

CMAP



Congestion Pricing

AN ANALYSIS OF THE GO TO 2040 MAJOR CAPITAL PROJECTS

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Introduction

Congestion pricing is a recommendation of GO TO 2040, CMAP's regional comprehensive plan. Under this policy, the price to travel on a road varies by the amount of traffic on the road. Higher prices would reduce traffic by encouraging travelers to carpool, take transit, or consider alternative routes and times for their trips. At the same time, those who choose to pay a premium price would enjoy significant travel time savings and improved trip reliability.

This study explores the effects of congestion pricing on the new highway facilities recommended in GO TO 2040. In this study, congestion pricing is either implemented on all lanes of a new road, or implemented on just one new lane on an existing facility. This new lane is separated from the general purpose lanes and priced to achieve free-flow speed.

This study quantifies some of the benefits of congestion pricing, such as travel time savings, and also examines potential drawbacks, such as impacts on local streets and inequity among users. To explore these questions, CMAP used a recently developed transportation demand model specifically designed to measure travel demand under different highway pricing scenarios.

Research Questions and Overview of Results

This study is organized around several primary research questions. The section below summarizes the study findings at a regional level. Results vary at the corridor level and are explained in more detail in the Results and Discussion section.

- What are typical travel time savings with congestion pricing?
 - A driver using an express lane during the morning peak would have his or her trip shortened 31 – 66 percent, depending on the road, relative to current travel times. Travel times would also be more reliable.
- To what extent would congestion change on expressways and on corridor arterials?
 - With the construction of new capacity and the implementation of pricing, congestion delay on the existing lanes would drop by 24 – 33 percent, depending on the road. Delay related to congestion on arterial roads in the corridor would decrease by 6 - 10 percent because of the added capacity on the expressways. Users of the express lanes, general purpose lanes, and arterials in the corridor would all benefit.
- What charge would be required to achieve free flow speeds in the express lanes?



- The charge would vary by facility, but an amount \$0.05 - 0.31 per mile above the base toll (or above zero on existing free roads) during the morning peak would be required. The projected prices are well within the range observed on other congestion-priced facilities in the United States.
- Would congestion-priced facilities exclude lower income users?
 - People at any income level choose to use congestion-priced facilities based on how important the travel time savings are to them. This study found that the median household income of express lanes users would be 13 – 19 percent higher than the income of general purpose lane users, but the results show some users from all incomes choosing to pay the premium.
- How would mode choice change in the area served by the facility if congestion pricing were implemented?
 - Most persons would not change their mode of travel as a result of implementing congestion pricing on new facilities. In particular, transit mode share is not anticipated to change significantly.
- How often would the typical driver choose to use the express lane?
 - Surveys in other areas suggest that drivers who use the express lanes at all take them for 2 – 3 one-way trips per week on average. Drivers do not choose to take those facilities every day, but only when they need to.
- How much additional toll revenue would be generated by congestion pricing?
 - In this study, where only new facilities are congestion-priced, the gross annual revenue is calculated to be approximately \$74 million. This is the amount of revenue that is due to congestion pricing only. The costs of toll collection have not been subtracted from this figure.



Methods

Facilities Selected for Study

The present study examines the new expressway facilities recommended as major capital projects in GO TO 2040, with the exception that several short add-lanes projects were not considered. Table 1 and Figure 1 summarize the projects studied. The facilities include:

- One express lane in each direction on the I-55 Stevenson Expressway, the I-290 Eisenhower Expressway, and the I-90 Addams Tollway; and
- All lanes on the IL 53 extension/IL 120 bypass project (also referred to as the Central Lake County Corridor) and the Elgin-O’Hare West Bypass suite of projects.

Table 1. Extent and length of new facilities studied for congestion pricing.

Projects	Extent	Length (mi)	Lanes to be congestion-priced (each direction)	Lanes on facility when complete (each direction)
Central Lake County Corridor	IL 53 north extension: entire	12	2 new	2 ¹
	IL 120 bypass: entire	11	2 new	2
Elgin O’Hare West Bypass	Gary to I-290 ²	6	1 new, 2 existing	3 ³
	East extension: I-290 to York	4	3 new	3 ³
	West bypass: entire	8	2 new	2 ³
I-55 express lane	I-355 to I-90/94	23	1 new	4
I-90 express lane	IL 31 to I-294	23	1 new	4
I-290 express lane	Mannheim to Damen Av ⁴	11	1 new	4

¹ The Illinois Route 53/120 Blue Ribbon Advisory Council Final Report recommended that the facility be constructed as a four-lane, 45-mph roadway. See <http://tinyurl.com/8hwp3gk>.

² Under the Tier II EIS for the Elgin-O’Hare West Bypass project, the two existing lanes on the Elgin-O’Hare Expressway are proposed to be converted to toll lanes. For operational reasons, these two converted lanes would probably need to be congestion priced if the three new lanes to the east are congestion priced, as the present study assumes. Note that the Tier II EIS assumes flat tolling. The present study analyzes the case of tolling that varies with congestion.

³ Short auxiliary lanes are proposed on the Elgin-O’Hare Expressway in certain places, but these were disregarded in the modeling.

⁴ GO TO 2040 proposes a shorter lane with an eastern end at Austin Avenue to be added in conjunction with transit improvements. Operationally, however, pricing would be more sensible for an express lane that continues into downtown. East of Central Avenue, where the roadway is four lanes in each direction, this study assumes that an existing lane would be converted to express. The express lane would end (switch back to a general purpose lane) at Damen so that travelers could exit to the Illinois Medical District.



Figure 1. New expressway facilities recommended in GO TO 2040.



Design and Operation Assumptions

Pricing

In this study, prices were set to achieve free-flow speeds during the peak periods. In other words, the price was set to essentially eliminate recurring delay, the additional travel time over



and above free-flow travel time caused by congestion. Delay resulting from non-recurring congestion, such as that caused by weather or major events, was not considered in this study.

The price on each facility was calculated as the product of delay on the facility in minutes and the regional average value of time,⁵ the latter quantity being estimated through the highway pricing model. For example, if a 5-mile segment of expressway is estimated to have a delay of 5 minutes, then the price for that segment would be calculated as:

$$\begin{aligned} & 5 \text{ minutes of delay} \div \\ & 60 \text{ minutes per hour} \times \\ & \$11.50 \text{ per hour, the regional average toll user's value of time} \div \\ & 5 \text{ mile segment} \\ & = \$0.19 \text{ per mile} \end{aligned}$$

The price charged per express lane segment is equal to the per-mile toll rate multiplied by the length of the segment.

Vehicle Eligibility

For simplicity and clarity, the present study assumes that all passenger vehicle classes will pay congestion charges, including high-occupancy vehicles. Other facilities elsewhere sometimes allow high-occupancy vehicles to travel for free or at a reduced price. Whether to give such discounts would typically be examined in detail as part of project planning. It is also assumed that trucks would not be permitted to use managed lanes, although they may use any lane on the fully congestion priced facilities (Elgin-O'Hare Expressway or Central Lake County Corridor).

Access Points

The access points for the express lanes were initially taken from general assumptions made in GO TO 2040. However, priced express lanes typically require more restricted access in order to achieve the desired free-flow operating conditions. For instance, the I-680 express lane in Alameda County, CA has only three access points on a 14-mile stretch of interstate⁶ while SR-91 has only one for a 10-mile facility.⁷ Thus, access points for the new express lanes on existing

⁵ Value of time (VOT) is the monetary value placed on the time a traveler spends in a trip. It represents the opportunity cost of travel – the value that could have been realized from engaging in the most worthwhile alternative to spending time traveling. The highway pricing model calculates VOT for travelers in the region based on their income (higher income suggests higher VOT) and trip purpose (non-discretionary trips such as work trips likewise suggest higher VOT).

⁶ http://www.680expresslane.org/I-680_Fact_Sheet.asp

⁷ <http://www.91expresslanes.com/overview.asp>



facilities were limited primarily to interchanges with other expressways.⁸ Congestion pricing would not change the originally assumed access points on the Elgin-O’Hare West Bypass or IL 53/120.

Table 2. Express lanes access points.

I-55	I-290	I-90
I-355	US 45/Mannheim Rd.	IL 31
I-294	Central Av.	I-290
IL 50/Cicero Av.	Damen Av.	West O’Hare Bypass
I-90/94		I-294

Travel Demand Modeling

Overview of Highway Pricing Model

For the present study, CMAP applied its recently developed highway pricing model, which is an activity-based travel model meant to improve upon conventional trip-based travel demand modeling by representing travel behavior more realistically. An activity-based model allows planners to simulate the responses of households to new policies or transportation investments. For instance, if congestion pricing is implemented, the highway pricing model will indicate whether travelers would choose priced or “free” roads, change mode of travel, travel in carpools, leave earlier or later, pick a different destination, or cancel the trip or join it to another trip. Readers who want to learn more about the CMAP highway pricing model specifically are encouraged to review *Activity-Based Model for Highway Pricing Studies at CMAP*.⁹

The modeling for this project was conducted at a planning level. Additional modeling is needed to support detailed design on individual roads. For example, the Tollway and CMAP are now working to develop a more detailed picture of travel behavior on I-90 with the addition of new congestion-priced lanes and in response to specific design alternatives.

Modeling Process

Network Coding

Managed lanes are represented as one lane, with posted speeds and lane widths equal to the neighboring general purpose lanes. Congestion-priced facilities were assumed to operate with open road tolling infrastructure. For the purposes of this study, previously coded toll points on IL 53/120 and the Elgin-O’Hare West Bypass were replaced with open road tolling, and no additional toll points were coded on I-55, I-90, or I-290.

⁸ With the exception of I-55 and Cicero. It was also assumed that the express lane on I-90 would begin at IL 31.

⁹ <http://tinyurl.com/9s87gg5>



Time-of-Day Periods

Traffic analyses are conducted for eight time periods over the course of an average weekday in 2016:

- | | |
|--------------------------------|----------------|
| 1) 8pm to 6am | 2) 6am to 7am |
| 3) 7am to 9am (morning peak) | 4) 9am to 10am |
| 5) 10am to 2pm | 6) 2pm to 4pm |
| 7) 4pm to 6pm (afternoon peak) | 8) 6pm to 8pm |

Socioeconomic Inputs

The population and employment assumptions used by the pricing model for this analysis are consistent with GO TO 2040.¹⁰ The pricing model uses detailed categories of employment and generates a synthetic population to represent household members that are statistically equivalent to the forecast.

Model Validation

Table 3 compares modeled daily vehicle miles traveled (VMT) with observed VMT on the facilities included in this study for the year 2010. The results suggest that the pricing model is able to simulate travel demand with acceptable accuracy. At the regional level, the model describes VMT to within 2 percent of the observed value. As a general observation, travel demand modeling is subject to greater error the smaller the geographic area or the shorter the time period being simulated.

Table 3. Comparison of observed daily vehicle miles traveled (VMT) to modeled daily VMT

Expressway	Modeled VMT	Observed VMT	Modeled/Observed
Elgin-O'Hare (existing roadway)	533,941	475,865	1.12
I-290 (Mannheim to Damen)	2,112,881	2,213,219	0.95
I-55 (I-355 to I-90/94)	3,507,887	3,937,035	0.89
I-90 (Elgin to O'Hare)	2,983,103	3,143,646	0.95
SUBTOTAL	28,344,803	29,134,864	0.97
Other expressways	51,759,102	49,503,759	1.05
TOTAL	80,103,905	78,638,623	1.02

¹⁰ Specifically these are the assumptions in the approved conformity analysis; more detail can be found at <http://www.cmap.illinois.gov/conformity-analysis>.

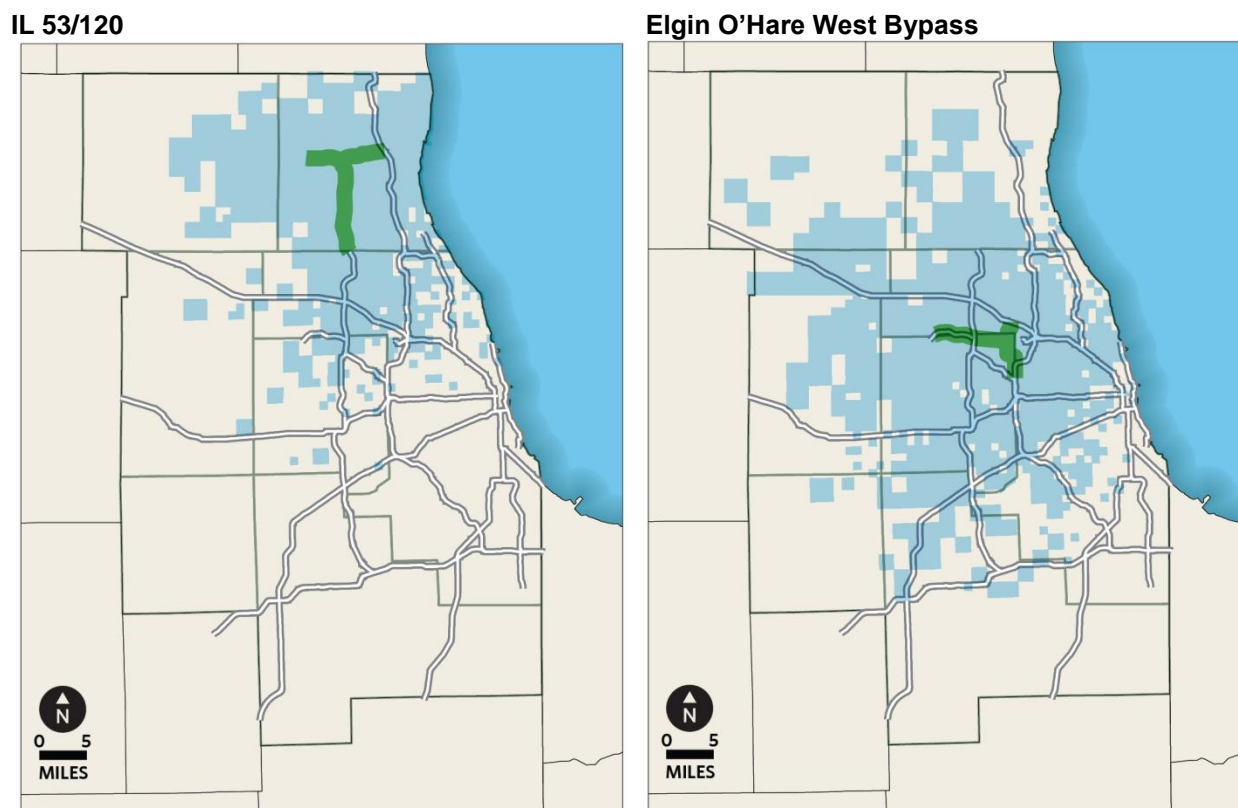


The modeling results at the network level were validated to reasonably match existing traffic counts. While this is established practice, the corresponding observed travel times cannot be expected to also match and so are typically adjusted for comparison purposes. This involved indexing modeled morning peak period delay on each facility so that it was comparable to observed recurring delay in the peak periods. The modeled morning peak travel times are then recalculated using indexed delay. A similar indexing of morning peak prices was also performed.

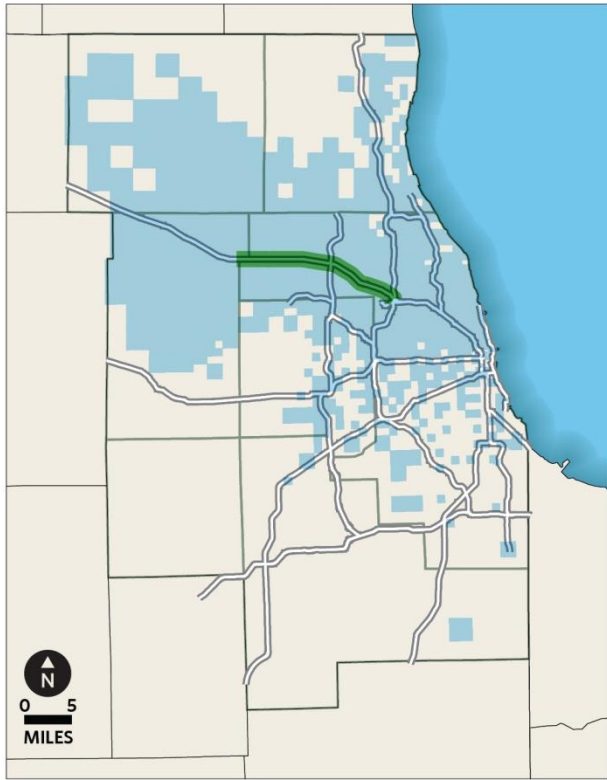
Travel Markets

The pricing model is able to identify the geographic areas from which the facilities' users are drawn. The "core" travel market was delineated by mapping the origin and destination locations for half of all the tours using the facility, ranked by demand. The resulting travel markets are shown in Figure 2. These travel markets were used to identify changes in arterial delay, mode share, and other parameters evaluated in the Results and Discussion section below.

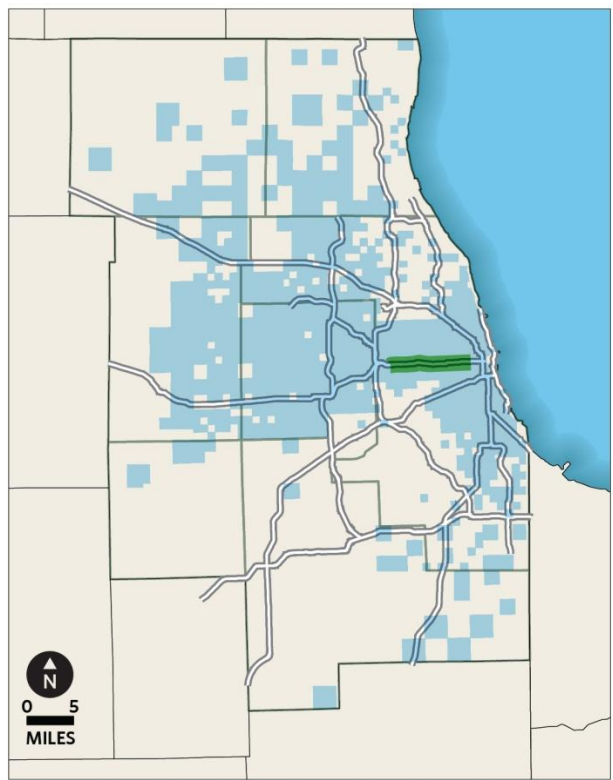
Figure 2. Travel markets for congestion-priced facilities.



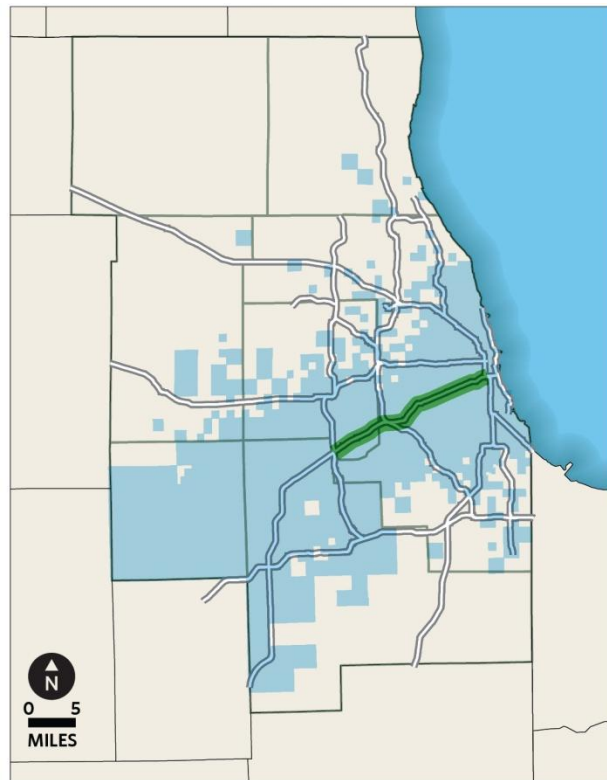
I-90 Addams



I-290 Eisenhower



I-55 Stevenson



Results and Discussion

Travel Time Savings

The major benefits of congestion pricing in this study are travel time savings and the improved reliability of travel times. During the morning peak, drivers choosing the express lanes on I-55, I-90, or I-290 could expect to spend 49, 31, and 66 percent less time traveling, respectively, than they do now (Table 4). The express lanes would be freely flowing, with travel speeds close to 55 mph. Because of the added capacity, however, all drivers would enjoy reduced travel times. The general purpose lanes on these expressways would enjoy a 17 percent reduction relative to current travel times.

In Table 4 and all remaining tables, the morning peak is considered to be 7:00 – 9:00 am and the afternoon peak 4:00 – 6:00 pm. Travel times were modeled for the year 2016.

Table 4. Travel times using expressway during AM peak (minutes)

Facility	Trip	Current	With congestion pricing	
			Gen purpose	Express
Central Lake County Corridor	Waukegan to Schaumburg	72	41 (all lanes)	
Elgin-O’Hare West Bypass	US 20 to I-90	29	19 (all lanes)	
I-55	I-355 to Dan Ryan	51	42	26
I-90	Elgin to I-294	35	29	24
I-290	Mannheim Rd to Damen Av	35	31	12

Source: CMAP analysis.

The Central Lake County Corridor and the Elgin-O’Hare West Bypass were evaluated somewhat differently. Because they do not yet exist, current travel times were calculated for the fastest existing route between two places, generally a mix of arterials and expressways. Since in this study all lanes would be congestion priced, there is no difference between the general purpose and the express lanes. Thus, building Central Lake County Corridor and the Elgin-O’Hare West Bypass and implementing congestion pricing on them would lead to travel time savings of 43 percent and 34 percent relative to current travel times, respectively.

Traffic Spillover

One concern about congestion pricing is that the regular lanes will become more congested as they absorb the drivers who are not willing to pay the premium. To avoid this congestion, some drivers would use local roads instead of the expressway, shifting congestion onto those streets. However, spillover should not occur if congestion pricing is implemented in new lanes,

since there will be more capacity than before. In fact, congestion on local streets on the corridor should be lessened. CMAP's analysis confirms this. Table 5 shows the percent change in overall delay during the morning peak relative to current conditions. The existing general purpose lanes on I-55 Stevenson, I-90 Addams, and I-290 Eisenhower would see reductions in congestion of 26 – 33 percent. Nearby arterial routes would benefit from 6 – 10 percent reductions in delay.

Table 5. Change in hours of delay during AM peak relative to current conditions.

Facility	General purpose lanes	Nearby arterials
Central Lake County Corridor	NA	-10%
Elgin O'Hare West Bypass	NA	-8%
I-55	-26%	-6%
I-90	-33%	-7%
I-290	-24%	-7%

Source: CMAP analysis.

Prices

As shown in Table 6, an amount \$0.05 - 0.31 per mile above the base price, or above zero on free roads, would be required during the morning peak to achieve the delay reduction shown above. The price needed in the afternoon peak appears to be somewhat lower because the peak in traffic in the afternoon is more "spread out." The projected prices are well within the range charged on other congestion-priced facilities in the United States (Figure 3).

Table 6. Average price¹¹ in dominant traffic direction during AM peak (dollars per mile)

Facility	Base price	With congestion pricing
Central Lake County Corridor ¹²	\$0.20	\$0.29
Elgin O'Hare Expressway ¹²	\$0.20	\$0.25
I-55	No toll	\$0.12
I-90	\$0.06	\$0.11
I-290	No toll	\$0.31

Source: CMAP analysis. Note: prices are shown in current dollars and correspond to traffic levels in 2016.

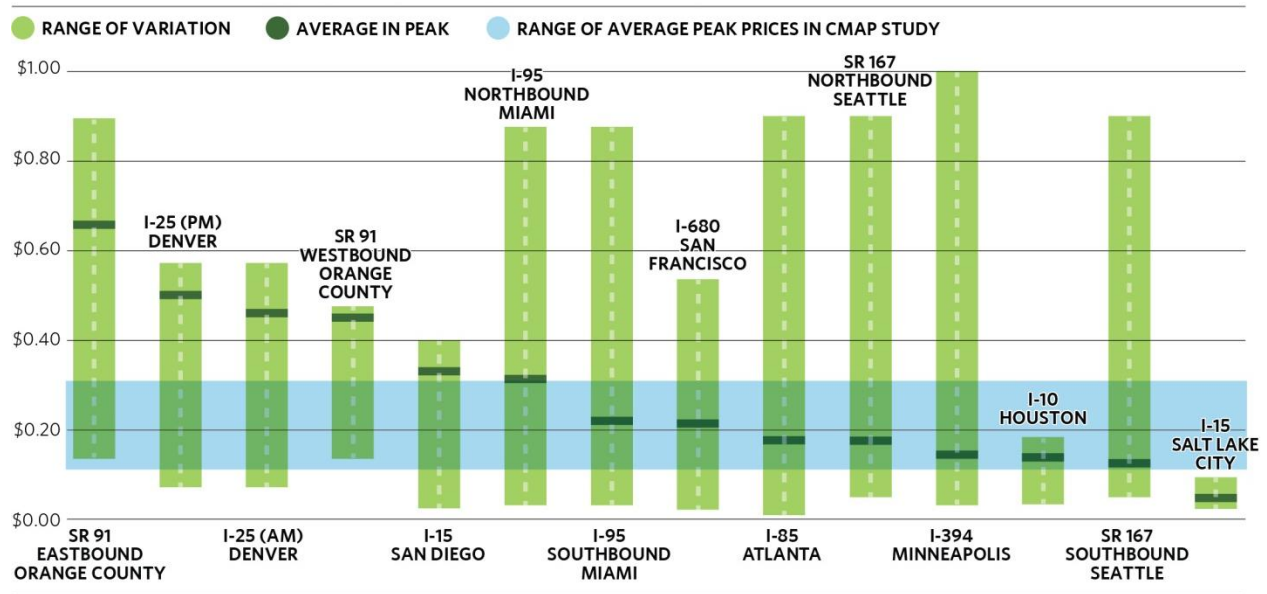
¹¹ Although the highway pricing model actually simulates intervals of 30 minutes, these intervals are aggregated to longer traffic assignment time periods (discussed in the "Methods" section). Thus, the prices in Table 6 are best described as averages.

¹² In the absence of congestion pricing, the Central Lake County Corridor and the Elgin-O'Hare system were assumed to be tolled at a flat rate of \$0.20 /mile, in keeping with the assumptions in the Tollway's previous analyses of these projects. See Elgin O'Hare - West Bypass Study: Tier II Draft Environmental Impact Statement (http://elginohare-westbypass.org/DEIS_2012/Forms/AllItems.aspx) and Illinois Route 53/120 Blue Ribbon Advisory Council Final Report (<http://tinyurl.com/8hwp3gk>).



In this study, the price was set to achieve a high level of service (free-flow speeds), which generally is not the rate that would maximize toll revenue or maximize the amount of traffic that an expressway can carry. Rates that maximize revenue or daily throughput are likely to be lower than the rates estimated in this study, but speeds will also be lower. This is because the maximum throughput of a roadway generally occurs at a speed somewhat lower than free-flow speed.

Figure 3. Prices on selected congestion-priced roads in the U.S. (dollars per mile)



Source: Project websites and CMAP analysis.

Frequency of Use

Some are concerned that congestion pricing is merely a way to charge higher prices to a set of captive commuters who have to take a certain route at a certain time of day. However, survey data from other regions suggest that few drivers use express lanes frequently, and that drivers from across the income spectrum choose to pay the congestion charge when it is worthwhile for them to do so.

For example, a 2011 survey of users of the SR 91 Express Lanes in Orange County, California estimated an average of 2.7 one-way trips per driver over the course of the week.¹³ That survey further estimated an average of 2.2 one-way trips per driver during the work week, and 1.8 one-way trips per driver during peak periods. Survey data suggests an average of 2.8 trips per

¹³ OCTA, SR 91 Express Lanes 2011 Customer Satisfaction Survey, <http://www.octa.net/pdf/OCTA%2091%20Express%20Lanes%20Customer%20Survey%202011%20Executive%20Summary%20T.pdf>



week on the I-25 HOT lanes in the Denver metropolitan area¹⁴ and 2.6 trips per week on the I-95 HOT lanes in the Miami metropolitan area.¹⁵ Data provided for the SR 167 Express Lane in Seattle suggests an average of 2.6 trips per week. Almost one-half of those driving alone on the facility use it one or fewer times per week and only five percent of single-occupant vehicle drivers take the express lanes every day.¹⁶

In another approach, CMAP also examined the probability of choosing to drive on the express lanes that the pricing model calculates. The results paralleled the findings of surveys in other regions.

Income Equity

One concern about congestion pricing is that low-income drivers would be discouraged from taking advantage of congestion-priced lanes. This study examined how the income profile of drivers would differ between drivers on the priced express lanes and those on the adjacent general purpose lanes. Figures 4 and 5 compare the projected income distribution of drivers on the express and the general purpose lanes.

In monetary terms, travelers with higher income are likely to value their time savings more, yet lower income travelers also choose to pay a premium if the travel time savings are sufficiently important to them. CMAP's analysis suggests that the median household income of express lanes users would be 13 percent higher on I-90, 18 percent higher on I-55, and 19 percent higher on I-290. Thus, the users of the express lanes have somewhat higher incomes than the patrons of the general purpose lanes, but as indicated by the overall distribution, drivers across the income spectrum would use the express lanes.

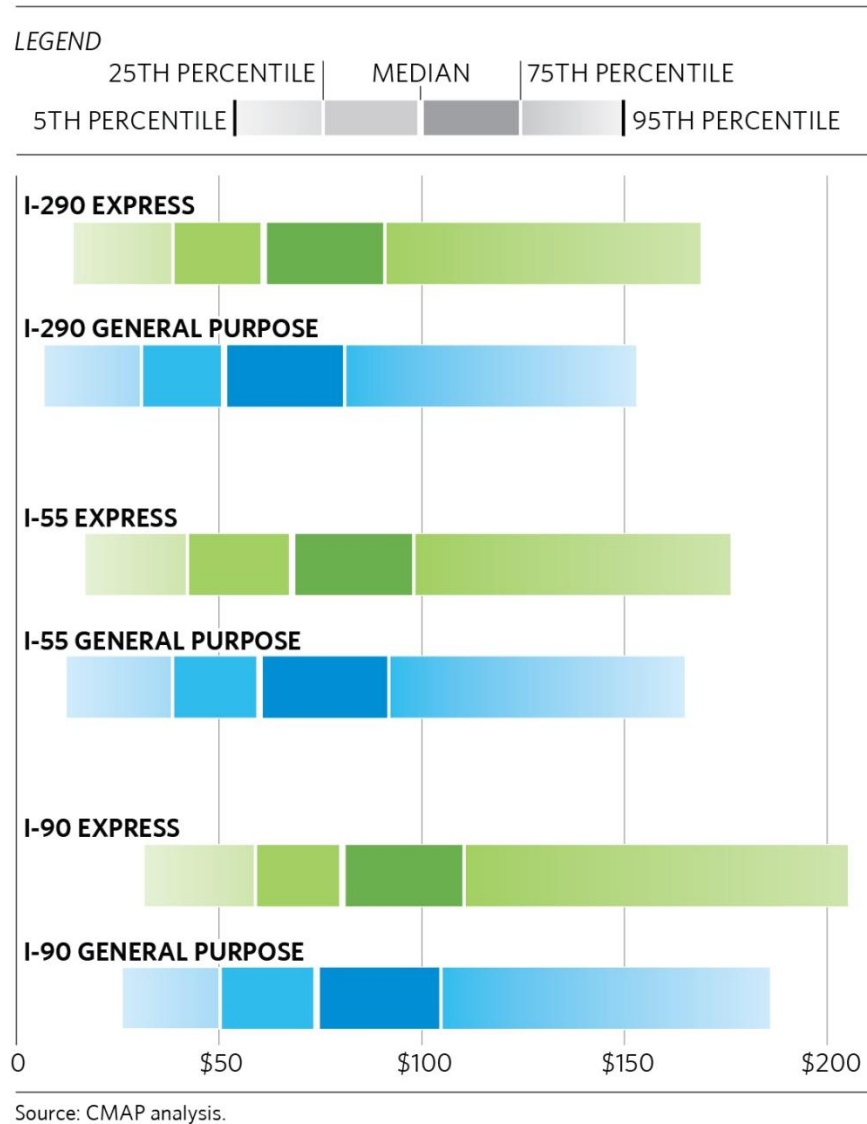
¹⁴ Colorado Department of Transportation, 2008 HOV/Express Lanes User Survey, prepared by Corona Research. http://www.coloradodot.info/travel/tolling/i-25-hov-express-lanes/Reports/WorkshopCoronaResearchPresentation.pdf/at_download/file

¹⁵ Florida Department of Transportation, 2012. Personal communication with Alicia Torrez at SunGuide/FDOT District 6, August 24, 2012.

¹⁶ Washington Department of Transportation, 2012. Personal communication with Michelle La Bolle, September 6, 2012.



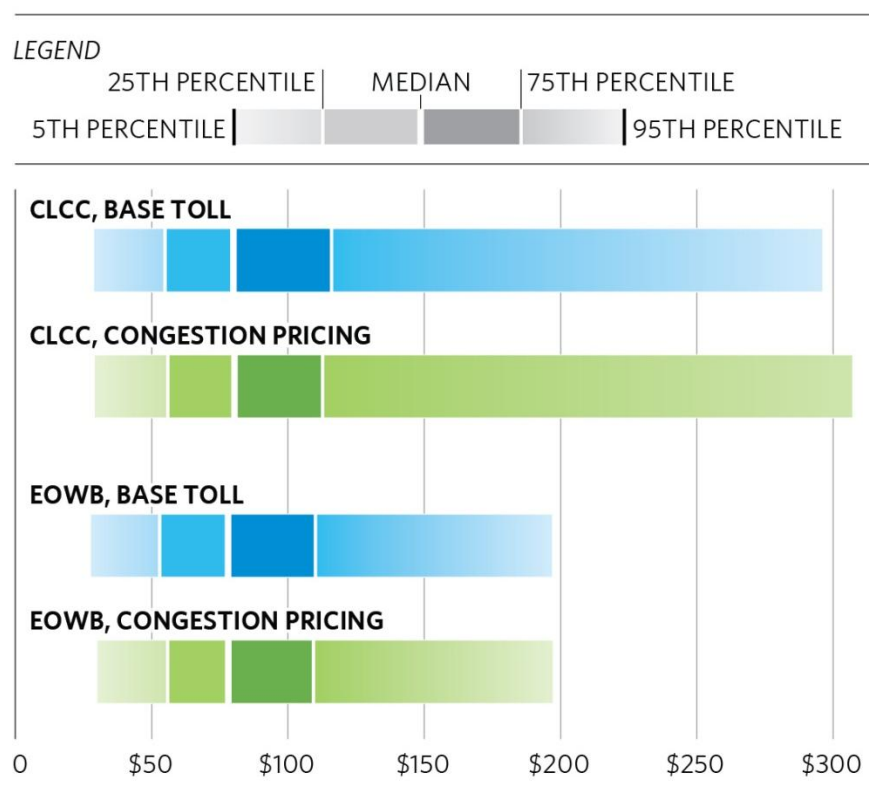
Figure 4. Annual household income of express vs. general purpose lane users (thousands).



Because the Central Lake County Corridor and the suite of Elgin-O’Hare West Bypass projects are to be constructed as toll roads, the comparison is between the income of those who would use the facility at the base toll rate and those who would use it at higher rates based on congestion. Figure 5 shows this comparison. The results suggest that there would be little difference between the incomes of the users in either case, likely because the base tolls assumed in the project studies are already relatively high.

Finally, note that the income of drivers varies between the facilities whether they choose to use the express lanes or not. This is because of the variation in income between the travel markets shown in Figure 2.

Figure 5. Annual household income of users at base toll vs. congestion pricing (thousands).



Note: CLCC = Central Lake County Corridor; EOWB = Elgin O'Hare West Bypass.
Source: CMAP analysis.

Mode Choice

One aspect of congestion pricing is that higher prices moderate demand by encouraging travelers to carpool, take transit, consider alternative routes and times, choose closer destinations, or forgo trips altogether. Table 7 suggests that mode share would not change much in the scenarios tested. The only apparent changes are in the proportion of trips made driving alone versus carpooling. Carpooling is slightly more prevalent under congestion pricing than driving alone, which is to be expected given that the out-of-pocket cost of driving can be shared by doing so. Changes in mode choice in this study are muted because the analysis considers only pricing on new expressway capacity.

When adding new highway capacity, a concern is sometimes voiced that by reducing traffic delays transit ridership will decline. Based on the results in Table 7, this is a negligible problem, partly due to limited competing transit choices in the corridors under study. The drop in transit mode share in the I-290 corridor is actually a tenth of a percentage point; rounding makes the change appear larger than it is.



Table 7. Mode share in facility's travel market during AM peak (percent of trips).

Mode	No build				
	CLCC	EOWB	I-90	I-290	I-55
Bicycle	2%	3%	3%	3%	3%
Carpool	31%	31%	30%	30%	30%
Drive Alone	50%	47%	44%	40%	40%
Other	7%	6%	6%	6%	6%
Transit	2%	5%	6%	9%	9%
Walk	7%	9%	10%	13%	12%
With capacity addition and congestion pricing					
Mode	CLCC	EOWB	I-90	I-290	I-55
Bicycle	2%	3%	3%	3%	3%
Carpool	32%	31%	30%	30%	30%
Drive Alone	50%	47%	44%	40%	40%
Other	7%	6%	6%	6%	6%
Transit	2%	5%	6%	8%	9%
Walk	7%	9%	10%	13%	12%

EOWB = Elgin-O'Hare West Bypass, CLCC = Central Lake County Corridor (the IL 53 extension and IL 120 bypass)

Source: CMAP analysis.

Revenue and Cost

The marginal revenue from congestion pricing, shown in Table 8, was calculated as the revenue from congestion pricing less the revenue from the base toll alone. This planning-level estimate of revenue comes to \$74 million in 2016 (in current dollars). It includes only revenue from passenger vehicles, not commercial vehicles. Most express lanes in the United States do not allow trucks, but a fully congested-priced facility like IL 53/120 or the Elgin O'Hare West Bypass would. Actual revenue could be higher depending on truck volumes and the prices charged.

One of the major questions about congestion pricing is whether congestion-priced facilities generate enough revenue to cover their costs and thus yield a surplus to use for other transportation improvements. Of the existing congestion-priced facilities in the United States, several generate significant surpluses, while several others do not. In the Chicago area, the answer depends greatly on the individual facility, requiring more detailed study to develop cost estimates and refine revenue projections. In general, however, express lanes will be more expensive to build and operate than fully congestion-priced facilities because of the costs of separating the lanes to control access, the increased costs of monitoring and taking enforcement action against violators, and other costs.



Table 8. Annual marginal revenue of congestion pricing.

Roadway	Gross revenue ¹⁷
IL 53 extension/IL 120 bypass	\$10,000,000
Elgin O'Hare Expressway	\$16,000,000
I-55 express lane	\$20,000,000
I-90 express lane	\$7,000,000
I-290 express lane	\$21,000,000
Total	\$74,000,000

Source: CMAP analysis. Note: revenue is calculated for 2016 and presented in current dollars.

Future Study

The present study evaluated the effects of implementing a certain form of congestion pricing on five major new facilities in the region. It is also CMAP's intention to examine the results of converting existing "free" lanes to express lanes on major highways in the region. This can be expected to decrease congestion delay significantly, but it also faces policy challenges that must be carefully considered. Besides this, future study might include an analysis of whether transit ridership can be increased by coupling congestion pricing policy with investment of the net revenues in improving transit service. Furthermore, the present study examined only a select set of high-level metrics. Near-term study could involve an analysis of the economic benefits of congestion pricing (e.g., the benefits of increased productivity brought about by decreasing time wasted in traffic) as well as the environmental benefits (e.g., improving traffic flow is expected to result in lower air emissions). Finally, the present study also did not consider truck traffic; future analysis should consider the prices needed to manage truck traffic.

¹⁷ Weekday revenue was calculated as the product of link volume from the activity-based model, the link length, and the per-mile toll rate, summed over all links in each corridor. The model estimates travel demand only for weekdays. The gross annual weekday revenue reported in the table was estimated assuming 52 work weeks of five days, with no correction for holidays; gross annual revenue could be somewhat higher if congestion pricing were also in effect on weekends. No allowance was made for toll violations (all drivers are assumed to pay with no violations).





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