

The Location Affordability Portal: Understanding the Impact of Location on Affordability

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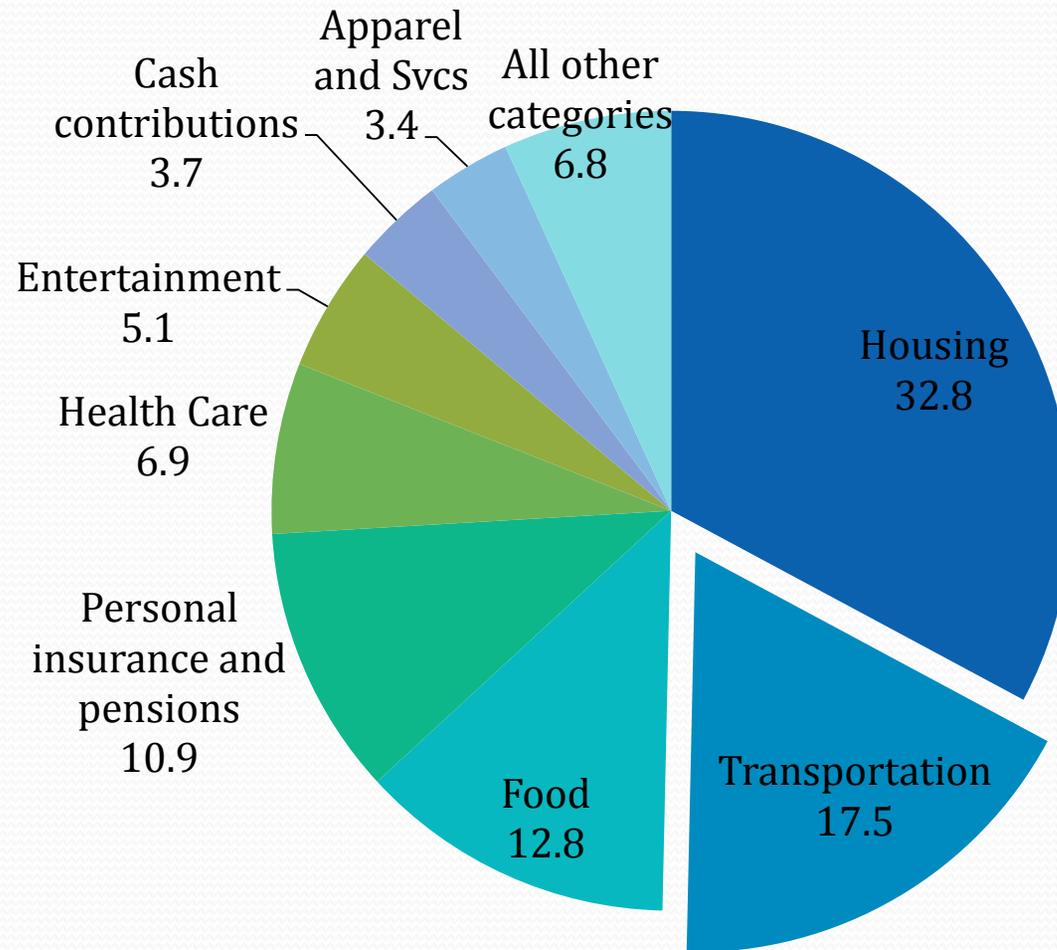
Background

Why is accounting for transportation costs important?

- Affordability – Major component of the cost of living

Distribution of Consumer Expenditures, 2012 CES

All Consumer Units

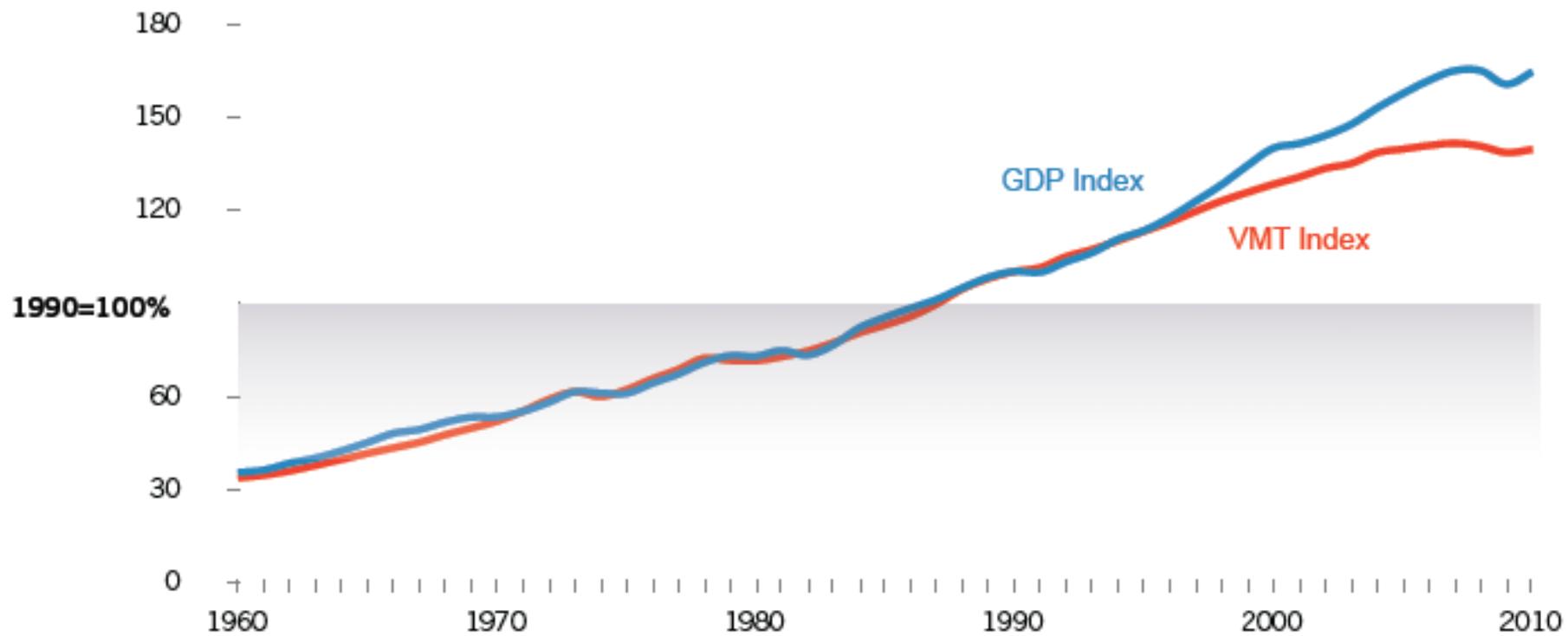


Why is accounting for transportation costs important?

- Affordability – Major component of the cost of living
- Efficiency – internalizing externalities affects...
 - Economic competitiveness – daylight's time and money spent on transportation that could go directly toward productivity (see *Growing Wealthier*)
 - Governance – policymakers can be more strategic about land use, transportation investments

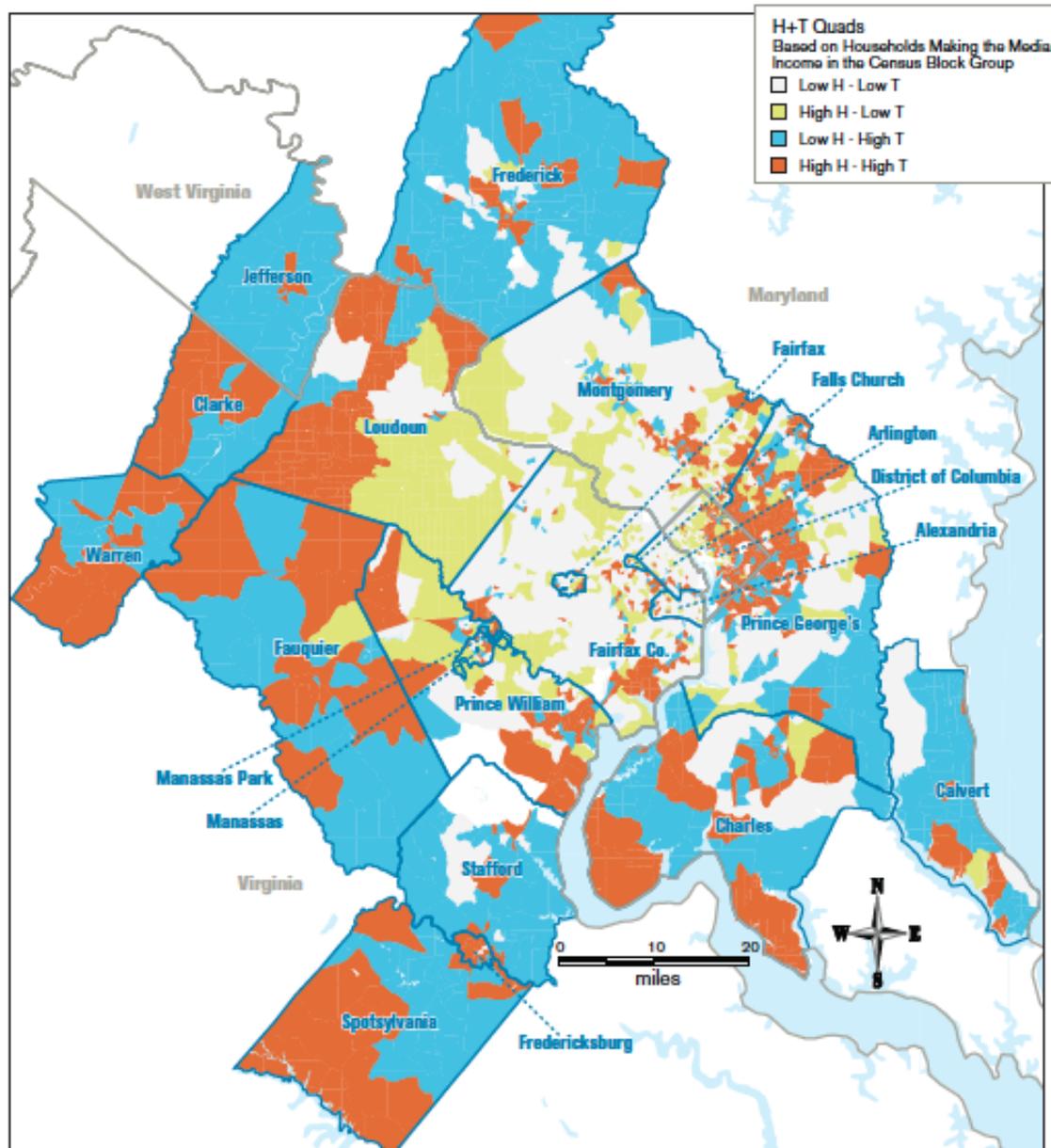


Figure 3. Historical Growth of Total On-road VMT and GDP



Data Sources: VMT: US DOT, BTS, Table 1-32: US Vehicle Miles, FHWA Traffic Volume Trends August 2010. GDP: BEA National Income and Product Account Table, Table 1.1.6 Real GDP, Chained (2005) Dollars

Share of Income Spent on Housing and Transportation in the Washington, DC, Metro Area



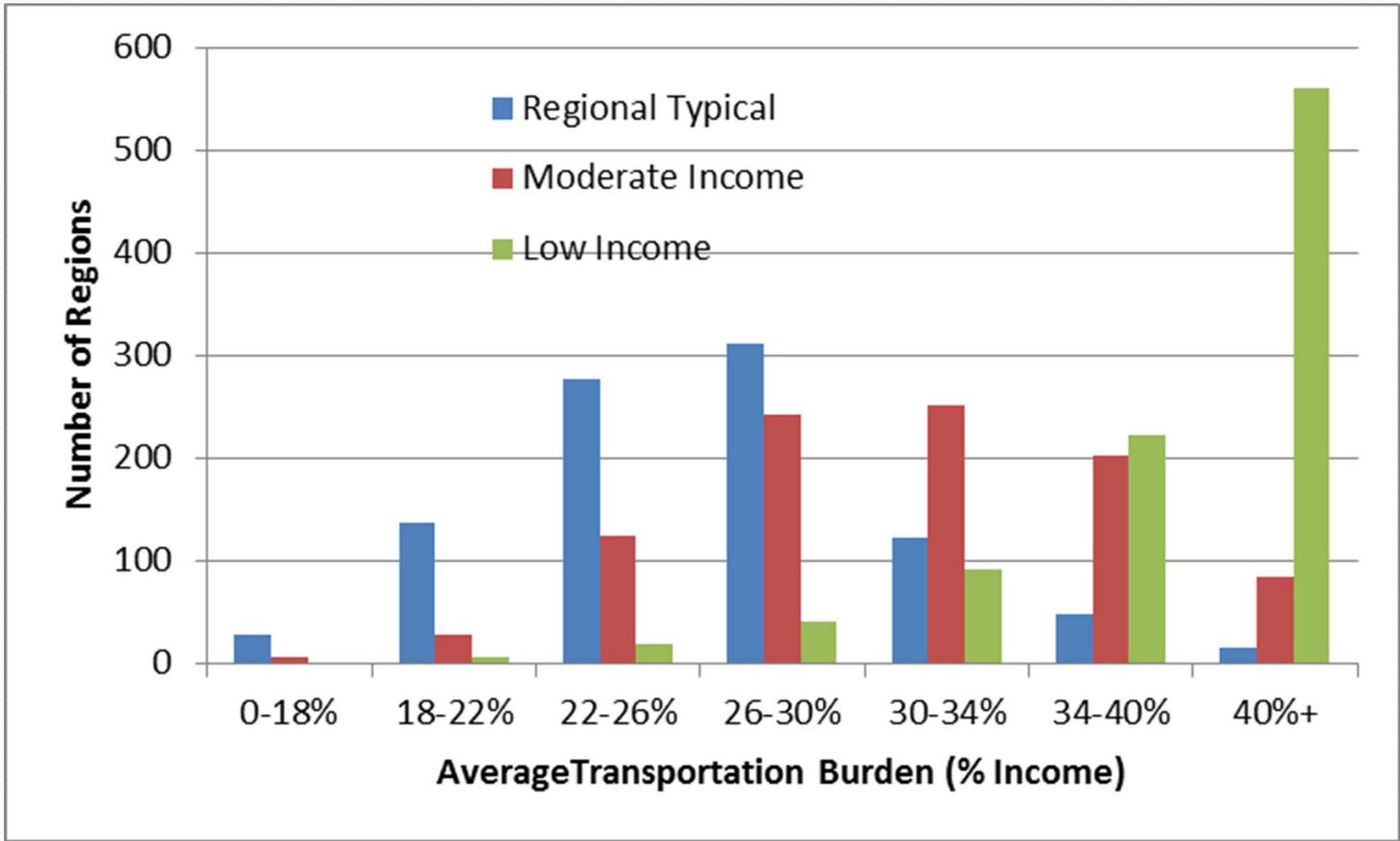
Source: Center for Neighborhood Technology.

Mapping the “Cost of Place” in the Washington, DC, Metro Area

This map provides a new way of understanding the Washington, DC, landscape, classifying neighborhoods based on the share of income residents spend on housing and transportation costs. These classifications can help policymakers identify priority areas in need of assistance and tailor appropriate remedies. “High” and “Low” refer to these cost burdens as compared with regional averages. Red areas have both **High Housing and High Transportation** cost burdens. These areas are found in the northeast and southeast quadrants of the District of Columbia, large portions of north Prince George’s County, MD, and scattered portions of some of the farthest reaches of the metro area, including Spotsylvania, Fauquier, Warren, and Clark counties, VA, and the western-most portions of Loudoun County, VA. Not surprisingly, the blue areas with **Low Housing and High Transportation** cost burdens are in the outer-suburban ring encircling the metro area. Among them are much of Frederick County, MD, and Jefferson County, WV, and many parts of Fauquier County, VA. **Low Housing and Low Transportation** cost burden areas are heavily clustered in the wealthier parts of Fairfax County, VA, and Montgomery County, MD (*white*). Finally, areas with **High Housing and Low Transportation** cost burdens (*yellow*) are found in suburban areas that are far from downtown but close to suburban job centers. Some of these areas, such as the northwest section of the District of Columbia, also are well served by public transit systems.

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 - Governance – policymakers can be more strategic about land use, transportation investments
- Equity – informed consumers can better understand their options, allowing them to optimize under current conditions or advocate for policy changes





Consequences of the status quo

- Sprawl
 - Policies favor development on inexpensive, undeveloped land
 - Households, incentivized by these policies, move farther from urban cores in search of less expensive housing but may not achieve more affordability because of high transportation costs
- Inefficiency – wasted time, money, natural resources

The Location Affordability Portal

Why Look at Combined

Transportation and Housing Costs?

- Transportation is the second-biggest household budget item after mortgage payments or rent (and exceeds housing costs for many lower-income and rural families)
- Both housing and transportation costs are tied to location and demographic characteristics



Site Objectives

- Provide consumers with user-friendly information on the combined housing and transportation costs for particular locations
- Enable municipalities, planning organizations, and researchers to access and use this data for planning and research applications



Advances over previous models

- Expanded to 942 metro and micropolitan areas covering 94% of the U.S. population
- Uses more recent data and more advanced analysis and modeling techniques
- Easily navigable website that displays affordability levels for 8 different household profiles
- Includes a Cost Calculator that produces customized cost estimates
- All data available for download and thorough documentation

Data and Methodology



Index specifications

- Description: indicates housing and transportation costs as a percentage of income for various household profiles at the neighborhood level
- Geographical unit of analysis: Census block group
- Coverage area: 942 CBSAs
- Last update: July 2013 (2006-2010 ACS)
- Next update: August 2014 (2008-2012 ACS)



Data sources

- U.S. Census American Community Survey (ACS) (2006-2010)
- U.S. Census TIGER/Line Files
- U.S. Census Longitudinal Employment-Household Dynamics (LEHD) Origin-Destination Employment Statistics (LODES) (2010)
- National Transit Database (2008)



Data sources

- Consumer Expenditure Survey (2008)
- AllTransit database – developed by the Center for Neighborhood Technology
- Illinois State odometer readings – acquired from the Illinois Environmental Protection Agency for vehicles in the state’s non-attainment areas (the Chicago and St. Louis metro areas) for 2007 and 2009
- National Household Travel Survey (2009)



Independent variables

- Operationalize the determinants of transportation behaviors:
 - Population density
 - Walkability
 - Transit access and quality
 - Employment access and diversity
 - Per capita income
 - Household demographics (income, number of members, number of commuters)

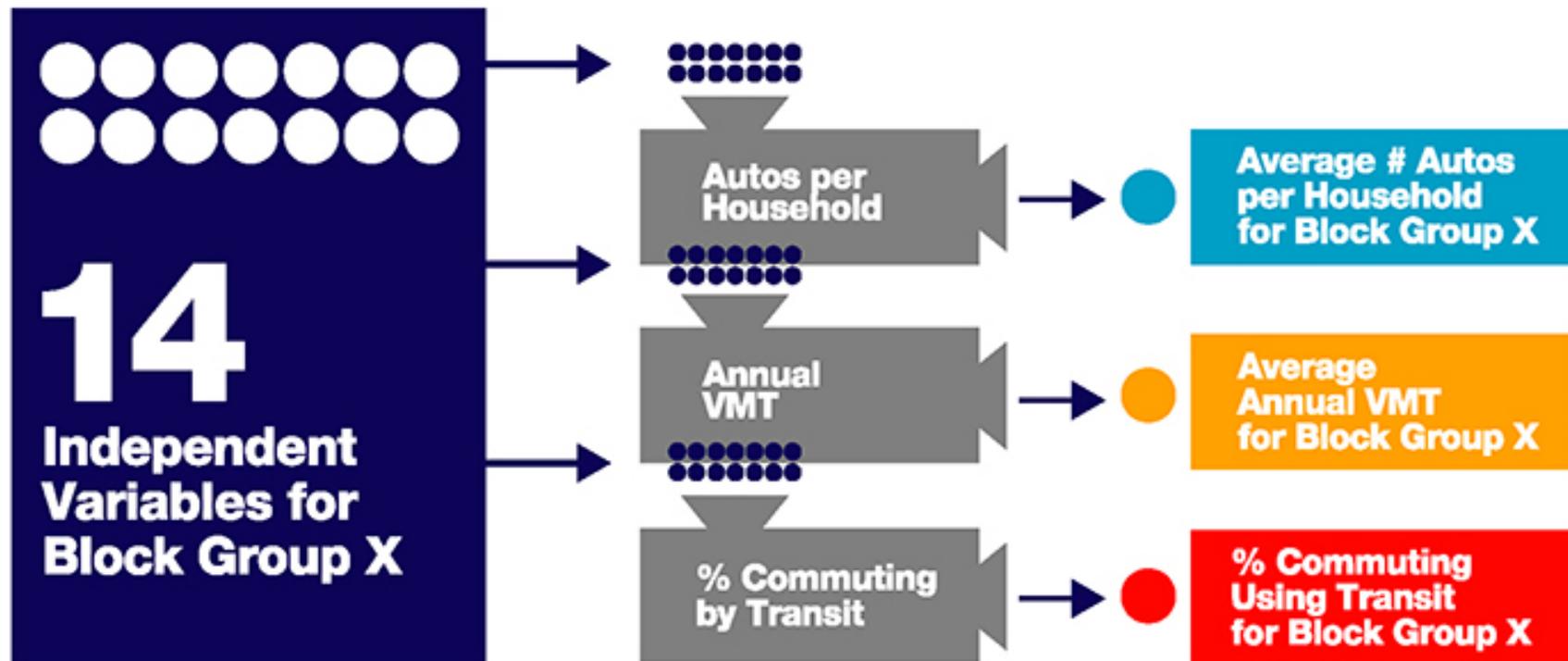
Variable	Description	Data Source
Gross Density	# of households/total acres	Census ACS, TIGER/Line files
Residential Density	# households in residential blocks/total acres in residential blocks	Census ACS, TIGER/Line files
Block Size	# of blocks/total land area	Census TIGER/Line files
Intersection Density	# of intersections/total land area	Census TIGER/Line files
Transit Connectivity Index	Transit access as a function of transit service frequency and proximity to transit nodes, weighted by observed journey to work data	AllTransit database
Transit Access Shed	Optimal accessible area by public transportation within 30 minutes and one transfer	AllTransit database
Transit Frequency of Service	Service frequency with a Transit Access Shed	AllTransit database

Variable	Description	Data Source
Job Diversity Index	Function of the correlation between employment in 20 different industry sectors and autos per household	Census LEHD-LODES
Average Median Commute Distance	Calculated from data on spatial distributions of workers' employment and residential locations and the relation between the two at the Census Block level	Census LEHD-LODES
Median Household Income		Census ACS
Average Household Size	Calculated from data on Tenure and Total Population in Occupied Housing Units by Tenure	Census ACS
Per-capita Household Income	Median household income/average household size	Census ACS
Average Commuters per Household	Calculated using the total number of workers 16 years and over who do now work at home	Census ACS

Dependent variables – transportation behavior

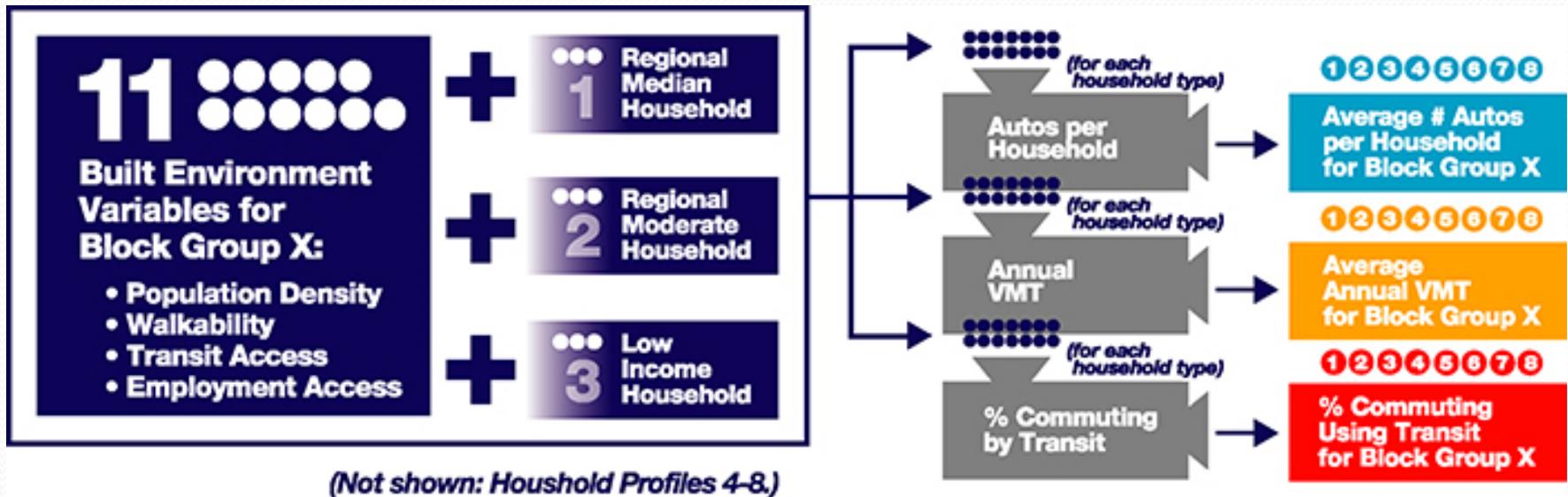
Variable	Data Source
Cars per household	Census ACS
Annual VMT per household	Illinois Department of Vehicle Services, National Household Travel Survey
Percentage of commuters using transit	Census ACS

Regression modeling



#	Household type	Family members	Income	Commuters
1	Regional Typical	Average Household Size for Region	Median Income for Region	Average number of Commuters per Household for Region
2	Regional Moderate	Average Household Size for Region	80% of Median income for Region	Average number of Commuters per Household for Region
3	Low Income	3	50% of Housing and Urban Development Area Median Family Income	1
4	Single Person Very Low Income	1	National Poverty Line	1
5	Single Professional	1	200% of Per Capita Income for Region	1
6	Single Worker	1	Median Per Capital Income for Region	1
7	Dual-Income Family	4	150% of Median Income for Region	2
8	Retirees	2	80% of Median Income for Region	0

Regression modeling



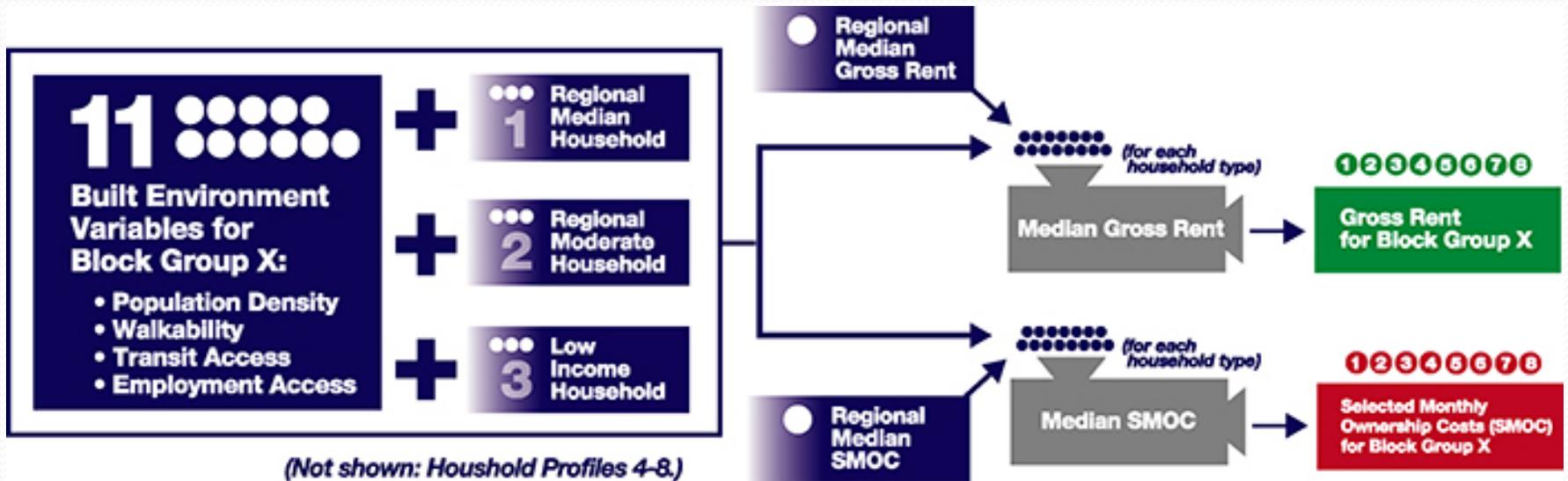
Calculating auto costs



Modeling housing costs

Dependent Variable	Data Source
Selected Monthly Ownership Costs	Census ACS
Gross Rent	Census ACS

Modeling housing costs



Limitations and additional considerations

- High margins of error for some key ACS variables
- Does not take into account variation in housing quality or some types of community characteristics (e.g., school quality, public safety, natural amenities, pollution exposure)
- Measures housing costs irrespective of how much housing is being used and whether housing is subsidized
- No way to value travel time systematically



Version 2

- Updated to ACS 2008-2012
- Moving to a Simultaneous Equations Model
- Will include additional variables for
 - Housing characteristics (% SF attached, rooms/dwelling)
 - Tenure split
 - Local amenities (proxied by retail jobs)

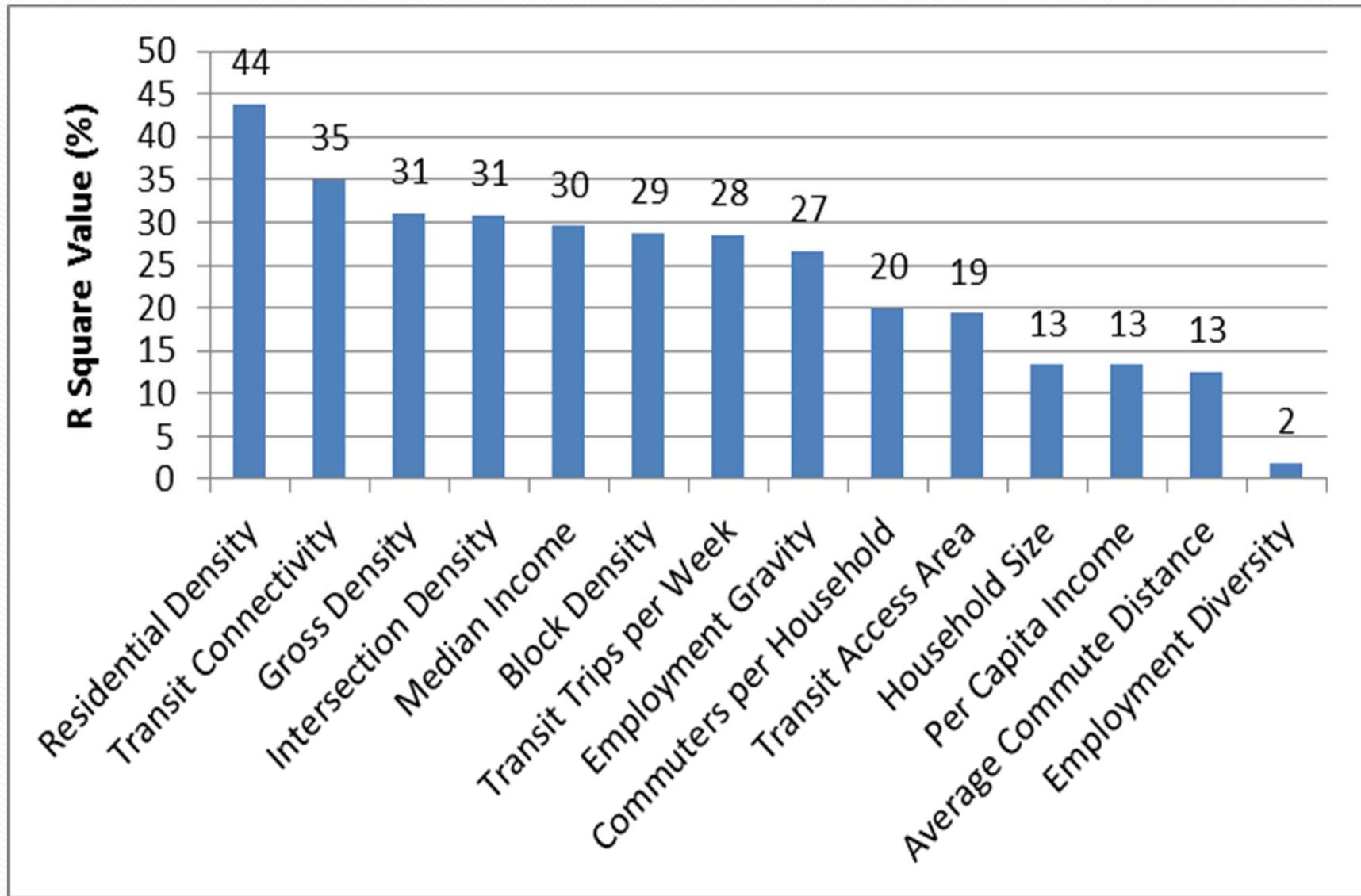
Site Demo

Policy Implications

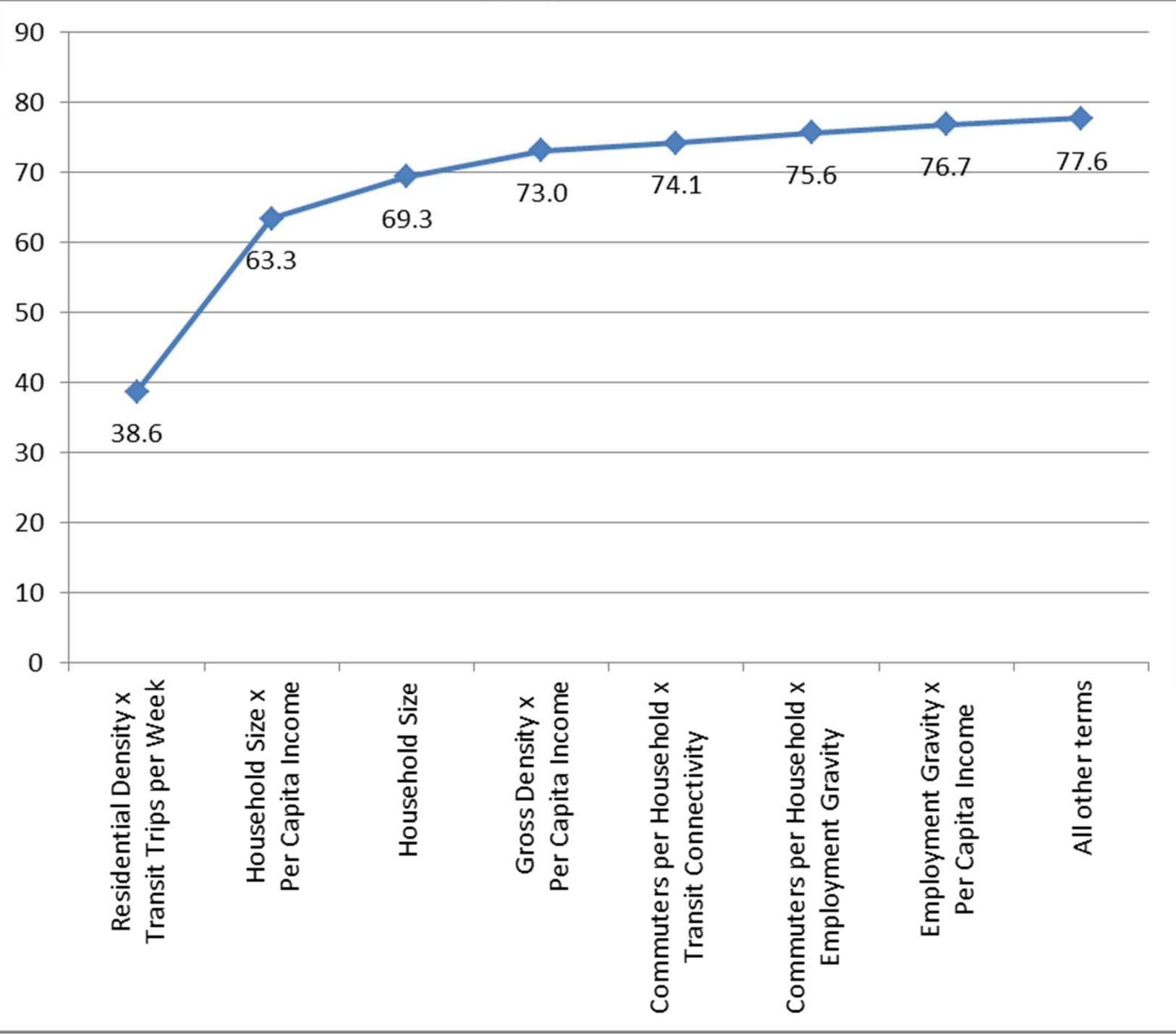
Determinants of household affordability

- Density of residential development and transit connectivity are the most important individual drivers of car ownership and car usage

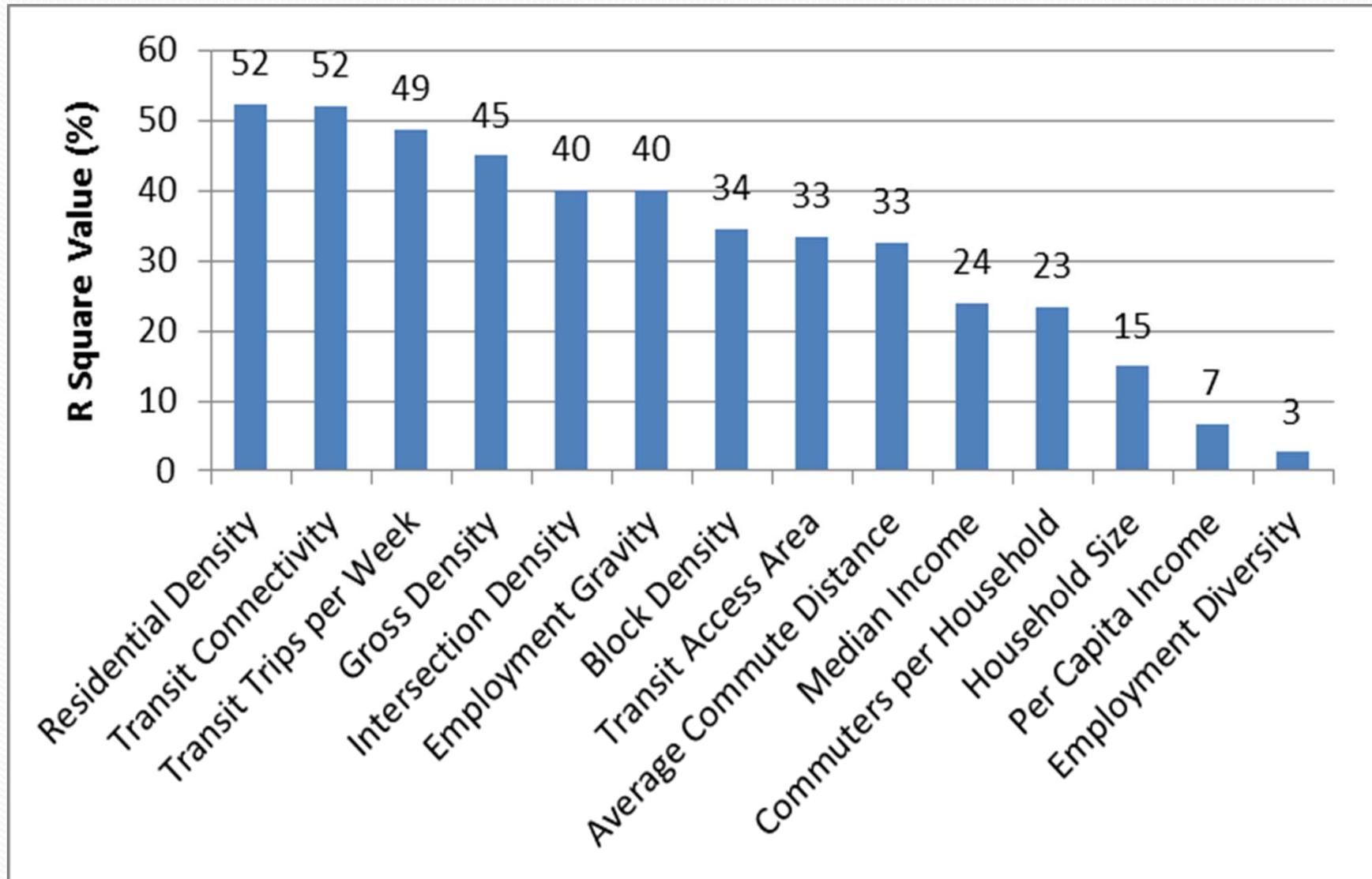
Auto ownership (bivariate R-squared)

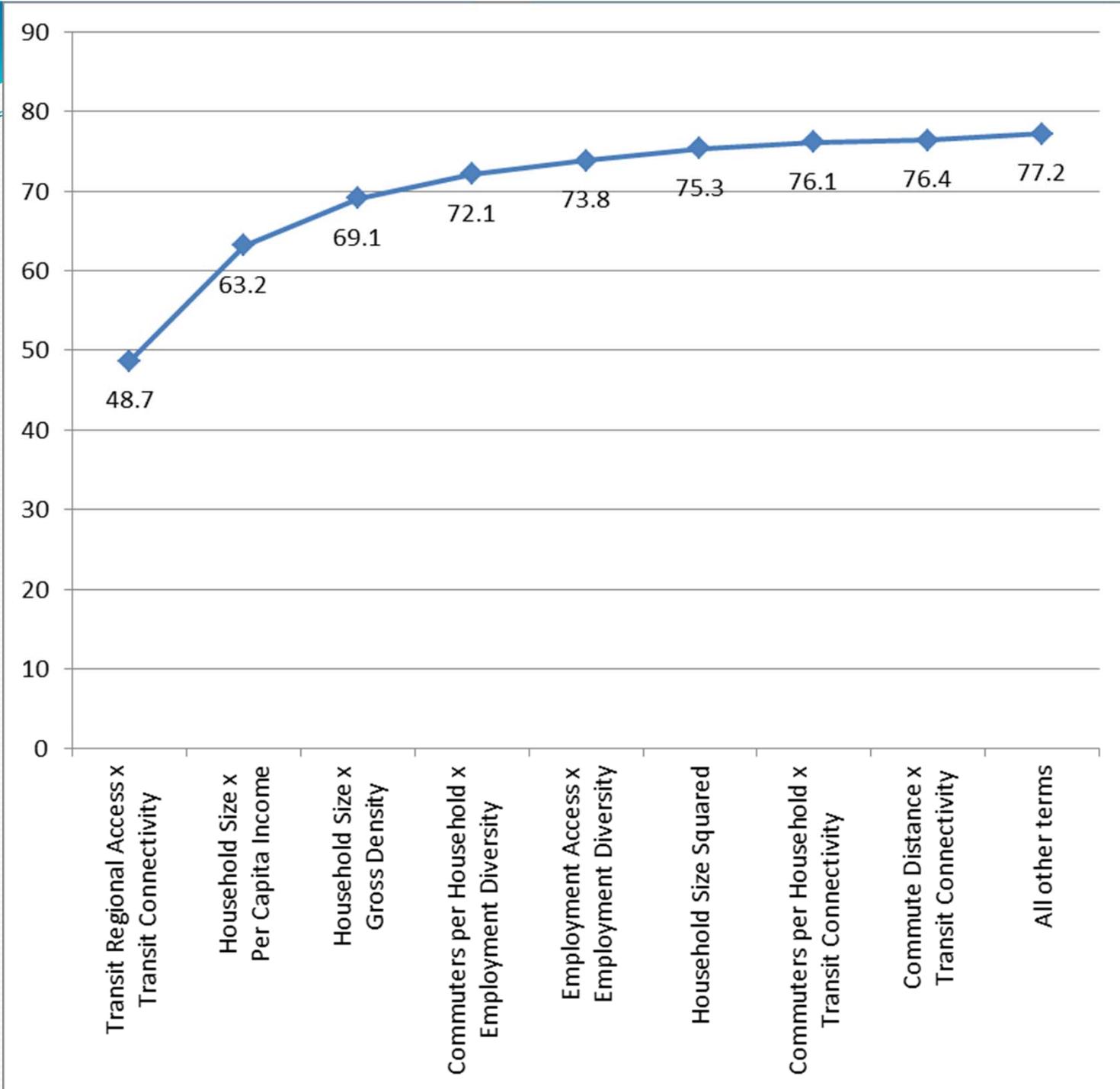


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Annual VMT (bivariate R-squared)



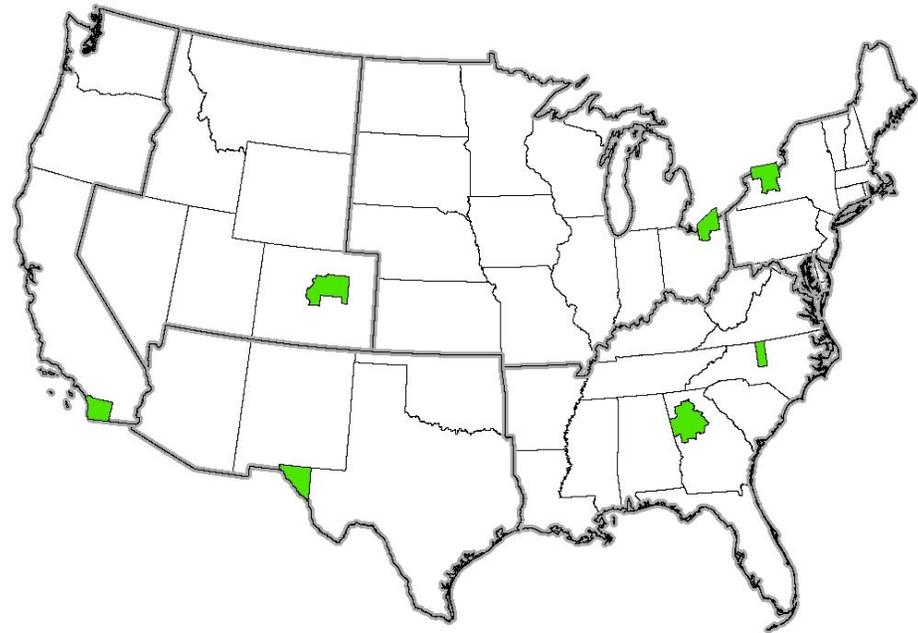


Distribution of affordability and opportunity

- Premise: just knowing housing and transportation costs isn't enough to attain high quality of life
- Other factors (not exhaustive):
 - Safety
 - Access to public amenities (e.g. parks, beaches, views)
 - School quality
 - Poverty concentration
 - Collective social capital
 - Exposure to environmental hazards

Distribution of affordability and opportunity

- Focused on 7 regions representing a diversity of sizes, housing markets, regional economies



- Matrix of all block groups divided into quintiles by both poverty and opportunity (operationalized in opportunity indices developed by HUD for Fair Housing and Equity Assessments)

Average transportation cost percentile for block groups categorized by poverty and opportunity quintiles

Poverty/ Opportunity	Lowest Opportunity	Low Opportunity	Medium Opportunity	High Opportunity	Highest Opportunity
Highest Poverty	30%	35%	40%	50%	53%
High Poverty	34%	47%	51%	54%	66%
Medium Poverty	37%	50%	57%	57%	66%
Low Poverty	39%	51%	58%	64%	64%
Lowest Poverty	30%	44%	59%	65%	61%

Distribution of block groups by poverty and opportunity quintiles

Poverty/ Opportunity	Lowest Opportunity	Low Opportunity	Medium Opportunity	High Opportunity	Highest Opportunity
Highest Poverty	11.6%	5.0%	1.8%	1.2%	0.4%
High Poverty	5.0%	6.6%	4.5%	2.4%	1.5%
Medium Poverty	1.8%	4.1%	5.5%	4.1%	4.5%
Low Poverty	1.1%	2.5%	4.8%	6.3%	5.4%
Lowest Poverty	0.5%	1.8%	3.5%	6.0%	8.2%

Predictors of regional average household transportation costs

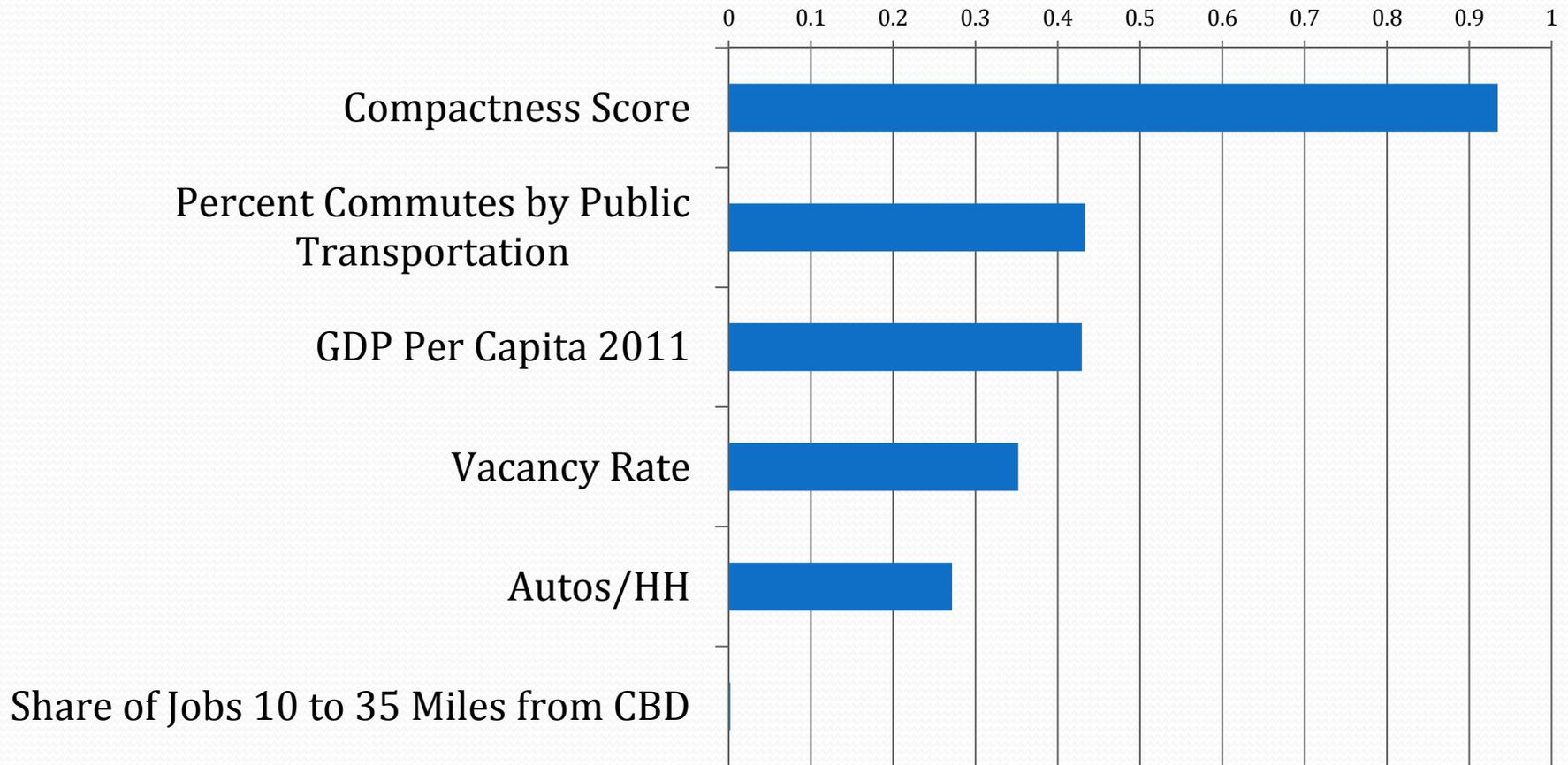
- Looked at 9 potential affordability determinants at the regional level:
 - Vacancy rate
 - Autos per household
 - GDP per capita (2011)
 - Growth in GDP per capita, 2001-2011
 - Core City growth, 1970-2010
 - Share of jobs 10-35 miles from CBD
 - Compactness Score (measures density and sprawl)
 - Population (2010)
 - Percent of commuters using public transit

Multivariate regression analysis

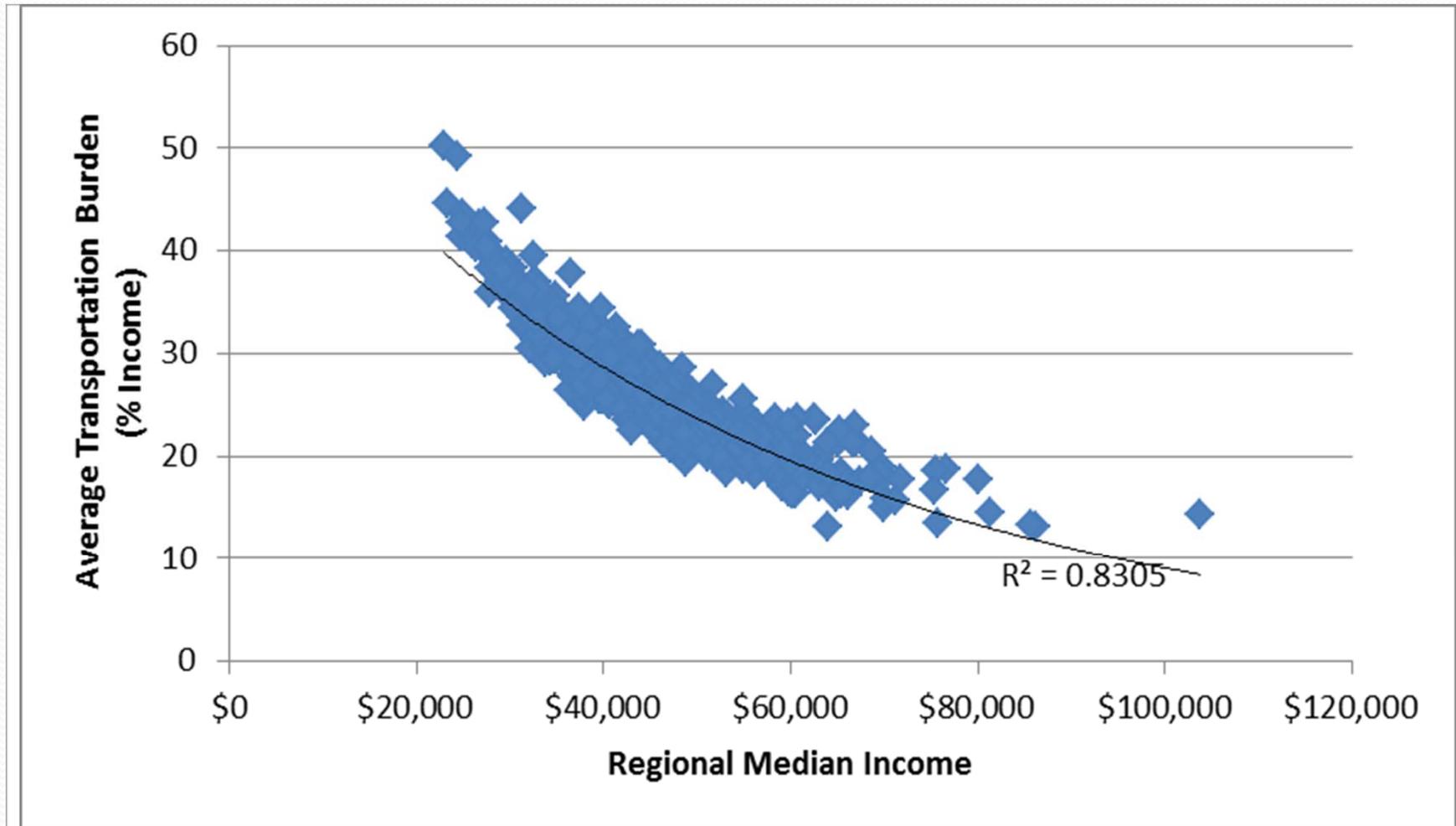
Multiple R	0.8845	Adjusted R-square	0.7555	Observations	83
R-square	0.7824	Standard Error	1.6930		

Variable Name	Value	Standard Error	P-value
Intercept	43.9789	5.1328	0.0000*
Vacancy Rate	26.2087	7.8042	0.0012*
Autos/HH	6.2174	2.2337	0.0068*
GDP Per Capita 2011	-0.0001	0.0000	0.0007*
GDP Per Capita Growth 2001-2011	0.8094	2.4976	0.7468
Core City Growth 1970-2010	-0.3143	0.1609	0.0546
Share of Jobs 10 to 35 Miles from CBD	-0.0406	0.0153	0.0098*
Compactness Score	-0.1637	0.0248	0.0000*
2010 Population	0.0000	0.0000	0.7460
Percent Commutes by Public Transportation	30.7197	11.2503	0.0079*

Standardized betas (absolute value)



Regional Median Income and transportation vs. housing cost burdens





Current applications

- Regional and comprehensive planning – prioritizing siting of new residential and affordable housing, targeting urban revitalization strategies, decreasing combined cost burdens
- Transportation planning
- Scenario evaluation – used as an input to help determine preferred growth scenarios
- Homebuyer counseling
- Public engagement/communication



Contact Information

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