HOUSING AND TRANSPORTATION AFFORDABILITY INITIATIVE

UNDERSTANDING THE COMBINED COST OF HOUSING AND TRANSPORTATION

The Impact of Transportation on Affordability:
An Analysis of Parking Cost Draft

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Introduction

The U.S. Department of Housing and Urban Development (HUD) and Department of Transportation (DOT) have partnered to support research on the costs of housing and transportation and develop tools that provide data on these costs. The central product of this Housing and Transportation Affordability (HTA) Initiative, the Location Affordability Index (LAI), allows users to access modeled estimates of housing and transportation costs for households at the Census Block Group level. The LAI illustrates the impact of the built environment and household characteristics on the affordability of housing and transportation in communities where over 90% of the nation's population resides.

While cost estimates included in the current iteration of the LAI cover major transportation expenditures associated with owning and operating an automobile and using public transportation, miscellaneous spending categories, such as parking and tolls, are not captured. In most instances, household parking costs are bundled and presumed to be captured within housing expenses, which are captured by the tool. Because of their bundled nature, the impact of parking costs on American household expenditures is currently unclear. This paper attempts to gauge the magnitude of these costs, and investigates whether they could be discretely captured to allow for their inclusion in future iterations of the LAI.

This paper responds to four key questions:

- How significant are parking costs for American households?
- What research and data is currently available on consumer parking costs?
- How can household parking costs be captured by residential location?
- What steps could be taken to include parking costs in the LAI?

The first two questions are addressed with a review and discussion of available research literature and data sources. While research on out-of-pocket parking costs is sparse, it is sufficient to provide some preliminary insights on the magnitude and prevalence of parking expenditure. Building from the review of research literature and data sources, the paper concludes with a discussion of potential steps necessary to develop parking cost data that could be included in the LAI.

Parking Cost Research

A number of researchers have focused on the cost of parking and its relationship to affordability, yet few specifically address out-of-pocket spending for households, and none have done so in a comprehensive manner. This gap in the literature may be explained by the fact that the cost of parking is usually not paid directly by consumers. When asked whether they had paid for parking during any part of their reported trips, 99% of the respondents to the 1990 Nationwide Personal Transportation Survey (NPTS) indicated that they had not (Shoup

2002).[1] Responding to the nearly ubiquitous subsidization of parking costs suggested by this result, much of the research on parking addresses the hidden costs associated with parking spaces, such as the external costs of free or underpriced public parking, or the substantial cost burdens imposed on developers and passed on to consumers as a result of excessive parking requirements.

While the existing literature on these topics generally does not shed light on out-of-pocket consumer parking expenditures, the research does provide a useful framework for discussion of the major elements of parking costs, most of which are bundled or in some way hidden. The research literature that relates to parking costs can be broadly divided into three categories: on-street parking management and pricing; off-street parking costs, standards and requirements; and pricing effects on mode choice and parking demand.

On-Street Parking Management and Pricing

Research on parking management in public streets is largely focused on how jurisdictions can most efficiently allocate public resources, in this case, parking spaces. It is generally understood that the most efficient way to allocate parking is to charge for it (Weinberger, et al. 2010; Litman 2010). The specific pricing strategies and goals associated with curbside parking management depend largely on whether the treatment area is primarily residential or commercial. In commercial districts, management programs generally involve parking meters with time limits designed to "improve safety, reduce traffic congestion, facilitate parking turnover, and provide for passenger and goods loading" (Kuzmyak, et al. 2003). In contrast, parking management in residential areas aims to prevent spillover parking and preserve spaces for area residents, goals typically accomplished with paid permit parking (Shoup 2002).

In recent years, advances in parking meter technologies have facilitated the development of more sophisticated parking management strategies, especially performance-based pricing (Shoup 2002; Shoup 2007). But even before the advent of these technologies there was consensus among many researchers that increasing the price of curbside parking could provide benefits such as increased public revenue, reduced traffic and congestion, and greater use of alternative transportation modes (Roth 1965; Falcocchio, et al. 1995; Arnott and Rowse 1999).

Broadly speaking, "performance-based parking pricing uses parking occupancy and turnover data to set parking rates and rules that drive demand patterns in a way that achieves a clearly stated policy objective" (Seattle Department of Transportation 2011). The three objectives most commonly tied to performance pricing are convenience, demand management and revenue generation (Litman 2011); to balance these objectives, many municipalities target an 85% occupancy rate for parking spots, which equates to roughly one available spot per block (Shoup 2007; Weinberger et al. 2010). This level of occupancy is thought to be achieved when the cost of parking is equivalent to the market clearing price, that is, the price at which parking supply and demand are in equilibrium.

[1] Subsequent surveys did not gather information on travel costs, so more recent data is not available.

Depending on local factors, performance pricing can include neighborhood subarea pricing, time-of-day pricing, seasonal pricing, event pricing, or progressive pricing for longer stays (Seattle DOT 2011). Dynamic pricing schemes often result in a net increase in the cost of street parking, though in areas of low demand they can effectively lower parking rates (San Francisco County Transportation Authority 2009; Weinberger et al. 2010). Information on parking rates is readily available at the neighborhood level in many jurisdictions. However, street parking rates are not necessarily connected to the cost of parking for area residents, so there is no straightforward way to connect parking prices to household spending. Indeed, households are probably least likely to drive to destinations immediately adjacent to their home, particularly in the high-density neighborhoods where parking tends to be scarce and rates tend to be highest.

Unlike metering and performance pricing programs, street parking permit programs can have direct and measurable impacts on the cost of parking for neighborhood residents, though these impacts may not be felt by households that use off-street parking. Additionally, many municipalities price residential parking permits at a nominal level that only covers the cost of administering the permit program (San Francisco County Transportation Authority 2009). While a comprehensive review of residential parking permit programs has not been identified, a scan of public information provided by jurisdictions suggests that the typical annual fee for parking permits is relatively small, generally less than $30 per year. Although the practice has not been adopted widely, permit programs could be converted into parking benefit districts, allowing non-residents to pay for parking in designated permit areas with proceeds funding public services within the district; Aspen, CO is cited as one example of the practice (Shoup 2002). Austin, TX has also implemented a similar program.

Parking Standards and Requirements

In most jurisdictions, zoning requirements dictate to developers the number of off-street parking spaces they must provide depending on the scale, location and type of development. Minimum parking standards are often set in an arbitrary fashion, resulting in an oversupply of parking, increased development costs and the displacement of other uses (Shoup 1997; 1999). Empirical analyses have demonstrated that parking requirements are frequently disconnected from local needs and development goals. For example, using GIS and lot-level assessor data, New York City, spatial variation in parking requirements does not match variations in transit accessibility and local development opportunities (McDonnell, et al. 2009).

The practice of imposing parking requirements bundles the cost of parking with the cost of development, driving up the cost of housing and effectively subsidizing auto ownership and driving (Weinberger, Seaman, et al. 2008; Manville and Shoup 2005). By shielding drivers from some of the costs of auto ownership and use, parking requirements incentivize more driving, leading to greater congestion and environmental harm.

Although it is passed on to the end user only indirectly, the cost of parking can be significant. Construction costs for structured parking have been observed as high as $26,000 per space (in 1994 dollars) (Shoup 1997); and construction costs ranging from $13,000 to over $20,000 have

been cited in various major metropolitan areas (Litman 2012). Unsurprisingly, folding these costs into the total cost of housing development can have significant impacts on affordability. On average, it is suggested that "requiring one off-street parking space adds about 6% to the unit cost, two spaces add about 16%, and 3 spaces adds about 34% compared with no parking" (Litman 2011). One study used a hedonic model to show that homes in San Francisco are more than ten percent more expensive when they include off-street parking, estimating that tens of thousands of additional households could qualify for home mortgages if units without parking could be legally provided (Jia and Wachs 1998). Several other researchers have also highlighted the negative impact of minimum parking requirements on housing affordability (San Francisco Planning and Urban Research Association 1998; Klipp 2004).

Recognizing the flaws in typical parking standards and policies, researchers have suggested alternative approaches to setting parking standards that would mitigate some of the negative impacts described above. One looks at the performance of city policies that allow developers to pay fees in lieu of providing parking on site, finding that these policies "assist development on difficult sites, encourage shared parking, reduce the demand for variances, improve urban design, and support historic preservation" (Shoup 1999). Another describes a data-driven method for municipalities to follow in implementing context-sensitive residential parking standards that would reflect real demand for parking based on local factors (Cuddy 2007). And a third, investigates data sources that can be used to estimate parking demand specifically in suburban multifamily housing to set appropriate zoning requirements (Willson and Roberts 2011).

While researchers continue to discuss new approaches to parking standards, several regions are moving progressive parking policy from theory to practice. King County is currently conducting a research project under a Federal Highway Administration (FHWA) grant to "impart data and strategies to help developers, jurisdictions, and neighborhoods accurately estimate the optimum amount of parking for new multifamily developments" (VIA Architecture 2012). The Metropolitan Transportation Commission in the Bay Area has published a toolkit to assist communities in the region in developing parking policies that support smart growth, including reduced parking requirements and parking maximums, and is in the early stages of developing a regional parking database that will be compiled to preserve locally provided information (Metropolitan Transportation Commission 2007).

Many jurisdictions adjust parking standards according to specific development circumstances, such as Transit Oriented Development (TOD) and affordable housing, based on research that demonstrates lower levels of parking demand, and therefore lower necessary parking supply, for these types of development. An empirical investigation of TOD locations by the San Jose State University/Santa Clara Valley Transportation Authority Collaborative Research Project (2010) revealed that twelve developments on light rail lines had excessive parking relative to demand. Similar analyses in San Diego and other regions have yielded comparable results, indicating that TOD housing often has excessive parking capacity relative to demand (Lee, et al. 2010; Cervero 2009). The City of Los Angeles is also investigating parking supply and parking

utilization for multi-family residential developments located in close proximity to transit stations with the objective of refining the city's minimum parking requirements for these developments (Southern California Association of Governments 2013). Recognizing minimum parking requirements as one of the main regulatory barriers in implementing regional affordable housing strategy, many cities and regions have recommended a reconsideration of parking requirements to facilitate development of affordable housing (Oregon Metro 2006; San Diego 2011). A number of cities, including San Diego, CA; Santa Monica, CA; San Francisco, CA; and Portland, ME have reduced parking requirements to facilitate affordable housing development.

Pricing, Parking Demand and Mode Choice

While research on parking standards and requirements deals largely with parking supply and capital costs, the other side of the coin is parking demand and its relationship to user costs. It is generally agreed that the lack of user costs for parking distorts demand, elevating car ownership and vehicle trips (Shoup 1997). This distortion occurs in the residential sphere, where parking spaces are often deeded with a home, or included in the rent. Similarly, most businesses provide parking to employees at no cost. In the 1990 NPTS, 95% of respondents indicated that they did not pay for parking at work (Shoup 1994).

Passing the true cost of parking amenities to users has the potential to affect consumer choices related to vehicle ownership, vehicle trips and mode choice. Once a parking space is built, if the cost of the space is passed on to those who occupy it with an explicit price tag, and depending on how it is priced, there may be significant effects on behavior. A survey of parking pricing strategies found that single occupancy vehicle commutes decreased by as much as 21 percent in response to significant parking pricing strategies (Vaca, Kuzmyak, et al. 2005). In a separate analysis of 656 survey responses from residents in the Washington, DC metro area, it was found that approximately 25% of those surveyed indicated they would switch modes in response to a hypothetical parking pricing scenario (Kuppam and Pendyala 1995).

In efforts to expand affordability, increase choice and manage regional travel demand, a number of regions have attempted to make parking costs explicit through measures such as unbundling parking from housing or cashing out parking benefits provided by employers. Cashing out employer-provided parking means offering employees the option to receive payment in lieu of free or subsidized parking, and is required of certain employers in California (California EPA 2009). San Francisco requires developers in some areas to unbundle the cost of parking spaces from residential units (Weinberger, et al. 2010). Fairfax County, Virginia encourages parking cash out and unbundled parking programs during the development review process (Kaufman, et al. 2012).

Parking Cost Data Sources

While the research reviewed above provides a useful framework for analysis of parking costs, it does little to advance our knowledge of parking expenditures for American households. The data sources described here still do not provide a complete picture of parking spending in America, but they do offer concrete data on how much is charged for parking in certain places and the sums that American households ultimately pay to park their cars. Each of the following datasets could contribute to the development of costs for adoption in the LAI.

U.S. Bureau of Labor Statistics Consumer Expenditure Survey

The Bureau of Labor Statistics (BLS) Consumer Expenditure Survey (CEX) consists of two surveys: the Quarterly Interview Survey and the one-week period Diary Survey, that provide information on the spending habits of American households. Parking costs in the survey are bundled with other transportation costs, in the "vehicle rental, leases, licenses, and other charges" subcategory of the "other vehicle expenses" category. The following survey question addresses parking costs:

> Since the 1st of (month, 3 months ago), how much was paid, excluding any payments made this month, for parking, such as parking meters, garage rental, or parking lot fees? Do not include expenses that are part of your property ownership or rental costs, a business expense or expenses that will be totally reimbursed.

Despite some ambiguity in cases where residential parking has been unbundled, i.e. respondents might interpret this cost as part of their rental costs, the value recorded in response to this question should represent the total quarterly out-of-pocket cost for parking for the respondent's household. Although the CEX does not include information on household location at a fine geographic level, it does offer demographic information for respondents, as well as tags identifying them based on location in central city, suburban or rural areas and by region of the country.

Collier's Parking Rate Survey

Collier's International produces an annual survey on parking rates, including hourly, daily and monthly rates, focused on the Central Business District (CBD) of selected North American metropolitan areas. While this data is not focused on household spending, it provides a robust source of data on the magnitude of parking costs in central districts of the included regions.

National Parking Association Parking in America

Similar to the Collier's Parking Survey, the National Parking Association produces an annual industry report with monthly, daily, and hourly parking rates included for many major metropolitan areas, including information for hotel, CBD, and airport parking facilities.

Regional Data

Some regions have undertaken research projects to inform parking policies and standards which include substantial data collection efforts at the local level. Although the resulting data sets are limited in scope, they can provide valuable information on regional parking supply and cost variation.

King County Right Size Parking Project

King County in Washington State received a grant from the FHWA Value Pricing Pilot program to research multifamily residential parking supply in the region. The project uses local information to guide context-sensitive parking supply and management decisions with the goal of reducing barriers to mixed-use residential development in urban centers near transit infrastructure; reducing household costs for housing and other expenditures; lowering vehicle miles traveled (VMT); and supporting alternative transportation modes. While much of the research in King County is focused on demand for and consumption of parking spaces, one element of the project focuses specifically on pricing, including investigation of multi-family pricing practices, impacts on affordability and household expenses, and the potential benefits of pricing strategies.

To support the research effort, the County assembled a data set of over 200 multifamily housing parcels in the region, with detailed information on parking supply, utilization, and pricing. Over half of the multifamily developments included in the study charge for parking, with costs ranging from $10 to $250 per month.

Consumer Parking Expenditure Analysis

As revealed in the literature, the cost of parking is usually not explicit to consumers. Instead, parking is often rolled into the cost of property ownership or subsidized by employers, local government and businesses. Many Americans pay little or nothing out of pocket to park their vehicles. Analysis of results from the 2011 BLS Consumer Expenditure Survey (CEX) confirms that most Americans do not incur expenses that are specifically identified as “parking costs,” with a majority of respondents reporting no money spent on parking during the period they were surveyed.

The analysis below covers results from 16,383 consumer units (roughly equivalent to households) that participated in the 2011 CEX. For each consumer unit, the BLS provides a range of demographic and locational variables. While these variables do not approach the level of geographic specificity used in the LAI, they do illustrate how out-of-pocket spending for parking varies across a range of places and household types. Out of the entire sample, over 82% of respondents did not report any spending on parking in the quarters they were surveyed. Across all households, average reported parking costs were under $8 (quarterly). Nevertheless, for a small proportion of households, parking can be a significant expense, with costs in the

hundreds or even thousands of dollars on an annual basis. Spending levels vary significantly based on several factors analyzed, including household income and location.

Table 1: Quarterly Spending on Parking, BLS Consumer Expenditure Survey 2011

None Reported	$1 $4.99	$5 $24.99	$25 $49.99	$50 $149.99	$150 or more	Average Spending
82.41%	3.65%	7.49%	2.50%	2.57%	1.38%	$7.96

Parking Costs and Income

Data from the CEX demonstrates that household parking expenditures are strongly related to income. While more than nine out of ten households with incomes below $20,000 reported no parking expenses, for households with an annual income of $70,000 or more, the figure is closer to seven in ten. The greater propensity for high-income households to spend money on parking is observed across the spectrum of spending levels, but is most pronounced at the high end. Households in the highest income group were many times more likely to spend over $50 quarterly on parking, compared to lower income households. While 7.6% of households with incomes over $70,000 reported more than $50 of quarterly parking costs, just 2.1% of all households with incomes below $70,000 reported this level of spending.

Table 2: Quarterly Spending on Parking by Income Class (CEX)

Income Class	None Reported	$1 $4.99	$5 $24.99	$25 $49.99	$50 $149.99	$150 or more	Average Spending
Less than $5,000	89.69%	2.97%	4.84%	1.09%	0.78%	0.63%	$3.67
$5,000 to $9,999	91.38%	2.16%	3.45%	1.15%	1.44%	0.43%	$2.99
$10,000 to $14,999	92.82%	2.30%	2.66%	0.71%	1.42%	0.09%	$2.00
$15,000 to $19,999	91.72%	2.60%	4.00%	1.02%	0.37%	0.28%	$1.79
$20,000 to $29,999	88.76%	2.78%	4.36%	1.68%	1.47%	0.95%	$5.49
$30,000 to $39,999	88.16%	2.24%	5.89%	1.47%	1.71%	0.53%	$4.23
$40,000 to $49,999	84.94%	4.12%	6.82%	2.12%	1.61%	0.39%	$3.79
$50,000 to $69,999	82.87%	4.33%	7.31%	2.27%	2.63%	0.58%	$5.08

$70,000 and over	71.48%	4.74%	11.86%	4.32%	4.50%	3.10%	$15.96

Parking Costs and Location

Although the limited sample size of the CEX precludes analysis at a small geographic scale, results from the survey clearly illustrate parking costs vary substantially by place. For those surveyed in the Phoenix-Mesa metropolitan area, for example, out-of-pocket spending on parking was exceedingly rare, with less than 5% of households reporting any costs. In contrast, nearly 40% of those surveyed in the San Francisco-Oakland-San Jose region reported at least some spending. For regions where the CEX reports separate results for suburban areas, the data suggests significant differences in spending patterns within, as well as between, regions. Suburbanites in New York and Connecticut were almost twice as likely to report spending on parking as residents of New Jersey suburbs, and slightly more likely to report spending than residents of New York City. However, the low reporting of out-of-pocket parking expenditures in New York City is largely a result of substantially lower car ownership rates.

Based only on households with at least one vehicle, New York City emerges as the region with the highest reported parking costs in the CEX. Nearly 8% of respondents in the region reported $150 or more in quarterly spending with an average cost across all respondents of over $50. But even in New York and San Francisco, the two regions with the highest parking costs in the survey, and even excluding households with no vehicles, a majority of respondents still reported zero expenditure.

Table 3: Quarterly Spending on Parking (CEX)

Primary Sampling Unit	None Reported	$1 $4.99	$5 $24.99	$25 $49.99	$50 $149.99	$150 or more	Average Spending
New York, NY	82.35%	4.55%	4.55%	2.28%	3.04%	3.23%	$20.83
New York, Connecticut Suburbs	75.00%	2.64%	9.55%	4.27%	6.50%	2.03%	$12.79
New Jersey Suburbs	87.08%	1.44%	4.07%	0.96%	1.67%	4.78%	$18.29
Miami-Ft. Lauderdale, FL	91.56%	1.33%	4.00%	0.44%	2.67%	0.00%	$2.67
Los Angeles-Orange, CA	72.31%	4.64%	12.41%	4.64%	4.50%	1.50%	$9.45
Los Angeles Suburbs, CA	87.22%	2.26%	6.02%	2.26%	1.50%	0.75%	$4.14
San Francisco-Oakland-San Jose, CA	61.16%	5.13%	13.62%	8.04%	8.93%	3.13%	$17.34
Phoenix-Mesa, AZ	95.02%	0.50%	1.49%	1.49%	1.00%	0.50%	$2.86

Table 4: Quarterly Spending on Parking, Excluding Consumer Units with No Vehicles (CEX)

Primary Sampling Unit	None Reported	$1 $4.99	$5 $24.99	$25 $49.99	$50 $149.99	$150 or more	Average Spending
New York, NY	60.29%	9.31%	11.27%	5.39%	5.88%	7.84%	$51.58
New York, Connecticut Suburbs	71.91%	2.91%	11.14%	4.60%	7.26%	2.18%	$14.21
New Jersey Suburbs	84.97%	1.73%	4.62%	1.16%	2.02%	5.49%	$21.39
Miami-Ft. Lauderdale, FL	91.71%	1.66%	4.97%	0.55%	1.10%	0.00%	$1.94
Los Angeles-Orange, CA	69.93%	4.90%	13.56%	4.90%	4.90%	1.80%	$10.56
Los Angeles Suburbs, CA	87.17%	1.33%	7.08%	2.65%	0.88%	0.88%	$4.00
San Francisco-Oakland-San Jose, CA	57.80%	4.86%	15.09%	8.44%	10.23%	3.58%	$19.58
Phoenix-Mesa, AZ	94.77%	0.58%	1.16%	1.74%	1.16%	0.58%	$3.31

In addition to illustrating cost differences across the individual regions sampled, the CEX data suggests trends in parking costs across region types. In particular, reported parking expenditures are clearly related to the size of the region in which a household is located. While the average cost for parking in the largest regions of over four million people was just $13.50, this represents more than ten times as much as spending as the average in the smallest regions of less than 125 thousand.

Table 4: Quarterly Spending on Parking by Region Size (CEX)

Primary Sampling Unit	None Reported	$1 $4.99	$5 $24.99	$25 $49.99	$50 $149.99	$150 or more	Average Spending
More than 4 million	75.47%	4.18%	9.96%	3.96%	4.06%	2.38%	$13.50
1.20-4 million	79.93%	4.29%	9.13%	2.63%	2.86%	1.17%	$7.36
0.33-1.19 million	81.25%	4.64%	8.71%	0.95%	2.65%	1.80%	$7.69
125-329.9 thousand	90.00%	3.11%	4.02%	1.35%	0.99%	0.52%	$3.31
Less than 125 thousand	94.66%	1.18%	2.72%	0.91%	0.37%	0.16%	$1.26

Parking Costs and the Location Affordability Index

Because the LAI currently reports estimated out-of-pocket spending on housing, car ownership, car usage, and transit usage as a function of location, a consistent approach to parking cost estimates would require information on household out-of-pocket expenditures, based on location. Unfortunately, research on parking costs illustrates that most, if not all, costs associated with parking are bundled or hidden. While these indirect costs are ultimately passed on to households in some form, a consistent strategy for quantifying and linking them to household transportation spending would need to be developed to facilitate their inclusion in the LAI. It would be necessary to determine how much households spend, on average, on parking based on their residential location, household characteristics, automobile ownership, and other relevant variables.

For the purposes of exploring how parking costs might be integrated in the LAI, parking can be organized into four major categories composed of constituent costs, both direct and indirect, associated with parking. The following discussion addresses each of these cost possibilities and suggests how they might be incorporated into the LAI.

- Residential Parking
  - Free/bundled parking on-site
  - Paid off-street parking
  - Paid residential permit parking
- Commuter Parking
  - Free/bundled parking on-site
  - Paid off-street parking
  - On-street parking (paid or unpaid)
- Parking for Daily Trips (shopping, recreation, etc.)
  - Free/bundled parking on-site
  - Paid off-street parking
  - On-street parking (paid or unpaid)
- Parking for Special Events, Hotels, Airports and other Destinations
  - Free/bundled parking on-site
  - Paid off-street parking

Residential Parking

Because the LAI provides estimates for housing and transportation costs associated with the location of a home, the cost of residential parking in a given location has direct implications for modeled costs. Accurately estimating the cost of residential parking is complicated by the fact that costs vary a great deal from neighborhood to neighborhood, and from household to household. Capturing the cost to consumers of parking a vehicle in the vicinity of a home adds a component of transportation cost that may be particularly significant in some parts of the country.

Free or Bundled Residential Parking

In most housing units across the country, no explicit cost is attached to residential parking. "Free" parking may come in the form of an attached or detached garage; a driveway; free street parking; or free access to a parking lot or garage in an apartment complex. While these parking amenities are not truly free, their cost to homeowners and renters is usually bundled with housing costs and not easily disaggregated. In most cases, such bundled costs are already captured by the housing cost estimates in the LAI.

As previously discussed, a great deal of existing literature on parking investigates the indirect costs associated with residential parking amenities that are not directly paid by users, either as unmetered or underpriced street parking, or parking spaces provided by developers, often as a result of local regulations. Because the majority of residential parking in most parts of the country comes in bundled forms, it is important to understand the true cost of these "free" parking spaces.

In places where local efforts exist to unbundle the cost of residential parking, more data may emerge on household parking costs. Leveraging local data from regions that have gathered information on parking pricing and costs, such as King County, might make it possible to model the portion of housing costs that cover the cost of parking, and determine how costs vary in different neighborhoods. These estimates could then be used to shift elements of housing costs currently associated with parking to the transportation cost side of the LAI. Presenting estimates in this way might provide a more complete picture of the division between housing and transportation costs.

Paid Residential Parking

Residential parking associated with a direct cost to the consumer comes in various forms, but can be divided into three major categories:

- Paid parking in a condo, co-op, or apartment complex (unbundled parking);
- Off-street parking in a private parking lot or garage;
- Paid permit parking on public streets.

These costs represent measurable out-of-pocket spending that is clearly tied to a home location. Though usually low, the CEX suggests that, in some cases, these costs can be significant. Anecdotally, in places like upscale neighborhoods in Manhattan, the monthly cost of a parking spot may rival or exceed the cost of a modest apartment in other markets. Although parking in Manhattan may be an extreme example, many of the multifamily complexes studied in King County charged over $100 per month for parking. In areas where the parking supply is tight relative to demand, typically urban centers, residents may face substantial parking costs.

Measuring the cost of paid residential parking is complicated by two main factors: a dearth of national data sources and significant local variation in parking costs. While the CEX includes information on parking expenditure, it does not distinguish different types of parking costs and,

more importantly, does not cover much of the country nor allow for the kind of fine geospatial analysis required for the LAI. Average parking costs at a regional level may be useful for comparing the cost of living across regions, but would do little to improve the neighborhood-level transportation cost estimates produced by the LAI. Absent survey data on the consumer-side, developing estimates for paid residential parking would involve a multipronged research effort focused on the three residential parking categories previously described.

Potential data sources for such an effort include industry reports on monthly parking costs in selected regions and submarkets, such as the Collier's survey and National Parking Association report, as well as regional data sets on parking rates in residential developments and municipal information on parking permits and fees. Because these kinds of information do not cover all Census Block Groups, after assembling, normalizing and vetting the data, a methodology would need to be developed to model costs in areas with no available data.

Additional Considerations

In addition to modeling residential parking cost estimates at a fine geographic level, a methodology for linking parking costs to existing LAI outputs, i.e. autos per household, and adjusting costs based on the household types used in the LAI would need to be developed. As demonstrated by the CEX data, income is a significant factor in parking expenditures. For example, a wealthier household may be more likely to pay for garage parking, while a lower-income household may opt for street parking.

Commuter Parking

For most commuters, there is no explicit cost of parking at or near a place of work. However, this does not necessarily mean that a commuter is not paying for his or her parking spot in the form of reduced compensation. In some places, cashing out the value of employer-subsidized parking is encouraged or even required. Research on these programs could inform the development of estimates for the hidden cost of commuter parking. Because the LAI is based on household locations rather than where household members work, including these costs would require additional analysis of commute origins and destinations using tools such as the Census Transportation Planning Products (CTPP). The 2006-2010 CTPP offers home-to-work Transportation Analysis Zone (TAZ) patterns tabulated by travel mode and, if combined with posted commercial parking prices, could potentially provide an appropriate parking cost model.

Parking for Daily Trips

For most Americans, parking for daily trips comes free in the form of customer parking or free street parking. Even when there is a charge for parking, many businesses pay for their customers parking through the practice of validation. While these costs are ultimately passed on to the consumer in the form of higher retail prices, it is probably not practical to attempt a geospatial analysis of the impact of these hidden costs for inclusion in the LAI. In any case, these impacts are generally felt as higher costs in other consumer spending categories not covered in the LAI.

Parking for Special Events, Hotels, Airports and other Destinations

Although parking for special events or travel may represent a significant cost for some households, the propensity of a household to spend money on this type of parking is not directly related to the location of the home. As such, these costs appear to be inappropriate for inclusion in the LAI.

Potential Research and Modeling Approaches

The current version of the LAI reports transportation cost estimates derived from CEX data on the cost of owning and operating an automobile, as well as estimates for the cost of transit use.[2] These estimates, though they include a spectrum of constituent costs, are based on direct household expenditures in select spending categories. As suggested in the parking research literature and confirmed by analysis of the CEX, the vast majority of American households spend little to no money directly on parking. Thus, the addition of out-of-pocket parking costs would likely have a negligible impact on transportation cost estimates in all but a few geographic areas.

Parking experts interviewed for this project discussed a number of potential approaches to developing parking costs for the LAI, but the key question raised in these conversations was whether it would be appropriate to include imputed parking costs in addition to explicit fees. Estimating the hidden costs of parking requires a more ambitious analytical strategy than developing estimates for out-of-pocket expenditures, and would be a departure from the cost estimates currently used in the LAI. Indeed, it would fundamentally change how the LAI reports costs. Yet these indirect costs represent the vast majority of spending on parking, and it is possible that unbundling them from housing costs would provide useful information to users of the LAI. Ultimately, whether or not to include indirect costs depends on the goals behind adding parking costs to the LAI.

The purpose of the LAI is to provide information on how household spending for housing and transportation is influenced by place; in determining an optimal approach to parking costs, another key consideration is how costs relate to location. In other words, to add value to the LAI, parking cost estimates must capture meaningful spatial variation across regions, and more importantly, across neighborhoods within a region. While the cost of residential parking is clearly tied to the location of a home, the link between home location and other parking costs is more tenuous. Research suggests that parking costs, both out-of-pocket and bundled, tend to be greatest in dense urban environments where land is at a premium.

Approaches to Out-of-Pocket Parking Costs

The most straightforward approach to determine direct parking expenditures would be to catalog and gather data on key spending categories, such as residential permit parking and

[2] LAI transportation costs also include estimates for the cost of transit use, which is not discussed here.

private parking fees. Much of this information is publicly available, though data on private parking rates is not readily available and collecting information on residential permits in dozens or hundreds of jurisdictions would require substantial effort. More importantly, the theoretical cost of a public or private parking space does not directly translate to parking spending by households, most of whom have access to parking connected to their homes.

To appropriately allocate household parking costs, additional research on parking supply and utilization would also be necessary. Although some agencies and Metropolitan Planning Organizations do collect local parking data, data does not exist in many areas and the scope of the LAI makes analysis of utilization in every block group impractical. A somewhat more practical, though still challenging, approach to allocating costs may be to focus on a region such as King County, where data on parking supply and utilization is already being assembled, and model these factors based on universally available built environment data, such as residential density. This model could then be applied in other regions where parking data is unavailable or incomplete. While this approach applies only to residential parking, using commute origin-destination information, commuter parking costs could also be modeled based on data for commute destinations.

Approaches to Imputed Parking Costs

The full cost of parking filters through the economy in numerous, fractured ways, but is most commonly bundled with the cost of housing or the cost of doing business. Although the LAI currently reports only direct costs, the purpose of the tool is to illustrate how location impacts the affordability of housing and transportation. Unbundling the cost of parking, though it would generally not change the overall affordability of a place, could provide a more nuanced picture of how resources are allocated to housing and transportation.

In most cases, the cost of a parking space is a function of the cost of the real estate it occupies. And the cost of parking ranges considerably: from surface parking in areas with low land costs, where the cost of a parking space is relatively small, to structured parking in a dense urban neighborhood, with exponentially higher costs. One approach to separating imputed parking costs from total housing cost would be to research and develop simplified estimates based on built environment characteristics and apply these typologies to all the block groups covered in the LAI. For example, an assumption could be made that homes in areas below a certain density feature surface parking, and a corresponding cost appropriate to that development type could be determined. The following table illustrates how these cost estimates could be developed.

Table 5: Typical Parking Facility Financial Costs[3]

	Land Cost	Annualized Land Cost	Annualized Construction	Annual O & M	Total Annual

[3] Todd Litman, "Parking Cost, Pricing and Revenue Calculator"

Type of Facility	Per Acre	Per Space	Costs	Costs	Cost
Suburban, On-Street	$250,000	$94	$326	$345	$765
Suburban, Surface, Free Land	$0	$0	$326	$345	$671
Suburban, Surface	$250,000	$215	$326	$345	$885
Urban, On-Street	$1,200,000	$453	$543	$345	$1,341
Urban, Surface	$1,200,000	$944	$543	$575	$2,062
Urban, 3-Level Structure	$1,200,000	$315	$1,954	$575	$2,844
Urban, Underground	$1,200,000	$0	$2,714	$575	$3,289
CBD, On-Street	$6,000,000	$2,265	$543	$460	$3,268
CBD, 4-Level Structure	$6,000,000	$1,089	$2,171	$575	$3,835
CBD, Underground	$6,000,000	$0	$3,776	$575	$4,007

Alternatively, a model could be developed to estimate parking availability as a function of housing type and year built, density and other housing characteristic and location variables. Models that provide some insight on how this might be done have been developed for New York City (Weinberger, 2012, McDonnell et al. 2011), and for King County (Right-Size Parking), though it is unclear how effectively these could be applied in other regions. Simple models may also be estimated using census data and the American Housing Survey which asks if parking is included in the rent or sales price of a home. Once the number of spaces in a dwelling is estimated, the added cost to housing (Jia and Wachs provide one potential approach) could be independently calculated (unbundled) and listed as a parking cost. This approach could also use prices in markets where unbundling has been successful to proxy the portion of housing that is due to parking. A more complex analytical approach could also take into account available commercial rates from data sets such as the Colliers and National Parking Association parking cost surveys.

Although they are not reflected in any consumer spending category, the costs associated with employer-subsidized parking are effectively passed on to households in the form of lower wages. In places where parking benefits are cashed out, allowing employees to convert their parking privileges to a higher effective wage, this impact is made explicit. However, it is not clear how the cost of employer-subsidized parking would be reported in the LAI, since it fits neither with the housing nor the transportation costs currently reported. If employer parking subsidies were to be included, Internal Revenue Service (IRS) data on parking benefits could provide additional information on the value of these subsidies.

Conclusion

The available research and data suggest that parking costs are a relatively small expense for nearly all American households, and especially for those with lower incomes. In fact, in every region for which data was available, the majority of households reported zero spending for parking. This lack of reported expenditure does not mean that parking carries no costs, just that most of these costs are bundled and largely invisible to consumers, rather than explicit fees.

In determining whether parking costs ought to be included in the LAI, the first question that must be addressed is whether the tool should remain an indicator of out-of-pocket costs. If the answer is yes, the addition of discrete parking costs would likely have a negligible effect on cost estimates provided by the tool in most regions. The limited areas in which discrete parking costs might have an impact would likely be in urban centers, especially large metros such as San Francisco and New York City.

Alternatively, if costs within the LAI were to focus on the indirect, hidden costs of parking, as the majority of existing parking research does, a new approach to reporting housing and transportation costs would be necessary. Currently available research on bundled parking costs fails to indicate how costs impact individual households; consequently a substantial amount of research would be necessary to establish which costs could realistically be captured and how they could be integrated into the LAI tool. The significant resources necessary to pursue a separate parking cost model may not be worthwhile at this juncture. Moreover, incorporating imputed parking costs in the LAI would represent a fundamental shift in the tool's design and potentially have wider implications for the tool.

Information regarding how research could be conducted under either option is provided in Appendix C.

Appendix A: LAI Transportation Cost Components -

Transportation Cost Calculation

The transportation model in the LAI estimates three components of travel behavior: auto ownership, auto use, and transit use. To calculate total transportation costs, each of these modeled outputs is multiplied by a cost per unit (e.g., cost per mile) and then summed to provide average values for each block group.

Auto Ownership and Auto Use Costs

Date from the US Bureau of Labor Statistics' Consumer Expenditure Survey (CEX) is the basis for the auto ownership and auto use cost components of the LAI. Research conducted as part of the HTA Initiative by Diane Schanzenbach, PhD and Leslie McGranahan PhD examined expenditures based on the 2005-2010 waves of the CEX, which include a range of new and used autos. This new research advances the effort to overcome the limitations of other measures that focused primarily on autos less than five years old. These expenditures are represented in inflation-adjusted 2010 dollars using the Consumer Price Index for all Urban Consumers (CPI-U). Expenses are segmented by five ranges of household income ($0-$20,000; $20,000-$40,000; $40,000-$60,000; $60,000-$100,000; and, $100,000 and above) and applied to the modeled autos per household and annual vehicle miles traveled (VMT) for the appropriate income range.

Expenditures related to the purchase and operation of cars and trucks are divided into four categories: 1) the cost of purchasing the vehicle from a dealer or a prior owner ("purchase costs"); 2) the cost of continuing to own a purchased vehicle even if it is not driven ("ownership costs"); 3) the cost of keeping the vehicle in drivable shape, e.g. maintenance and repairs ("drivability costs"); and 4) the cost of the fuel used to drive the vehicle ("driving costs").

Transit Use Costs

The 2008 National Transit Database (NTD) serves as the source for transit cost data. Specifically, directly operated and purchased transportation revenue are used (i.e., demand response revenue is not factored into this analysis). The transit revenue is assigned to each of the transit agencies where General Transit Feed Specification (GTFS) data was collected. The allocation of transit revenue to the metropolitan level is then based on the percentage of each transit agencies' bus and rail stations within the primary versus surrounding metropolitan areas. For example, if a transit agency has a total of 500 bus stops and 425 of those stops are located in the primary metropolitan area and 75 stops extend into a neighboring metropolitan area, the primary metropolitan area receives 85 percent of the transit revenue and the neighboring metropolitan area receives 15 percent. The allocation of the transit revenue is then applied to the block group level, based on the percentage of transit commutes and household commuter counts within each block group from the American Community Survey (ACS), to estimate the average household transit costs. This method of allocating household transit cost is also used to

allocate transit trips since the NTD also reports overall unlinked trips. It therefore can be used to estimate the number of household transit trips based on the percent of journey to work trips. This normalization method has an implicit assumption that the transit use for the journey to work is a good surrogate for overall transit use.

There are a number of metropolitan areas for which GTFS data are not available and/or there was no revenue listed in the NTD. In these cases, the national transit cost average from the allocation calculation described in the previous paragraph is used for these metropolitan areas. The average transit costs are then allocated to the block group level based on the percentage of transit commutes and household commuter counts. The end result is an average household transit cost at the block group level.

Appendix B: Consumer Expenditure Survey Tables -

All Consumer Units -

Primary Sampling Unit	None Reported	$1 $4.99	$5 $24.99	$25 $49.99	$50 $149.99	$150 or more	Sample Size
Philadelphia-Wilmington-Atlantic City, PA - NJ - DE - MD	72.80%	3.53 %	12.09 %	5.04%	5.29%	1.26%	397
Boston-Brockton-Nashua, MA – NH – ME – CT	65.84%	5.45 %	15.35 %	4.95%	4.95%	3.47%	404
New York, NY	82.35%	4.55 %	4.55%	2.28%	3.04%	3.23%	527
New York, Connecticut Suburbs	75.00%	2.64 %	9.55%	4.27%	6.50%	2.03%	492
New Jersey Suburbs	87.08%	1.44 %	4.07%	0.96%	1.67%	4.78%	418
Chicago-Gary-Kenosha, IL-IN-WI	77.71%	1.57 %	10.20 %	3.77%	3.61%	3.14%	637
Detroit-Ann Arbor, MI	78.06%	4.70 %	8.46%	3.45%	3.13%	2.19%	319
Cleveland-Akron, OH	80.63%	5.24 %	7.85%	4.19%	2.09%	0.00%	191
Minneapolis-St. Paul, MN – WI	63.93%	6.85 %	18.72 %	4.57%	2.28%	3.65%	219
Washington, DC – MD – VA –WV	67.85%	6.75 %	9.32%	8.36%	4.50%	3.22%	311
Baltimore, MD	83.44%	1.32 %	7.95%	2.65%	2.65%	1.99%	151
Dallas-Ft. Worth, TX	85.42%	5.83 %	4.96%	1.46%	1.17%	1.17%	343
Houston-Galveston-Brazoria, TX	63.64%	8.39 %	20.28 %	1.75%	4.90%	1.05%	286
Atlanta, GA	83.23%	4.52 %	8.06%	2.90%	0.32%	0.97%	310
Miami-Ft. Lauderdale, FL	91.56%	1.33	4.00%	0.44%	2.67%	0.00%	225

		%					
Los Angeles-Orange, CA	72.31%	4.64 %	12.41 %	4.64%	4.50%	1.50%	733
Los Angeles Suburbs, CA	87.22%	2.26 %	6.02%	2.26%	1.50%	0.75%	266
San Francisco-Oakland-San Jose, CA	61.16%	5.13 %	13.62 %	8.04%	8.93%	3.13%	448
Seattle-Tacoma-Bremerton, WA	68.68%	6.42 %	16.60 %	3.02%	3.40%	1.89%	265
San Diego, CA	73.81%	8.10 %	11.90 %	3.81%	1.90%	0.48%	210
Phoenix-Mesa, AZ	95.02%	0.50 %	1.49%	1.49%	1.00%	0.50%	201

Consumer Units with One or More Vehicles -

Primary Sampling Unit	None Reported	$1 $4.99	$5 $24.99	$25 $49.99	$50 $149.99	$150 or more	Sample Size
Philadelphia-Wilmington-Atlantic City, PA – NJ – DE – MD	66.89%	4.78 %	13.99 %	6.83%	6.48%	1.02%	293
Boston-Brockton-Nashua, MA – NH – ME – CT	61.05%	5.81 %	17.73 %	5.81%	5.52%	4.07%	344
New York, NY	60.29%	9.31 %	11.27 %	5.39%	5.88%	7.84%	204
New York, Connecticut Suburbs	71.91%	2.91 %	11.14 %	4.60%	7.26%	2.18%	413
New Jersey Suburbs	84.97%	1.73 %	4.62%	1.16%	2.02%	5.49%	346
Chicago-Gary-Kenosha, IL-IN-WI	75.18%	1.28 %	11.86 %	4.38%	4.20%	3.10%	548
Detroit-Ann Arbor, MI	77.61%	5.60 %	7.46%	4.10%	2.99%	2.24%	268
Cleveland-Akron, OH	80.00%	5.81 %	6.45%	5.16%	2.58%	0.00%	155

Minneapolis-St. Paul, MN – WI	59.90%	7.81 %	20.83 %	5.21%	2.60%	3.65%	192
Washington, DC – MD – VA –WV	65.30%	6.72 %	10.82 %	8.58%	4.85%	3.73%	268
Baltimore, MD	82.52%	1.40 %	8.39%	2.80%	2.80%	2.10%	143
Dallas-Ft. Worth, TX	83.82%	6.47 %	5.50%	1.62%	1.29%	1.29%	309
Houston-Galveston-Brazoria, TX	60.61%	9.09 %	21.97 %	1.89%	5.30%	1.14%	264
Atlanta, GA	80.97%	4.85 %	9.33%	3.36%	0.37%	1.12%	268
Miami-Ft. Lauderdale, FL	91.71%	1.66 %	4.97%	0.55%	1.10%	0.00%	181
Los Angeles-Orange, CA	69.93%	4.90 %	13.56 %	4.90%	4.90%	1.80%	612
Los Angeles Suburbs, CA	87.17%	1.33 %	7.08%	2.65%	0.88%	0.88%	226
San Francisco-Oakland-San Jose, CA	57.80%	4.86 %	15.09 %	8.44%	10.23%	3.58%	391
Seattle-Tacoma-Bremerton, WA	63.18%	7.73 %	20.00 %	2.73%	4.09%	2.27%	220
San Diego, CA	71.73%	8.38 %	13.09 %	4.19%	2.09%	0.52%	191
Phoenix-Mesa, AZ	94.77%	0.58 %	1.16%	1.74%	1.16%	0.58%	172

Appendix C: Potential Research Agendas -

Option A: Out-of-Pocket Parking Costs

Currently, no national data set offers information on out-of-pocket parking costs at a geographic scale matching the LAI. Although some local parking datasets offer greater insight into locational cost variations, they tend to focus on individual parking categories, such as multifamily residential parking (e.g., King County's Right Size Parking Project) or metered street parking (e.g., San Francisco's SF*park* program[4]). Moreover, these data sets focus on prices associated with parking spots rather than specifically on household spending.

Due to the lack of appropriate data, generating parking cost estimates for households at a neighborhood level requires substantial new research and analysis. Short of surveying a large, national sample of households on their parking expenses, a method for modeling costs must be developed based on existing data on parking prices, supply and utilization.

Project Timeline

The scope of the work necessary to assess data resources, and develop and test a parking cost model is quite extensive and would likely take a minimum of 12-18 months to complete.

Research Team

A mix of academic and practitioner experts experienced in parking cost analysis as well as econometric modeling would need be needed to compile and effectively analyze available parking data. These experts would best be suited to identify and process available national and local parking data, and to develop a modeling methodology to estimate household parking cost.

Scoping and Data Collection

In consultation with field and federal agency experts, the best available data sources for residential and commuter parking costs would be identified and assembled. Sources would need to be selected based on the inclusion of pricing or cost data, the level of locational detail, and an array of different demographic and built environment characteristics. As available data suggests that out-of-pocket spending on parking in non-urban areas is typically close to zero, the scope of analysis may need to be limited to metropolitan areas, or those metros meeting a certain population threshold requirement.

Residential Parking Cost Model

Once data sets have been compiled, available residential parking cost data (including unbundled on-site parking, street parking, private parking, etc.) could be regressed against a range of potential explanatory variables such as residential density, median gross rent, median

[4] The SF*park* Program is a San Francisco Municipal Transportation Agency (SFMTA) initiative that adjusts meter and garage pricing up and down to match local parking demand. More information on the program may be found at sfpark.org).

income, etc. available at the Census Block Group level. A model would then be developed to estimate residential parking costs based on neighborhood factors that correlate most strongly with costs.

Commuter Parking Cost Model

The cost of commuter parking could be modeled based on neighborhood characteristics in a fashion similar to the residential model. However, for the commuter parking cost model, costs would need to be associated with the characteristics of the areas to which residents of a given block group commute, as recorded in the LODES dataset, CTPP or other appropriate source. A weighted average of the estimated parking costs in these destination block groups could then be calculated to represent the average cost of commute parking for resident households.

Incorporating Out-of-Pocket Parking Costs into the LAI

Because LAI estimates represent average out-of-pocket costs, parking cost estimates reflecting out-of-pocket spending could be added to the transportation costs as they are currently reported without significant changes to the structure of the index. These costs could either be reported as additional costs or simply used to calculate total transportation cost estimates. However, because the transportation cost estimates are modeled for a range of household types in the LAI, additional analysis of the relationship between household characteristics and parking spending would be necessary to align parking estimates with household types.

Option B: Imputed Parking Costs

To date, although a substantial amount of research has focused on bundled parking costs, most efforts have failed to indicate how these costs impact individual households. Determining imputed parking costs for inclusion in the LAI would require substantial additional research to determine which costs could realistically be captured and how they could be integrated into the tool.

Project Timeline

A full-scale research effort to identify and document bundled parking costs, and develop a method for incorporating them into the LAI would likely take 18-24 months.

Research Team

A research team of experienced academic and practitioner transportation planners, experts and modelers would be needed to analyze bundled parking costs. The analysis would require a complete review of existing research to determine what new research and data sources would be required, as well as to develop a methodology for associating these costs with households in different locations.

Typology-Based Approach

The cost of a parking space is generally a function of the cost of the real estate it occupies. One approach to separating imputed parking costs from total housing cost would be to research and develop simplified estimates based on built environment characteristics and apply these typologies to all block groups covered within the LAI. The type of parking found in various block groups could be analyzed based on specific built environment characteristics and a corresponding cost factor for that type of parking space could be applied

Modeling Approach

Alternatively, a model could be developed to estimate parking availability as a function of housing type and year built, density and other housing characteristic and location variables. Models that provide some insight on how this might be done have been developed for New York City (Weinberger, 2012, McDonnell et al. 2011) and for King County (Right-Size Parking), though it is unclear how effectively these models could be applied in other regions. Simple estimation models using census data and the American Housing Survey (i.e., questions regarding whether parking is included in the rent or sales price of a home) could also be developed. Once the number of spaces in a dwelling is estimated, the added cost to housing could be independently calculated (unbundled) and listed as a parking cost (Jia and Wachs provide one potential approach). This approach could also use prices in markets where unbundling has been successful to proxy the portion of housing costs related parking. A more complex analytical approach would take into account available commercial rates from data sets such as the Colliers and National Parking Association parking cost surveys.

Employer Parking

Although not reflected in any consumer spending category, costs associated with employer-subsidized parking are effectively passed on to households in the form of lower wages. In places where parking benefits are cashed out, allowing employees to convert their parking privileges to a higher effective wage, this impact is made explicit. However, since it does not fit with either the housing or transportation costs currently reported, it is not clear how the cost of employer-subsidized parking would be reported in the LAI.

Incorporating Imputed Costs in the LAI

In cases where residential parking is part of the property, such as a driveway, garage in a single family home, or parking lot for residents of a multifamily development, imputed parking costs will already be included in current LAI housing cost estimates. To determine these costs, LAI housing cost estimates could be adjusted to reflect the actual cost of residential parking, either in the form of distinct parking cost estimates, or higher transportation cost estimates. A methodology for including other bundled costs, such as the cost of employer-provided parking would have to be determined as part of the research effort.

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