

Friday, October 16, 2009 12 Comments

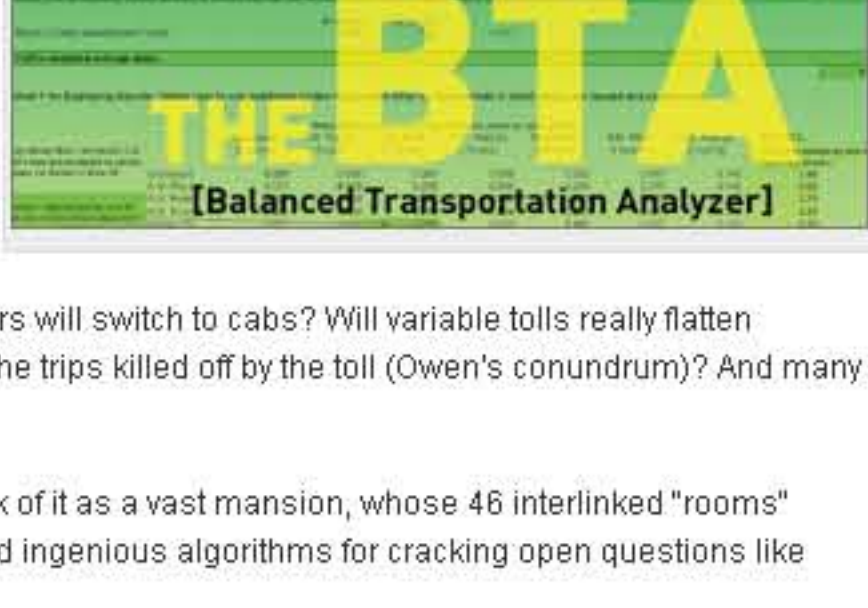
Wanted: Crowd-Sourced Transportation Analysis

by Charles Komanoff on October 16, 2009

My recent [post](#) refuting David Owen's [attack](#) on congestion pricing ignited a long, rich thread. Here's one [comment](#), from "Jonathan," that struck a nerve:

[A] cordon-pricing plan ... which doesn't charge center-city residents could result in an increase in those residents' automobile use. If the streets are free of outer-borough traffic, more of my Manhattan neighbors might drive to work, or simply make extra automobile trips within the cordon that without CP [congestion pricing], they would have made by subway or taxi.

Jonathan's right: Any Manhattan cordon-pricing scheme will lead to an uptick in car trips that start and end within the charging zone. It's one of those "rebound effects" that congestion-price modeling needs to account for, and which I've taken pains to incorporate in my [Balanced Transportation Analyzer pricing model](#).



Indeed, I daresay that the BTA handles just about every issue ever raised on this blog about congestion pricing. How many transit users will switch to cabs? Will variable tolls really flatten rush-hour peaks? Won't faster roads lure back the trips killed off by the toll (Owen's conundrum)? And many more.

Technically, the BTA is a spreadsheet. But I think of it as a vast mansion, whose 46 interlinked "rooms" (worksheets) are stocked with precious data and ingenious algorithms for cracking open questions like these:

- ▶ How does congestion on weekends compare with weekdays?
 - ▶ How sharply do traffic speeds rise as volumes fall?
 - ▶ Which boroughs and counties stand to pay the most with congestion pricing?
 - ▶ Will a cordon toll lead to more bicycling, and will that improve public health?
 - ▶ Can decommissioning vehicle lanes increase congestion pricing's benefits?
 - ▶ Which will boost transit use more: lower fares or better service?
 - ▶ How many fares does a cabbie get in a ten-hour taxi shift, with and without pricing?
- Multiply that list a hundredfold and you get a sense of the BTA's hidden treasures.
- I say "hidden" because, except for a few mavens like "Gridlock" [Sam Schwartz](#), who [calls](#) it "the best [modeling] tool that I have seen in my nearly 40 years," the Balanced Transportation Analyzer remains largely untapped by advocates. To me, it's as if we're all starving while this rich storehouse next door goes to waste.

Which prompts me to ask: **Why is the BTA so underused? Is our community missing out on a valuable tool? What should we do about it?**

Let's make this an open thread, with emphasis on what can we do together to make the BTA more accessible and useful to New York's livable streets community. (The model is adaptable to other cities, so those of you not from NYC are also invited.)

As for Jonathan's question: the BTA shows that over the course of a typical weekday, 72 percent of all vehicle miles traveled inside the Manhattan Central Business District are by cars, trucks and buses that have crossed into the CBD, either at 60th Street or across the Hudson or East Rivers, and thus would pay the congestion toll. The remaining 28 percent of VMT is mostly by medallion taxicabs (22 percent). Cars and trucks that stayed within the cordon zone and couldn't be tolled accounted for just 6 percent of all CBD traffic. (All this is derived and shown in the table at the bottom of the BTA's "Cordon" worksheet.)

This tells us that 1) Even if "intrazone" traffic rises sharply, as Jonathan fears, it will add relatively little VMT because it's such a small share of overall cordon traffic to begin with, and 2) rather than fret over the free pass for intrazone trips (which are impractical to toll with current technology), congestion pricing needs a strategy to stop a surge in *taxicab* use from filling the newly freed road space.

The plan currently [advocated](#) by [Ted Kheel](#) and [myself](#) does just that. It combines a 33 percent surcharge on all three taxi-fare components -- mileage, waiting time, and the "drop" -- with time-variable car tolls of \$3/\$6/\$9 on weekdays and \$2/\$3/\$4 on weekends (trucks pay double, reflecting their greater bulk, while medallion cabs are exempt from the toll but pay the surcharge). Under this Kheel-Komanoff Plan, intrazone VMT is predicted to rise by approximately 120,000 miles a day -- 40,000 by cars and trucks, 80,000 by taxicabs. But cordon VMT by vehicles coming from outside, and thus tolled, falls far more, by 450,000. This yields a net drop in cordon travel of 330,000 VMT, an 8 percent decline that, the model predicts, will boost average travel speeds within the CBD by around 20 percent.

The point of this post isn't to advocate for a particular plan, however. It's to show that rebound effects and other asserted congestion-toll pitfalls can be modeled and, with the right plan, accommodated.

The figures are based on 2007 traffic levels. Current volumes are probably slightly less. While a decrease in "baseline" traffic cuts into the benefits of congestion pricing, both the saved time and new transit revenue predicted for Kheel-Komanoff are still striking. And, yes, if you want to test our pricing plan (or your own) with reduced baseline traffic, the BTA even has a switch to adjust the volume.

12 Comments | Last comment by Ian Turner | Leave a comment »

mike
It can't be a spreadsheet. Make it sexy, simple and interactive — I'm thinking like a flash or "web 2.0" (ugh, I hate that phrase) web site. Make it something that people will really want to play around with and share.

Obviously this requires expertise and funding. But that's the way to go.

October 16, 2009 at 11:35 am | [Link](#) # 1

Nat
I agree with Mike. Spreadsheets are difficult for many people to interface with. Some much more interactive and graphical interface would significantly increase interest in the use of the BTA. There is also the issue of having faith in the results. It is very difficult to be fully confident that non-intuitive results that may be predicted by something like the BTA without a full understanding of it. Graphics helps people get a sense of why a particular result makes sense.

October 16, 2009 at 12:08 pm | [Link](#) # 2

J.Lai
I think Mike and Nat, between them, have hit upon the 2 main reasons why the BTA is underutilized.

A more user-friendly interface would definitely help, as would a way to gain greater confidence in the underlying assumptions.

To address the second point, is there any chance you can get this in a peer-reviewed academic journal (forgive my ignorance if you already have)?

October 16, 2009 at 12:32 pm | [Link](#) # 3

BicyclesOnly
If I could wish for anything:

I would include in the model actual or estimated traffic volume and speed data by roadway, and then create a graphic interface that allows the user to "play God" on a map of the grid by converting lanes of MV traffic to other uses. The model would compute the changes in the resulting modal composition, volumes and speed of the traffic on all of roadways predicted to be affected by the changes the user makes, based on observations and assumptions regarding traffic patterns and behavior. I'd bring the model to a Community Board meeting and put it on a screen so these people (whose are by no means experts on traffic) can see the effect of a proposal such as BRT, protected bike paths, closing Central park to cars, etc.

I have a feeling the model I'm describing is only slightly less ambitious than Hari Seldon's model of psychohistory (Asimov fans take note) and would take Charles a lifetime to construct, but maybe it would be feasible for Charles to work with activists on the Upper East and West Sides who have convinced their respective community boards to at least consider proposals for protected bike lanes, to come up with an analysis of traffic effects to rebut the arguments of those who mindlessly argue that any reduction in traffic lanes will "bring traffic to a standstill," when in fact non-MV traffic is facilitated rather than hindered, that effect is magnified by modal shift, and MV effects are materially offset by modal, route and time-of-commute shifts by drivers in response to the changes.

October 16, 2009 at 1:03 pm | [Link](#) # 4

Cap'n Transit
Charles, I remember that a previous version of the spreadsheet allowed you to see the effects of making buses free, but not the effect of fare prepayment or proof-of-payment systems. Has that been included now?

October 16, 2009 at 1:08 pm | [Link](#) # 5

DJStroky
The estimated trip distance is quite likely the most serious drawback to this whole model. The lack of a GIS-based assignment engine makes these distance assumptions hard to calibrate or validate. Furthermore, I don't see a section on traffic diversion to other areas. For example, I set a ridiculous \$200 auto toll (attempting successfully to break the model) during bins 4 and 5. It appears that the calculations say that 63% of trips were "eliminated" and there ended up being negative trips. The 1977 elasticity values are likely quite out of date by now in terms of auto travel. I'd expect these "eliminated" trips to be just diverted to areas outside the cordon, especially for the non-work and thru trips which have higher elasticities.

October 16, 2009 at 1:47 pm | [Link](#) # 6

Charles Komanoff
Great comments so far, thanks all.

Mike -- Nat -- J.Lai -- I'll check out the interface angle, thanks.

BicyclesOnly: Your hunch is right that geographic differentiation can't be built into this level model, unfortunately. As to community boards, engineers and planners like Sam Schwartz, Fred Kent, Jan Gehl et al. are far more knowledgeable and persuasive than I could be even if I had the kind of model you're fantasizing.

Cap'n Transit: The BTA's "Bus Boarding" worksheet isn't quite complete, but take a look. (The version you recall in BTA 1.0 was simplistic and I'm working on improving it.)

DJStroky: Congratulations on "breaking the BTA." I'm a bit chagrined, though also pleased that it took a \$200 cordon price! I'm sorry I don't have a cash prize for you, you deserve one. What broke it wasn't the price-elasticity but the *time-switching* algorithm ... I probably need to attenuate that, since even with a \$200 toll next to a \$6 toll, some drivers will stick to the higher-price period. Thanks for smoking that out.

DJStroky (more): As for the estimated trip distance, are you questioning my chosen parameters, or my use of a point estimate rather than a distribution? I'm not sure I would agree on either count, but I'd like to know. As for the 1977 elasticities, did you get to read further down in the "Elasticities" worksheet where I back up the key variable (driver price-elasticity) with recent findings?

DJStroky and all: Thanks much, keep it coming. — CK

October 16, 2009 at 2:20 pm | [Link](#) # 7

DJStroky
@Charles Komanoff: Using a static point estimate of driving distance even after a significant toll is applied was my concern because driving distance is likely to change as people choose new destinations for activities. As for the elasticities, I didn't read far enough to see the more recent studies being cited.

October 16, 2009 at 6:57 pm | [Link](#) # 8

JK
Charlie. I don't really understand how the taxi fees reduce taxi VMT by much. They will reduce passenger demand for cabs, but cabbies and medallion owners still need to pay the bills. Therefore don't they have to cruise more to access the same size consumer/passenger market (demand) they had before? In other words, reducing demand for cabs isn't going to reduce the supply of cabs much because medallion owners still have to pay for those medallions and drivers still have to make a living. Or, is there research showing that cab VMT declines with fare hikes?

October 17, 2009 at 10:32 am | [Link](#) # 9

Charles Komanoff
Hi John --

Your surmise is correct that taxi usage would be slashed (moved in both directions at once) under congestion pricing, particularly if some toll revenues are used to reduce transit fares. Under the Kheel-Komanoff Plan, the taxi surcharge and fare cuts would cut taxi use, while faster travel and less use of private cars would raise it.

Using the parameters in the BTA, the predicted net impact is a 5% *increase* in taxi ridership even as overall VMT within the CBD falls by 8%. This should be good news for cab drivers. Ditto, the prediction in the BTA of almost 3 more fares per shift, due to speedier trips. (See "Motor Vehicles" worksheet, Row 772, and "Taxi" worksheet, Row 150.)

As for *cruising* — I admit that I hadn't thought about how pricing might affect the share of taxi VMT accounted for by cruising — I simply kept it at 39%. My price-elasticity of taxi use (from Schaller, BCTW — it's sourced near the top of the "Taxi" worksheet) is for taxi ridership, not taxi VMT. But the question of whether taxi VMT would vary differently from taxi ridership seems non-essential to me, especially if taxi ridership is projected to increase.

— Charlie

October 17, 2009 at 7:53 pm | [Link](#) # 10

Doug Irvine
I recall the taxi strike a while back. The thing I noticed immediately was how fast the traffic was speeding down Ninth ave. There were cars and trucks doing 50mph.

My fear is congestion pricing might just make the streets more dangerous. I favor enlarging sidewalks (and bike lanes), removing street parking, and closing more streets to traffic to discourage people from driving in nyc.

Strangely, I make the best time walking on Wednesdays. With all the Broadway matinee traffic, it's easy to cross against the lights.

October 19, 2009 at 10:13 pm | [Link](#) # 11

Ian Turner
Doug,

A serious concern. There is fortunately an easy solution: Speed cameras.

October 20, 2009 at 12:56 am | [Link](#) # 12

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— StevenF

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