, or accommodate new population growth. Expanded road capacity entails significant outlays for communities, both for initial infrastructure development and ongoing maintenance, as well as environmental costs. Since road expansion does not enhance traffic outcomes, the majority of these costs becomes waste. Reducing traffic congestion in Bend requires actions exclusive of adding roadway capacity; solutions emphasizing pedestrian, cyclist, and mass transit infrastructure enhancements should be prioritized since these do improve traffic outcomes."

for walking and biking are developed, more walking and biking occurs that extends the fuel tax's benefits of generating lower transportation system funding needs and fewer negative externalities/greater positive externalities.

Since most of these benefits are public goods, they are advantageous to everyone, regardless of an individual's personal walking/cycling/driving mix. For instance, an individual benefits from cleaner air due to more people walking and biking, even if he personally only drives. He similarly benefits from lower crime, improved social capital, decreased traffic congestion, and so on, all of which can be viewed as an in-kind tax cut or, equivalently, an increase in public services at a static tax burden.

Thus, use of fuel tax revenue for developing pedestrian and cyclist infrastructure is in the public interest because it generates well-distributed gains and does so cost-efficiently. It is accordingly fair.

5. The Use of Fuel Tax Revenue for Pedestrian and Cyclist Infrastructure Is Fair and Efficient Partly Because Much Pedestrian and Cyclist Infrastructure Only Is Needed Due To Vehicle Hazards and/or Because That Infrastructure Contributes Positively to Vehicle Transportation

Identifying what infrastructure is specifically oriented towards pedestrians and cyclists is not as straightforward as might be assumed.

Certain pedestrian and cyclist infrastructure is needed only because of vehicle travel. For example, safety-related infrastructure for pedestrians and cyclists is not, strictly speaking, necessary for walking and biking, but is instead only required for vehicle safety in the presence of walking and biking. Whether such infrastructure should be properly considered pedestrian/cyclist or vehicle facilities is debatable.

Is a crosswalk pedestrian or vehicle infrastructure? The crosswalk would be superfluous without vehicles; at the same time, it would be unnecessary without pedestrians. Is one-half of the crosswalk pedestrian infrastructure and the other half vehicle? What is the appropriate ratio? Is a bike lane that reduces traffic congestion on a road by 10% properly considered bike or vehicle infrastructure?

The broader point is that the distinctions are difficult to draw. But it may be fairly assumed that any type of infrastructure investment instinctively viewed as pedestrian- or cyclist-related actually relates substantially to vehicles as well. And so it is misleading framing to suggest that any infrastructure spending ostensibly for cyclists or pedestrians is solely attributable to or beneficial for that transportation mode.

Importantly, this relationship does not hold in the opposite direction. Spending on vehicle infrastructure is likely solely attributable to and beneficial for that transportation mode. For example, there is no obvious nexus between

a vehicle parking space in, say, a municipal parking garage and ease of walking or cycling. Nor is there a clear connection between the addition of a vehicle traffic lane and walking or cycling capabilities. Indeed, research shows that the addition of vehicle infrastructure actually harms and discourages transportation modes like walking and cycling.¹⁴ It cannot be argued that, just as there is ambiguity about the causes and consequences of spending on pedestrian or bike infrastructure, so must there be ambiguity about vehicle infrastructure spending; there is not.

Since at least a fraction of virtually any outwardly pedestrian or bike investment counteracts vehicle hazards and/or facilitates vehicle transportation by, for instance, causing modal substitution that reduces congestion, it is fair and efficient to spend fuel tax revenue on such projects.

Summary

In summary, our counterarguments to the claims that a fuel tax unfairly exempts pedestrians and cyclists and that it would be unfair to spend fuel tax revenue on pedestrian and cyclist infrastructure are:

- 1) Walking and biking should be encouraged because of their cost efficiencies and generation of positive rather than negative externalities, and a fuel tax does that;
- 2) The present transportation funding mix penalizes walking and cycling, and it subsidizes driving; this is socially damaging and creates structural funding shortfalls, while a fuel tax helps reverse this effect;
- 3) Spending fuel tax revenue for pedestrian and cyclist infrastructure is fair and efficient due to supply-induced demand effects that magnify the public benefits of a fuel tax, whereas spending fuel tax revenue on vehicle infrastructure would counteract the benefits; and
- 4) Spending fuel tax revenue on pedestrian and cyclist infrastructure is fair and efficient partly because so much pedestrian and cyclist infrastructure is needed only due to vehicle hazards and/or because that infrastructure contributes positively to vehicle transportation.

Thank you for your consideration.



Steve Porter



Michelle Porter

¹⁴ This especially manifests through the joint mechanisms of "displacement" (i.e., the "crowding out" of non-automotive travel when transportation infrastructure tilts more heavily toward automotive transport) and land use patterns (especially de-densification of residences and workplaces that causes increased automotive utilization and dependence, which self-intensifies through a positive feedback loop by deterring non-automotive usage). Porter, "Evidence & Implications of Supply-Induced Demand in Transportation Systems" (2018).

ABOUT THE AUTHORS

Steve Porter

Steve is a recognized authority on economic analysis and valuation. He has provided expert testimony in high-stakes commercial litigation on topics including economics, valuation, statistics, econometrics, market definition, consumer choice, business strategy, and pricing, among others. He has consulted with Fortune 500 corporations on intellectual property licensing, asset transactions, and valuation issues, and he has conducted economic impact analyses, including work performed on behalf of the Los Angeles Superior Court. His articles have published in the *Journal of Legal Economics*, *les Nouvelles*, the *Patent, Trademark & Copyright Journal*, the *Journal of the Patent and Trademark Office Society*, and *Intellectual Asset Management*, among others. He also is co-author of *IP Strategy, Valuation, and Damages* (LexisNexis), a treatise on intellectual property economics. Some of his work has been cited as authoritative in filings submitted to the Supreme Court and the Federal Trade Commission, and he has been quoted by and featured in the editorials section of the *Wall Street Journal*. He has been an invited speaker before the Chicago Bar Association, the Attorney General's Office of the State of Arizona, and various law firms and corporations, where he has lectured on topics ranging from economic analysis and valuation to econometrics and game theory. He is a recipient of the William J. McKinstry Award in economics, the *Wall Street Journal* Scholar Award, the Micronomics Economic Research Award, and the IE Fund Leadership Scholar Award. He served as a teaching assistant in economics at the Dolibois European Center in Luxembourg, an ad hoc referee for the *Journal of Forensic Economics*, and as Co-Chair and an Executive Committee Member of Young Professionals Advisory Council at the Farmer School of Business. He graduated *summa cum laude* and with University Honors from Miami University in Oxford, Ohio, completing dual majors in economics and marketing. He received his MBA, with honors conferred by the Dean and Board of Academic Affairs, from IE Business School in Madrid, Spain, graduating 5th in a class of more than 400. He holds the Series 65 securities license.

Michelle Porter

Michelle is an expert in valuation, economic analysis, and quantitative methods. She has been engaged by Fortune 500 companies, SMEs, U.S. and international government entities, and leading law firms to provide expertise in high-stakes commercial litigations, negotiations, and asset transactions. Her consulting work has encompassed advisory roles in industries including pharmaceuticals, medical devices, banking, telecommunications, consumer goods, software, and transportation technologies, among many others. Michelle is co-author of the book entitled *IP Strategy, Valuation, and Damages* (LexisNexis). Her articles have appeared in *les Nouvelles*, *Intellectual Asset Management*, *Intellectual Property Magazine*, *Smart Business*, *Los Angeles Daily Journal*, *The Recorder*, and *China Intellectual Property*, and she has been quoted by *Forbes*. Michelle has spoken before such groups as the Intellectual Property Law Committee of the Chicago Bar Association, Google, and Motorola Mobility. Her work has been recognized with the Accenture International Consulting Competition Top Honors Award, the IE Women Leaders Scholarship Award, the *les Nouvelles* Best Article Award, and the Micronomics Economic Research Award. In addition, Michelle has served as an advisor to the Forte Foundation's MBALaunch for Women, President of the IE Business School Southern California Alumni Association, Co-Chair and Executive Committee Member of Young Professionals Advisory Council at the Farmer School of Business, and an instructor in microeconomics. Michelle graduated *cum laude* from Miami University in Oxford, Ohio, majoring in economics. She received her MBA from IE Business School in Madrid, Spain.