

A Brief Introduction to the LUSTRE Model

Elena Safirova

Modeling Growth for the Nation's Capital:
A Work in Transit

RFF Workshop

March 2007



Acknowledgements

- The development of LUSTRE was partially supported by EPA STAR grant RD-83145001-0
“An Integrated Framework for Estimating Long-Term Mobile Source Emissions Linking Land Use, Transportation and Economic Behavior”
- MVA consultancy
- Alex Anas, Andrew Baglino, Kenneth Gillingham, Abram Lipman

LUTI Literature Overview

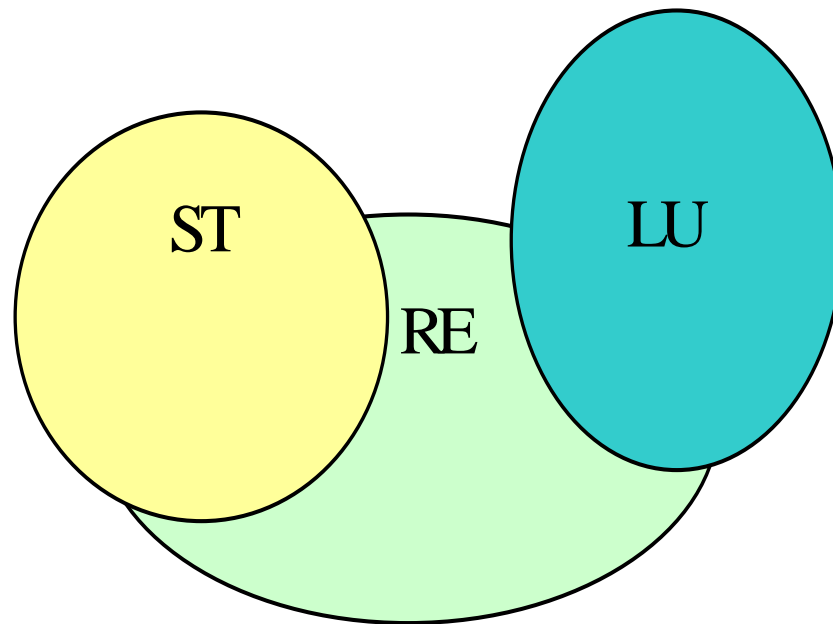
- DRAM/EMPAL
- TRANUS & MEPLAN
- Urban Futures Model
- MUSSA
- UrbanSim
- New approaches: dynamics; agent-based; activity-based

LUTI Agenda

“While there has been some progress in linking together aggregate transportation models with aggregate spatial-interaction or spatial-input-output models of land use, no disaggregate framework has yet been developed that explain land use and travel behavior in an integrated way”

Paul Waddell. “Towards Behavioral Integration of Land Use and Transportation Modeling”. In Travel Behavior Research – The leading edge, p.65

What is LUSTRE?



Theoretical Foundations

- Spatially Distributed Households
- Spatially Disaggregated Transportation Sector
- Industry Modeling
- General equilibrium and “closed” model
- Various taxes

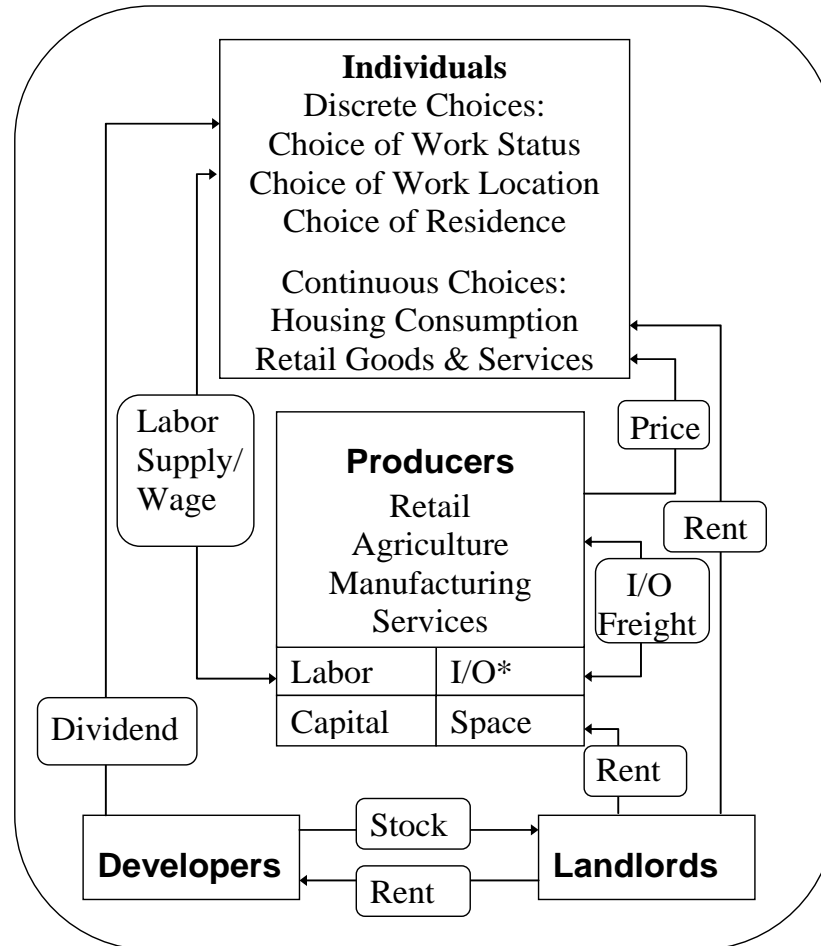
Why is LUSTRE Unique?

- Consistent spatial disaggregation
- Non-monocentricity
- Agent heterogeneity
- Unemployment
- Frictions
 - Income and real estate taxes
 - Congestible alternative modes

RELU Model Features

- Spatially disaggregated general equilibrium model of economic activity without predetermined location of residents and firms
- Some extras
 - 4 income classes
 - Employed and unemployed
 - Explicit modeling of housing
 - Developers' and landlords' decisions
 - Income and property taxes

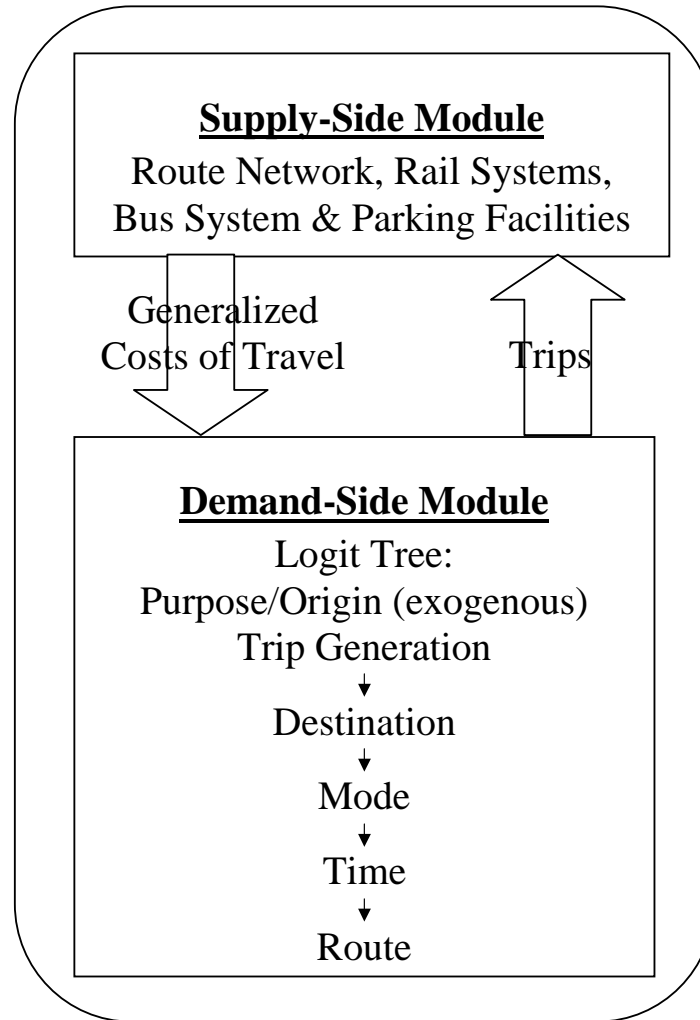
RELU Model



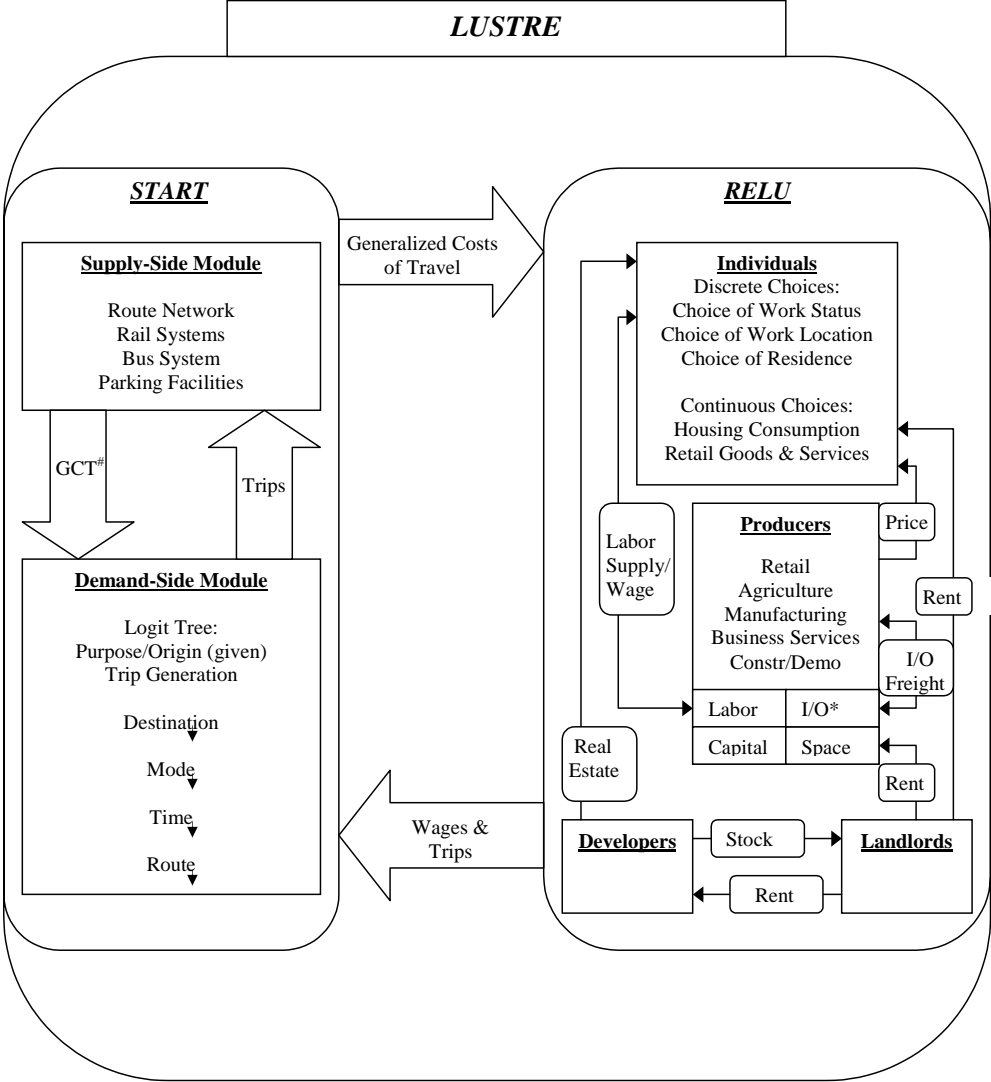
Washington-START Model

- Transportation simulation model
- Developed by RFF researchers using START modeling suite
- Designed for quick policy analysis
- Evaluation of policies using a consistent economic framework
- Not politically constrained
- Calibrated for Washington, DC metro area

Washington-START Model



LUSTRE Model Overview



Generalized Costs of Travel

*Intermediate demand for finished goods and services, also referred as Input/Output (I/O) tables.

Data Sources

- 2000 Census
 - SF1A & SF3A
 - CTPP
- BEA production data
- Consumer Expenditure Survey
- MWCOCG transportation data
- Land use data

What is LUSTRE good at?

- “Fast” Policy Analysis
- Welfare and Distributional Implications
- Uncovering Unintended Consequences

What have we used it for?

- Evaluation of selected congestion pricing schemes
- Application to urban energy consumption
- Application to emissions
- Selected infill policies
- Intercounty connector



Future Development Plans



- Add dynamics
- Household decision-making process
- Vehicle choice
- Extensions to incorporate other critical elements of urban spatial structure (e.g. schools)

Future Application Plans

- Calibrate for another city
- Specific pricing policies of interest to policy-makers
- Specific land use policies of interest to policy-makers

•??

