Differentiated Road Pricing, Express Lanes, and Carpools: Exploiting Heterogeneous Preferences in Policy Design

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DISCUSSION

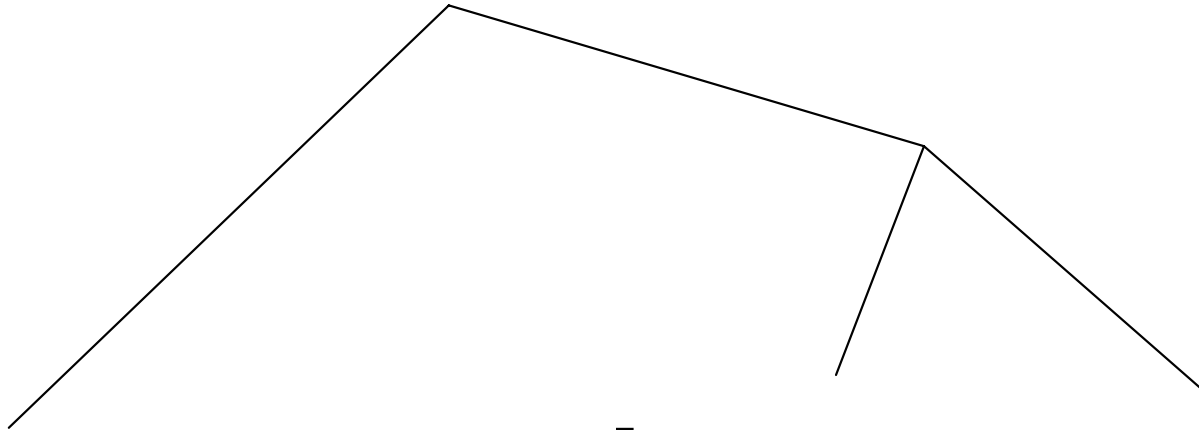**Alex Anas**

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WORKSHOP ON USING PAYMENT INNOVATIONS TO IMPROVE URBAN TRANSPORTATION NETWORKS
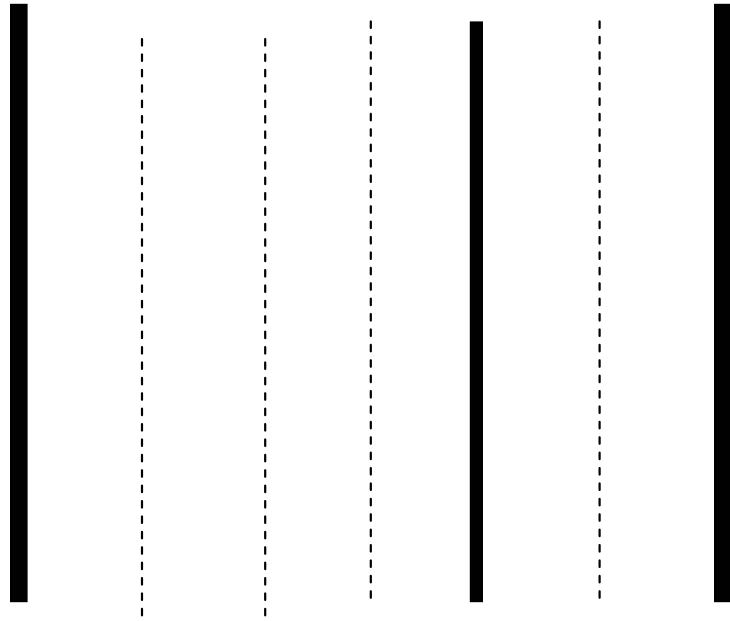
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Federal Reserve Bank

&

CHICAGO METROPOLIS 2020

OTHER ROUTES
ON NETWORK

CHOICES ON
CSR-91 TEN MILE
STRETCH

GENERAL
LOW-TOLL
LANES

EXPRESS
HIGH-TOLL
LANES

RELIABILITY

- **If travelers care about reliability, they should be risk averse. But in the study they are treated as implicitly risk neutral. This requires further study.**

- **Do congestion tolls make traffic more or less reliable? Congestion is stochastic and as it increases traffic should fluctuate more. Tolls reduce congestion, improve reliability?**

Significance of Study

- **Shows importance of knowing distribution of income (VOT) in calculating tolls.**

- **Demonstrates unequal effects of congestion tolls according to income.**

- **Leads to insights on implementation by public vs. private operators.**

How tolls will be set ?

- **We need to know the income distribution on the road to set tolls correctly. Otherwise tolls would only capture a small part of potential benefits.**

- **Is it appropriate to use an econometric model to calculate the tolls people should pay ?**

- **If not, then how will we realize the effect of the income distribution on the tolls we set ?**

HOV, HOT may not be optimal

- **These solutions need not be used. Uniform tolling of lanes is better from perspective of economic efficiency.**

- **BUT, private road operators would use HOV, HOT solutions to get better revenue.**

Alternative Tolling Schemes

REVENUE/PER.		SURPLUS/PER.
HOV	$ 0	$ 2.11
HOT	$ 0.24	$ 2.01
ONE-RTE.	$ 1.64	$ 0.50
TWO-RTE.	$ 5.35	$ -2.36
TWO-HOT	$ 1.81	$ 0.98
2-HOT.LTD.	$ 1.05	$ 1.36

TWO-ROUTE TOLL POLICY
(BEST OF THOSE TRIED)

Sample median income = $ 46,250

TYPE OF LANE	TOLL	TRAVEL TIME (ONE WAY)	TRIPS PER YEAR	TOLL PER YEAR	TOLL AS PERCENT OF MEDIAN INCOME
EXPRESS	$10.14	11.6 min	500	$ 5070	10.9%
GENERAL	$ 8.16	12.8 min	500	$ 4080	8.8%

REVENUES FROM THE TOLL
($5.35/PERSON)*500 = $ 2675

CONSUMER SURPLUS FROM THE TOLL
(-$2.36/PERSON)*500 = - $ 1180/PERSON

Income effects

- **How will the consumer economize to partially offset the financial burden of the tolls ?**

How will travelers react ?

Substitution effects cause:

- **Choose lane type/change route**
- **Switch to public transit**

Income effects cause:

- **Switch to efficient vehicles**
- **Make fewer trips and shorter trips**
- **Reduce dwelling size or change residence location**
- **Move to Buffalo**

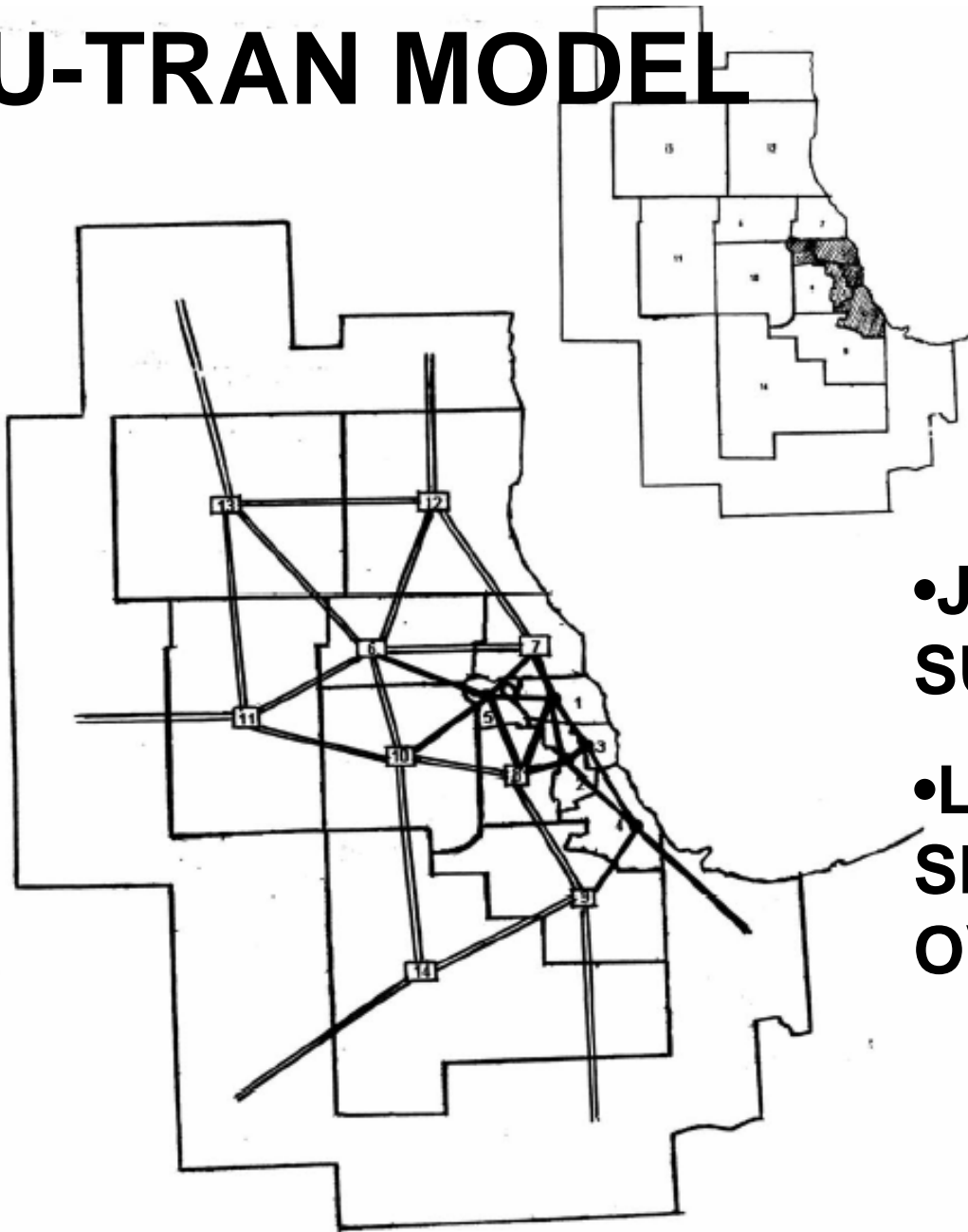# QUESTIONS RAISED IN READER'S MIND THAT NEED STUDY

- ## Are there income effects ?
  These are ignored in the model but above calculations suggest they are important.

- ## Which (and whose) taxes should be reduced when tolls are charged?
  We must find those taxes that are the most distorting and reduce those.

RELU-TRAN MODEL

- JOBS MOVE TO SUBURBS

- LAND USE CHANGES SLOWLY BUT ADDS UP OVER TIME.

CHICAGO MSA 14 ZONE TEST VERSION

Nodes and Links in 170 Zones

Nodes
- 1 - 170
- 171 - 727

Links

Zones

10   0   10   30 Miles