Work-related expenses in the Supplemental Poverty Measure

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Introduction

In November of 2013 the Census Bureau released the third report on the Supplemental Poverty Measure (SPM) that followed suggestions from an Interagency Technical Working Group on Developing a Supplemental Poverty Measure (ITWG) for a new measure that would supplement the current official measure of poverty.[1] This report represented a joint effort between the Census Bureau and the Bureau of Labor Statistics (BLS). BLS has responsibility for developing expenditure-based SPM poverty thresholds using the Consumer Expenditure Survey (CE). The Census Bureau then calculates geographic adjustments for the thresholds and estimates poverty statistics using the Current Population Survey Annual Social and Economic Supplement (CPS). Both the BLS and the Census Bureau are tasked with conducting research on methodological improvements to various components of the SPM.

In March of 2010, the ITWG listed suggestions for a new measure that would supplement the current official measure of poverty. The ITWG was charged with developing a set of initial starting points to permit the Census Bureau, in cooperation with the BLS, to produce the SPM that would be released along with the official measure each year. Their suggestions included:

- The *SPM thresholds* should represent a dollar amount spent on a basic set of goods that includes food, clothing, shelter and utilities (FCSU), and a small additional amount to allow for other needs (e.g., household supplies, personal care, non-work-related transportation). This threshold should be calculated with five years of expenditure data for families with exactly two children using CE data, and it should be adjusted (using a specified equivalence scale) to reflect the needs of different family types and geographic differences in housing costs. Adjustments to thresholds should be made over time to reflect real change in expenditures on this basic bundle of goods at the 33rd percentile of the expenditure distribution. (See Table **1** below)

- *SPM family resources* should be defined as the value of cash income from all sources, plus the value of in-kind benefits that are available to buy the basic bundle of goods (FCSU) minus necessary expenses for critical goods and services not included in the thresholds. In-kind benefits include nutritional assistance, subsidized housing, and home energy assistance. Necessary expenses that must be subtracted include income taxes, Social Security payroll taxes, childcare and other work-related expenses, child support payments to another household, and contributions toward the cost

[1] For information, see ITWG, *Observations from the Interagency Technical Working Group on Developing a Supplemental Poverty Measure* (Interagency), March 2010, available at <www.census.gov/hhes/www/poverty/SPM_TWGObservations.pdf>, accessed September 2011.

of medical care and health insurance premiums, or medical out-of-pocket costs (MOOP). (See Table 1 below)

Table 1. Poverty Measure Concepts: Official and Supplemental

	Official Poverty Measure	Supplemental Poverty Measure
Measurement Units	Families and unrelated individuals	All related individuals who live at the same address, including any coresident unrelated children who are cared for by the family (such as foster children) and any cohabitors and their relatives (SPM Resource Units)
Poverty Threshold	Three times the cost of minimum food diet in 1963	The 33rd percentile of expenditures on food, clothing, shelter, and utilities (FCSU) of consumer units with exactly two children multiplied by 1.2
Threshold Adjustments	Vary by family size, composition, and age of householder	Geographic adjustments for differences in housing costs and a three parameter equivalence scale for family size and composition
Updating Thresholds	Consumer Price Index: All items	Five year moving average of expenditures on FCSU
Resource Measure	Gross before-tax cash income	Sum of cash income, plus in-kind benefits that families can use to meet their FCSU needs, minus taxes (or plus tax credits), minus work expenses, minus out-of-pocket medical expenses

The ITWG stated further that the official poverty measure, as defined in Office of Management and Budget (OMB) Statistical Policy Directive No. 14, will not be replaced by the SPM. They noted that the official measure is sometimes identified in legislation regarding program eligibility and funding distribution, while the SPM will not be used in this way. "The SPM is designed to provide information on aggregate levels of economic need at a national level or within large subpopulations or areas…" and, as such, "…the SPM will be an additional macroeconomic statistic providing further understanding of economic conditions and trends." In addition to specifying the nature and use of the SPM, the ITWG laid out a research agenda for many of the elements of this new measure. They stated:

> *As with any statistic regularly published by a Federal statistical agency, the Working Group expects that changes in this measure over time will be decided upon in a process led by research methodologists and statisticians within the Census Bureau in consultation with BLS and with other appropriate data agencies and outside experts, and will be based on solid analytical evidence.*

Among the elements designated by the ITWG for further development were in-kind benefits in the thresholds, geographic adjustments for price difference across areas, work related expenses other than childcare and medical out-of-pocket expenses. The ITWG based its suggestions on earlier National

Academy of Sciences (NAS) recommendations (Citro and Michael, 1995) for improving the current official poverty measure. The ITWG noted that work expenses include both standard expenses associated with commuting as well as childcare. These expenditures can be thought of as subtractions from earnings, and they should be accounted for in order to calculate a "net wage" that indicates the resources families actually have to spend from their work income on the basic needs defined in the thresholds. The decision to subtract work-related expenses on the resource side of the poverty measure reflects the concern of the NAS panel that the official poverty threshold was not adequately distinguishing between working and nonworking families, and was further motivated by their concerns regarding the difficulty of creating additional thresholds based on this distinction. (Measuring Poverty: A New Approach. p 240)

Out-of-pocket expenses for childcare are collected with new questions added to the CPS ASEC in 2010. For other work expenses, the group suggested the Census Bureau investigate the comparative advantages of trying to measure actual expenses versus assigning an average amount to all working adults. Measuring actual work expenses is preferable if other work expenses are highly variable across families (Observations from the Interagency Technical Working Group on Developing a Supplemental Poverty Measure. March 2011. p 6).

Going to work and earning a wage often entails incurring expenses, such as travel to work and purchase of uniforms or tools. For work-related expenses (other than childcare) the NAS panel recommended subtracting a fixed amount for each earner 18 years of age or older. Their calculation was based on 1987 Survey of Income and Program Participation (SIPP) data collected on work expenses in a set of supplementary questions. The SIPP collects information on work-related expenses from people who had at least one employer, or owned their own business, in the reference period. Three types of expenses are identified by the SIPP:

- annual work-related expenses, such as union dues, licenses, permit, special tools, or uniforms
- the number of miles usually driven to and from work in a typical week, for people who do some driving to work (the IRS federal reimbursement rate for mileage is used to convert mileage to expenses)
- other expenses incurred in getting to and from work, such as bus fares or parking fees, in a typical week

The NAS panel calculated 85% of median weekly expenses —$14.42 per week worked for anyone over 18 in the family in 1992. Total expenses were obtained by multiplying this fixed amount by the number of weeks respondents reported working in the year. The NAS panel argued that, since many families make other sacrifices to minimize work expenses (e.g., move near work, work opposing shifts) and these other costs would not be reflected in reported expenses, it would be better to use a fixed dollar amount. The most recent available data are used to calculate median weekly expenses for updating the SPM. Estimates for the CY 2011 SPM used data from Wave 10 of the 2008 Panel of SIPP. The number of weeks worked, reported in the CPS ASEC, is multiplied by the 85% of median weekly work-related expenses for

each person to arrive at annual work-related expenses. The ITWG suggested that further research on this topic and a refinement of methods would be valuable.

Another aspect of calculating transportation expenses in the SPM was raised by comments in response to a Federal Register notice concerning the new measure.[2] There was concern that transportation costs vary with different geographical areas, including urban/rural, cross metropolitan, and transit-rich/non-transit-rich areas as do commuting expenses for mass transit/personal vehicle usage, as well as access to public transportation, and/or vehicle availability. The suggestion has been made that commuting costs may vary across geographic areas and should be considered in addition to housing costs when constructing geographic adjustments. Transportation costs have been shown to vary considerably across geographies such as regions, state, and even neighborhoods,[3] which is expected given the variation in available travel modes, average distance traveled, gas prices, congestion, vehicle maintenance and other factors across the U.S.

Rapino et al. (2011) addressed this topic. Their research examined the appropriateness of applying a flat amount, the federal mileage reimbursement rate, for commuting costs by investigating geographic variation in average commuting expenses for automobile commuters across 100 urban areas, regions, and divisions, as defined by the U.S. Census Bureau. They used two methods: (1) state gas prices and (2) federal mileage reimbursement rate to value mean travel time data from the ACS with average speed estimates for different urban areas. This research found that these two methods produce significantly different cost estimates and that there is significant geographic variation in commuting costs when state level gas prices are used for the calculation.

This paper will take advantage of information derived from several ACS questions related to the work commute and work schedule to describe and analyze alternate methods of estimating commuting costs. Section 1 describes the current method using the SIPP in more detail and evaluates the use of an assigned median costs vs. using actual reported expenses. Section 2 uses the ACS to investigate alternate cost calculations based on geographic variation in commuting patterns. Section 3 describes the SPM for calendar year (CY) 2011 using the current SIPP based deduction and then calculates an alternate measure that incorporates the ACS based method. Poverty estimates using the two methods are compared and evaluated. Section 4 concludes.

Current Methodology

In the CY 2011 SPM report, the supplemental poverty rate was calculated at 16.1 percent for the nation. If these calculations were to exclude the deduction of work-related expenses from individual's income, the poverty rate would have been reduced to 14.4 percent. The only resource subtraction to have a

[2] *Federal Register* notice (Vol. 75, No. 101, p. 29513) was issued on May 26, 2010, soliciting public comments regarding specific methods and data sources in developing the SPM.

[3] For examples, see Consumer Expenditure Survey www.bls.gov/cex/ or The Housing and Transportation Affordability Index <htaindex.cnt.org/>.

larger impact on the SPM in CY 2011, was medical out-of-pocket expenses, which would have reduced the poverty rate to 12.7 percent if not deducted from individuals incomes.[4] As expected, the subtraction of work-related expenses is most impactful for individuals aged 18-64 who experienced larger increases in their poverty rates after subtracting their work-related expenses from their income compared to children or individuals aged 65 and older.[5]

As shown in Appendix Table A - 1 median weekly work-related expenses in CY 2010 were $32.00, increasing to $37.30 in CY 2011. In both calendar years, driving costs made up the majority of these reported median expenses. Driving costs in the SIPP are derived from survey respondents reported weekly miles driven to and from work.[6] Total weekly work-related miles driven are reported for all individuals who report driving alone to work, and are converted to a weekly costs using the Internal Revenue Services (IRS) standard mileage rate covering the period of 2011. The 2011 IRS reimbursement rate of 53.25 cents per mile accounts for gas, depreciation, insurance, and other fixed and variable costs incurred by driving one's own vehicle.[7]

Driving costs, and subsequently calculated total weekly work-related expenses are highly skewed to the right due to the presence of some extreme outliers in reported miles driven per week. (See Appendix Table A - 1)

Alternate Calculations of Work-Related Expenses using the SIPP: Comparing the Overall Population Median to Actual Reported Amounts

It has been suggested that the use of an overall population median when subtracting work-related expenses may be masking significant differences in work expenses across different groups within the employed population. Given the demonstrated impact that work-related expenses have on SPM estimates, this research revisits the ITWG recommendation to investigate the comparative advantages and disadvantages of measuring actual expenses verses a median amount for all working aged adults.

Our analysis of work-related expenses as calculated in the SIPP will attempt to answer the question of 1) How much discrepancy exists between individuals' self reports and their assigned expenditure values? 2) What components of work-related expenses are most responsible for driving these differences? and 3) Is it possible to better assign work-related expenses based on individual or geographic characteristics?[8]

[4] The percentage point change in the CY2011 SPM after subtracting work-related expenses was not statistically different from the percentage point change when subtracting Social Security payroll taxes (FICA).

[5] Short, Kathleen S. "The Research Supplemental Poverty Measure." U.S. Census Bureau, Current Population Reports, P60-241. Washington, DC: U.S. Government Printing Office.

[6] Reported miles driven in a week cover all work-related commuting across all jobs within a reference period.

[7] The IRS standard mileage rate was 51.0 cents from January to June of 2011, and increased to 55.5 cents from July to December of 2011. This research uses an average over those two periods (53.25 cents) to assign driving costs. See http://www.irs.gov/uac/IRS-Increases-Mileage-Rate-to-55.5-Cents-per-Mile.

[8] In this application, the deduction for work-related expenses is not functioning as an estimator, but as an assigned deduction irrespective of person-level characteristics. This research will evaluate that deduction as an estimator, in order to evaluate

In answering these research questions, we utilize variables available in both the SIPP Core File and the SIPP Work-Related Expenses Topical Module. However, given that work-related expenses as calculated through the SIPP are then used to determine expenses of individuals and families interviewed in the CPS, when implementing changes to the calculation of the SPM based on this research, we are limited to calculating medians based on variables available in the CPS.

Residuals Analysis: Differences between Reported and Assigned Costs

In CY 2011, the median reported weekly work-related expenses for individuals who were aged 15 and older and reported working or owning a business in the reference period was calculated as $37.30. In calculating the SPM, we assign all individuals' weekly work-related expenses at the 85th percent of the median, in CY 2011 this was calculated as $31.70.

One way to assess our current methodology is to investigate how individuals' self-reported weekly work-related costs differed from their assigned values of $31.70. In this paper, we refer to the difference between an individual's reported and assigned weekly work-related expenses as their residual costs, although this differs from the statistical interpretation of the term. Given that the current deduction for work-related expenses reflects a percentage of the median, we do not expect residuals calculated under the current methodology to average to 0, however, this research hopes to provide some insight on how our currently assigned deductions vary from reports of incurred expenses.

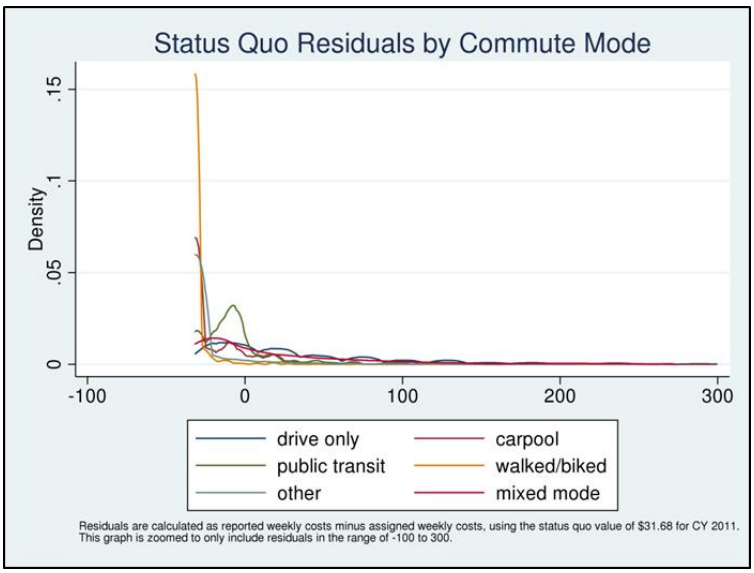
In Appendix Table A - 2 we report mean residual values calculated by subtracting individuals' assigned weekly cost of $31.70 from their reported weekly costs. Looking at various demographic and geographic groups allows us to assess 1) if individuals' reported values differ from their assigned values, and 2) if so, in what direction and magnitude we may be over or underestimating their costs when calculating their resources in the SPM.

For the average working adult, our current methodology understates weekly work-related costs by $29.20. (Appendix Table A - 2) We also find differences in calculated residuals by a variety of characteristics as shown in Appendix Table A - 2, notably commute mode, where we see large differences based on the mode of transportation used to get to and from work. For individuals who report driving their own vehicle to work, we are currently underestimating weekly work-related expenses by an average of $40.40, while for individuals who report walking or biking to work, we are overestimating weekly work-related expenses by an average of $28.00. Figure 1 below shows that the overestimation we find for alternative commute modes is due to large clustering among individuals who report no expenses, but who are still assigned a weekly cost of $31.70. Somewhat surprisingly, we see

how well this assigned deduction reflects reported costs at the person-level. Additionally, this research is primarily concerned with improving the assignment of work-related expenses. To whatever extent the current work-related expense deduction is capturing the trade off in housing to commute costs is not of primary focus in this research.

limited clustering in the density of the residuals for individuals who report driving alone or taking mixed modes of transportation, illustrating the highly variable reports of weekly mileage among drivers.

Figure 1. CY 2011, Status Quo Residuals by Commute Mode



Source: U.S. Census Bureau, Survey of Income and Program Participation, 2008 Panel. For information on confidentiality protection and sampling and nonsampling error, see <http://www.census.gov/sipp/source.html>.

Considering that 80.5 percent of individuals who reported working or owning a business in the SIPP Wave 10 Topical Module commuted by driving alone to work, underestimating work-related expenses by an average of $40 a week for this population leads to concerns that we may be misassigning poverty status for a number of families. This concern is particularly pronounced for those families with two workers who both commute by driving alone to work.

When we move from looking at how residuals are distributed across demographic and geographic characteristics to evaluating how component expenses drive these differences, we find that driving costs are responsible for 94 percent of the person-level variation we see across reported and assigned weekly work-related costs. When looking at the discrepancy between reported and assigned expenses, very little of the person-level variation is explained by other costs components. (See Table 2 below)

Table 2. CY 2011, Regression output of cost components on residual total weekly work-related expenses

Variables	(1)	(2)	(3)	(4)
Driving	1.016***			
	(0.002)			
Transit		0.578***		
		(0.054)		
Parking/Tolls			1.553***	
			(0.113)	
Other Expenses				1.176***
				(0.046)
Constant	-28.82***	27.55***	26.94***	27.11***
	(0.177)	(0.487)	(0.462)	(0.462)
Observations	30,915	38,064	38,064	38,064
R-squared	0.94	0.018	0.061	0.033

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Alternate Median Calculation by Subpopulation Characteristics in the SIPP

Given the evidence that calculating an overall population median is masking key differences in work-related expenses across subpopulations, one easily implemented alternative would be to calculate medians by subpopulation groups in an effort to improve work-related expenses as assigned for the SPM.

We run a series of quantile regressions to determine whether reported median costs vary based on a variety of individual, family, and geographic characteristics. We run each quantile regression model calculating median weekly total work-related costs, as well as for each component work-related cost (i.e., driving, parking, transit, and other expenses). See Appendix Table A - 3 for a comprehensive listing of model iterations and regressors used.

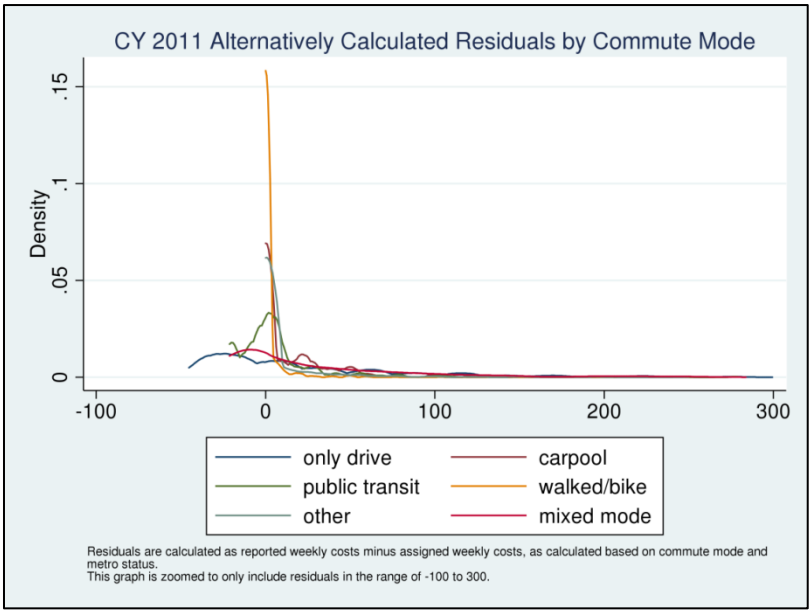
As expected, our current methodology of assigning median total expenses without any dependent variables provides very poor model fit, with an R-squared value of 0.00. We find that commute mode provided the highest performing single variable model while the interaction of commute mode and metro status provided a slightly higher R-squared value, with both rounding to 0.11.

We then use the medians calculated based on commute mode to assign weekly work-related costs at 85 percent of the median for a given subpopulation.

As shown in Figure 2 below, we find that moving from an overall median to a subpopulation specific median based on commute mode drastically improved residual fit for individuals who commute by walking/biking, carpooling, or taking other transport modes. Assigned medians for each of these commute modes round to $0 a week in CY 2011 regardless of metro status. This again illustrates that one of the largest issues we face in assigning work-related expenses is accounting for individuals who

have no work-related costs. Under the commute mode costs model we also see improved clustering around zero for individuals taking public transit, but continue to see widely dispersed residuals for individuals who commute by car or mixed modes.

Figure 2. CY 2011 Alternative Residuals by Commute Mode



Source: U.S. Census Bureau, Survey of Income and Program Participation, 2008 Panel. For information on confidentiality protection and sampling and nonsampling error, see <http://www.census.gov/sipp/source.html>.

Based on this initial analysis, the key challenge in assigning work-related expenses at an individual level comes down to identifying 1) whether an individual had such expenses, and 2) if so, how to better assign driving costs given that driving expenses are a key component of total expenses and the primary driver of person-level variance.

Determining the probability and amount of work-related expenses in the SIPP

We find that 88.5 percent of all individuals who reported working or owning a business in the SIPP Wave 10 Topical Module reported some form of work-related expense.

In trying to determine the probability of having work-related expenses, we run a series of logit regressions on a binary flag indicating whether a respondent reported any work-related expenses. We find that assigning probabilities by commute mode provide the highest single variable model pseudo R-squared value, with a pseudo R-squared value of 0.63.[9]

[9] In comparing pseudo R-squared values across logit models we use McFadden's adjusted R-square value.

As we have shown above, much of the improved performance in our assignment of median work-related expenses is derived from assigning zeros to populations that use low cost commuting modes such as walking or carpooling. However, even with improved cost assignment among these populations, individuals who drive or used mixed commuting modes make up 81.2 percent of individuals who reported working or owning businesses in the Wave 10 SIPP topical module. Figure 2 above shows that even when assigning medians by commute mode, high variability exists across reported and assigned costs for these population groups.

To gain a better understanding of how we may be able to explain this variation, we run the same series of quantile regressions used to estimate medians by subpopulation, but limit our sample to only those individuals who reported costs. We find that once we remove individuals who reported zero work-related expenses from our sample it becomes very difficult to model median weekly work expenses by individual or geographic characteristics. When looking at total work-related expenses, none of the variables or interactions listed in Appendix Table A - 3 provide an R-squared value greater than 0.05. When looking explicitly at driving costs, we find that the best fitting model provides an R-square value of 0.03, based on the interaction of state and city/urban code. When assigning driving costs at 85 percent of the median for those with reported miles driven as calculated by state and city/urban code, we continue to underestimate driving costs for the average person who drove to work by $28.10 and for mixed mode commuters by an average of $7.70.

Conclusions and Limitations from the SIPP

Section 1 of this report provides a starting point for evaluating discrepancies across individual's reported work-related expenses and our assigned deduction across a variety of characteristics. We find that gas costs (calculated based on reported mileage) are a key driver of differences across reported and assigned costs, and that assigning work-related deductions based on commute mode may provide a closer estimation of individuals reported actual expenses, particularly among individuals who walk/bike to work, carpool, take public transit, or commute by some other way. However, a critical limitation to implementing a new cost assignment strategy in calculating the SPM is the availability of variables in the CPS survey. Given that respondents in the CPS do not report their commute mode, we are unable to conditionally assign costs for the SPM based on this characteristic.

Additionally, we found limited opportunities for improving our cost estimates among drivers, who make up approximately 81 percent of commuters captured in the SIPP. None of the regressors used in this analysis provided strong predictive power in estimating mileage driven, which is the largest driver of variance across reported and assigned costs. Predicting costs based on state and city/urban codes showed some limited improvements in mileage/gas cost estimation, but we are limited in using the SIPP given the small survey sample size among sub-state geographies.

Experimental Commuting Cost Analysis Using the ACS

The Bureau of Labor Statistics reports that about 18 percent of U.S. household expenditures are devoted to transportation-related costs (BLS 2012). A complex set of factors contribute to transportation costs for individuals and families, and these may vary considerably across places. It is this variation that this experimental work aims to capture. This section presents a measure of average commuting costs for workers in several specific large U.S. metropolitan areas, along with regional cost breakdowns by metropolitan and non-metropolitan status.[10] In its approach to measuring commuting costs, this project takes advantage of the information collected from the American Community Survey (ACS), an ongoing survey conducted annually by the U.S. Census Bureau.[11] The ACS captures changes in the demographic, social, and economic characteristics of communities across the United States and Puerto Rico.[12] [13]Its periodicity, national scope, and uniformity across years make it ideal for measuring changes in average household expenses relevant to the SPM.

For automobile commuters, who make up about 86 percent of all workers as measured in the ACS,[14] daily commuting costs might include automobile maintenance, insurance, parking, tolls, gas, and other miscellaneous expenses. For transit riders, about 5 percent of all workers as measured in the ACS,[15] transit fare is the primary expense. The automobile is the predominant commute mode in the U.S., but transit plays an important role in the overall transportation mix, particularly in large cities. Commuting cost assessments should reflect geographic variation in the contribution of these factors to the extent that available data allows. Among the many components of commuting costs, some are more difficult to measure than others, yielding any approach to capturing real commuting costs a compromise of data availability and accuracy.

Data and Methods

A measure of commuting costs should be easy to replicate, transparent, and should reflect changes in the social, economic, and built environment characteristics that influence commuting patterns across

[10] *Workers* are civilians and members of the Armed Forces, 16 years and over, who were at work the previous week. Persons on vacation or not at work the prior week are not included.

[11] For more information on the ACS, see www.census.gov/acs/www/.

[12] The ACS uses a series of monthly samples to produce annual estimates. Detailed questions that previously appeared on the Decennial Census long form are now included in the ACS, and the Decennial Census is now limited to producing a count of the nation's population and a snapshot of its most basic demographic characteristics. Five years of ACS data collection are necessary to achieve a cumulative sample large enough to ensure respondent confidentiality for smaller communities and for small geographies such as census tracts or block groups.

[13] Puerto Rico is not included in this analysis.

[14] Source: U.S. Census Bureau, American Factfinder 2011: Table S0801.

[15] Source: U.S. Census Bureau, American Factfinder 2011: Table S0801.

places and time. Although not without its limitations, an ACS-based commuting cost measure may meet all of these criteria. The ACS asks respondents in the workforce about several aspects of their commute. The strengths of the ACS are rooted in the geographic flexibility afforded by its large national sample. It does not directly ask about commute distance, but captures information on the home and workplace location of each worker at the census block level, allowing for an approximation of commute distance. People who worked at more than one location during the survey reference week are asked to report the location at which they worked the greatest number of hours. For automobile commuters, the travel distance between the home and workplace plays an important role in determining variation in commuting costs. Knowledge of the specific transit modes provides a key piece of information about transit commutes. The ACS provides this information for small geographies, making it possible to arrive at a rough estimate of automobile commuting cost by multiplying the distance traveled by a fixed mileage reimbursement rate, and transit commuting cost by applying a fixed average transit fare for individual travel modes. Both types of costs are applied at the individual worker level.[16] No cost is assigned to workers who commute by walking or bicycle which account for just over 3 percent of all workers as captured in the ACS.[17,18]

This analysis uses information about respondents' principal workplace location and travel mode to work from the ACS 2007-2011 5-year pooled sample. Individual worker records are used to derive average annual commuting cost estimates for several large metropolitan areas within the United States and for the remainder of the population within each state separated by metropolitan (the metro areas that were not calculated individually) and non-metropolitan areas. Metropolitan areas for which costs are calculated separately are those large enough to be included in the CPS public data file, or 264 metro areas. In addition to an average cost for all workers, separate commuting cost estimates are presented for workers who commute by automobile,[19] and workers who commute by using public transportation. The 5-year ACS multiyear data affords a much larger sample than the single-year ACS data and yields estimates with smaller margins of error than those associated with single-year data. This is particularly important for small metro areas and non-metropolitan areas, where small sample sizes may be associated with larger margins of error.

The initial sample is restricted to workers 16 years of age and older who did not work at home. Workers who reported primarily working from home were omitted due to the ambiguity associated with assigning them a commuting cost. The ACS edit procedure geographically codes workplace locations down to the block level when possible. When this is not possible due to insufficient address information, respondents' workplace location is coded to the place level. For automobile commuters, the cost estimate presented is based on ACS worker records for which workplace block has been determined, which includes about 78 percent of all worker records. Among workers with known workplace block locations, those who reported commuting more than 75 miles one-way by automobile were considered

[16] Workers who commute by motorcycle are treated as automobile commuters and taxi commuters are given a fixed cost of $10 one-way.

[17] Source: U.S. Census Bureau, American Factfinder 2011: Table S0801.

[18] The analysis does not include people who work from home, which included 4.2 percent of all workers in the 2007-2011 ACS.

[19] Defined as car, truck, van, and motorcycle.

extreme outliers and were omitted.[20] [21] The final eligible sample of workers includes 104,055,835 workers from the 2007-2011 ACS 5-year data.

For workers who commuted by automobile, cost estimates are calculated based on the round trip distance travelled and the 2011 IRS mileage reimbursement rate (53.25 cents per mile).[22] Travel distance for automobile and transit commuters is calculated using a straight line (Euclidean) measure of the distance between the residence block centroid and the workplace block centroid.[23] Euclidean distance measures underestimate the distance between two points because people do not travel in straight lines. For this analysis, a conservative inflation factor of 10 percent is applied to commuting distance. For people who carpooled by automobile, the cost of travel is divided by 2, the most common number of persons per vehicle among multiple occupancy vehicles. The formula for annual automobile commuting cost takes the following form:

$$Daily\ round\ trip\ commuting\ cost\ for\ individual\ automobile\ commuter = (Oneway\ distance) \times 2 \times (Distance\ inflation\ factor\ of\ 1.1) \times (milage\ reimburselemt\ rate\ of\ 53.25\ )$$

[20] Among these outliers are cases where the worker reported a workplace location several hundred miles away from their residence location. Atypical work scenarios such as conference trips may explain such cases.

[21] This eliminated about 1.0 percent of the eligible sample. Does not include workers who worked at home.

[22] Although these estimates use the IRS reimbursement rate, which is calculated as a standard national rate, Rapino et al. (2011) found that there is significant geographic variation in commuting costs when state level gas prices and average speed estimates are used to calculate mileage reimbursement rates.

[23] The use of Euclidean distance rather than a street network-based measurement presents advantages and drawbacks. An advantage lies in its simplicity and ease of replication. It also makes no assumptions about which roads commuters use to travel to work, information that is not possible to obtain through surveys on a large scale and difficult to simulate. Its drawbacks are primarily related to its inability to account for the many nuances of real-world street network travel (turns, congestion, stop lights, etc.).

Table 3. One-way Cost Associated with Non-Private Vehicle Travel Modes

Travel Mode	One-Way Cost Estimate
Bus*	$1.50
Subway, Light Rail, and Elevated Rail*	$1.88
Commuter and Long-Distance Rail*	$6.00
Ferry*	$1.94
Taxi	$10.00
Walk	$0
Bicycle	$0

*Source: American Public Transportation Association

*Walking and bicycle commuting assigned no cost

The pricing structure for transit usage is difficult to capture, as it varies across public transportation markets and across populations (e.g., senior and student fares) and across times throughout the day (e.g., peak travel fares). Some transit systems charge a fixed rate that is not dependent on distance traveled, but other systems such as the Washington, DC Metro system adjust the fare according to trip length. No single database contains transit fare information for all transit systems, but the APTA provides average fare prices for several specific modes of Public Transportation based on a sample of systems from the APTA 2010 Public Transportation Fare Database. The appropriate fixed cost is applied to each worker who reported a given transit mode.

For workers who commuted by transit, one-way transit fares are calculated by applying a fixed cost associated with the specific transit mode reported by an individual worker. The American Public Transportation Association (APTA) provides average transit fares based on information from 234 participating transit agencies.[24] One-way trip costs are doubled for each transit commuter. Table 3 shows the fixed one-way costs associated with transit and other non-private vehicle travel modes.

Average daily commuting costs for a given area reflect the sum of the daily cost for all individual workers divided by the number of workers in a given geographic area. These costs include workers who bicycle or walk to work, who are assigned zero daily expenses. There are important aspects of travel that vary across households, places, and states, but are beyond the scope of this analysis. For example, for automobile commuters, state or regional variation in the price of gas is not reflected, nor is variation in levels of traffic congestion or vehicle fuel efficiency. Tolls and parking are not included in the fixed mileage reimbursement rate. The approach taken here attempts to capture a snapshot of typical daily commuting costs incurred by workers in a given area. It does not capture potential savings made by taking one travel mode over another or by choosing a particular household location to mitigate commuting costs.

[24] http://www.apta.com/resources/statistics/Documents/FactBook/APTA_2011_Fact_Book.pdf.

Geographic Differences in Commuting Costs

The average daily commuting cost for eligible workers in the sample is $10.33 round trip. This cost varies notably across regions, states, and metropolitan areas due to differences in available commuting modes and commute distance. Due to the high proportion of automobile-based commuters in most metro areas and the higher cost of automobile commuting, the average commuting costs for all eligible workers closely resemble those for just automobile commuters in several automobile-dominated metropolitan areas. Table 4 below shows the regional variation in daily round trip commuting costs by metropolitan and non-metropolitan residential status. To provide insight into the relative weight that each mode has on the region's overall average commuting cost, it shows the percentage of workers in each region who commute by automobile.[25] The Northeast had the lowest level of automobile commuting, at 75.4 percent, while the South showed the highest, at 92.4 percent. Non-metropolitan workers have higher average commuting costs in all regions except the West. Non-metropolitan Southern commuters have the highest average daily commuting costs at $13.23, while non-metropolitan commuters in the West had the lowest daily cost at $8.71. The relatively high commuting cost observed for the South is consistent with findings from the Consumer Expenditure Survey for overall transportation costs, which showed that Southern households spend a greater share of their income on transportation relative to those in other regions.[26] Commuting costs vary more across regions for metropolitan workers than their non-metropolitan counterparts. Perhaps the relatively large size of metropolitan areas and their common characteristics contribute to the smaller variation commuting costs across regions relative to non-metropolitan areas.

Table 4. Regional Variation in Commuting Costs

Regional Variation in Commuting Costs: 2007-2011 ACS											
	Workers who Drove Alone or Carpooled		All Workers			In a Metropolitan Area			Not in a Metropolitan Area		
Region	Percent	Margin of Error	Number of Workers	Daily Round-Trip Cost	Margin of Error	Number of Workers	Daily Round-Trip Cost	Margin of Error	Number of Workers	Daily Round-Trip Cost	Margin of Error
Midwest	91.4	0.1	24,166,438	$10.31	$0.01	19,734,619	$10.14	$0.01	4,431,819	$11.08	$0.04
Northeast	75.4	0.1	20,536,568	$9.66	$0.02	19,172,144	$9.47	$0.02	1,364,424	$12.32	$0.07
South	92.4	0.1	35,536,282	$10.85	$0.01	31,237,971	$10.52	$0.01	4,298,311	$13.23	$0.06
West	87.8	0.1	23,816,547	$10.17	$0.02	22,282,478	$10.27	$0.02	1,534,069	$8.71	$0.06

–Represents or rounds to zero

Estimates calculated by author using 2007-2011 5-year ACS data

The 50 areas among the highest commuting costs varied considerably by population and region (See Appendix Table A - 4), but common characteristics emerged. The list includes several small or medium-

[25] Source: Author's calculation based on 2007-2011 ACS. Includes motorcycle. Workers who worked at home are not included in the calculation.

[26] www.bls.gov/cex/.

sized metro areas that are within a reasonable commuting distance from a larger metro area. Such metro areas include Riverside-San Bernardino-Ontario, CA, Poughkeepsie-Newburgh-Middletown, NY, Stockton, CA, Vallejo-Fairfield, CA and several others. Although smaller metro areas contain distinct economic centers of their own, a large portion of their residents travel relatively long distances to nearby larger metro areas for work. Among workers in the Poughkeepsie-Newburgh-Middletown, NY metro area, about one- third travel to a workplace located outside of their county of residence, including the nearby New York City, NY metro area.[27] Similarly, about 40 percent of workers in the Vallejo, CA metro area travel outside of their county for work, a large portion of whom travel to the nearby San Francisco metro area. Four metro areas have average daily commuting costs of $15.00 or more (Appendix Table A - 4). Very large metro areas such as New York, Los Angeles, or Chicago do not appear among the 50 areas with the most expensive commutes. Workers in such metro areas show relatively high levels of diversity in travel distance and commute mode, including a substantial portion of low-cost public transportation commuters.

Housing and transportation costs are closely related and are often best understood collectively, as consumers make important tradeoffs in one area for gains in the other. Some workers endure long commutes in exchange for optimizing their housing situation. Financial resources, housing choices, and occupational flexibility influence workers' ability to calibrate their commute based on residential and transportation preferences. Workers may face limitations to housing choices due to family arrangements, financial resources, disability, or discriminatory mechanisms in the housing market. Such limitations may increase the commute burden for some households. For example, families with children may encounter a limited supply of affordable housing large enough to accommodate their needs within close proximity to employment centers, prompting a move to an outlying area. Residential segregation patterns also influence commuting patterns by limiting the residential choices of some groups. A rich body of research finds that housing discrimination along lines of race, ethnicity, and national origin has had a considerably influence on the spatial distribution of metropolitan populations in U.S. metropolitan areas (Logan et al. 2010; Parks 2005).

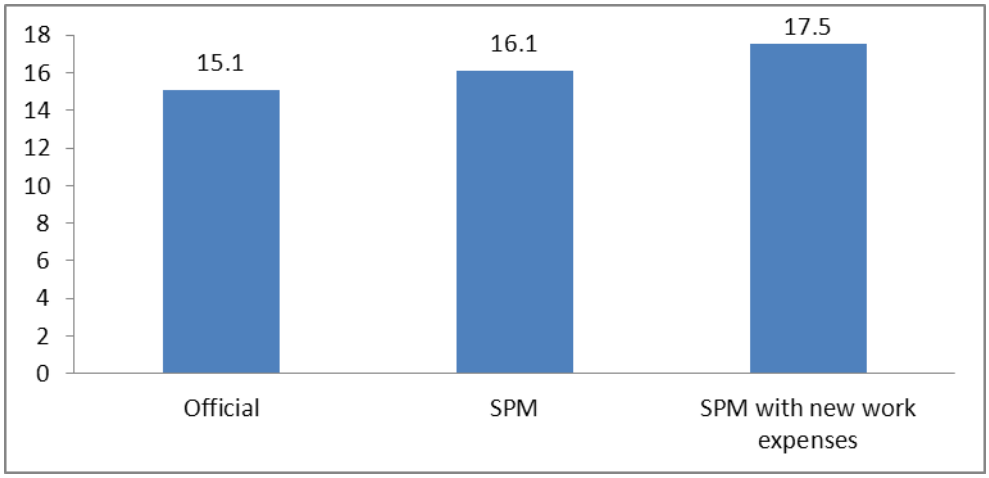
To the extent that individuals and families with similar characteristics cluster spatially within and across metropolitan areas, they might experience similar transportation options. For example, in a low-density largely residential suburb far from the city center, all workers in the community may choose to drive to work, if possible, because automobiles are the most reasonable travel option in such an environment. Similarly, all workers located within a short walking distance to a transit stop may find transit to be most attractive as long as it takes them where they need to go. Differences in housing patterns across population characteristics such as race, age, income, and the like will inevitably shape differences in transportation choices across groups, and therefore differences in average transportation costs. The following section applies geographically adjusted commuting costs to the U.S. working population and shows how geographic adjustments affect poverty rates across several population characteristics.

[27] Source: Census Bureau: Table B08007, 2007-2011on American Factfinder.

Poverty Rates and Composition of the Poor:

The focus of this section of the paper is on the difference in SPM rates when a new measure of commuting costs is used to calculate SPM resources. Figure **3** below shows poverty rates for three measures, the official poverty measure and two SPM measures for 2011. The percent of the population that was poor using the official measure for 2011 was 15.0 percent (DeNavas et al., 2012). For this study, including unrelated individuals under age 15 in the universe, the poverty rate was 15.1 percent.[28] The research SPM using the traditional SIPP calculated work-related deduction of $31.70 a week yields a poverty rate of 16.1 percent for 2011. There were 49.6 million poor using the SPM definition of poverty, more than the 46.6 million using the official definition of poverty with the alternate universe. Using the alternate ACS based method of calculating work expenses in the SPM yields a poverty rates of 17.5 percent representing 54.2 million people.

Figure 3. Comparative Poverty Rates 2011



Source: U.S. Census Bureau, Current Population Survey, 2012 Annual Social and Economic Supplement.

Appendix Table A - 5 shows poverty rates for a variety of selected demographic groups for the two alternatively calculated SPM measures, the SPM as published using SIPP compared to the same measure with ACS calculated commuting costs (details comparing the official measure to the SPM for these groups are found in Short (2012)). For all the groups shown in Appendix Table A - 5, SPM rates were higher using the new ACS based work expenses. There are some groups with greater differences than others. Hispanics and individuals who are not citizens have poverty rates that increase by 3.2 and 3.6 percentage points respectively when moving to an ACS based work-expense subtraction. On the other hand, elderly poverty rates increase by only 0.4 points.

A better way to examine differences is to look at the distribution across subgroups of the poverty populations using the two measures. These are shown in Appendix Table A - 6 for the same groups

[28] The 15.0 and 15.1 rates are not statistically different.

shown in Appendix Table A - 5. Looking at changes in the composition of the poor shows an increase in the proportion of non-elderly adults, Hispanics, homeowners with mortgages, those residing in non-metropolitan areas and in the Midwest, and all workers. Groups with lower representation among the poor with the new measure include the elderly, African Americans, those residing inside central cities and in the Northeast.

Since the new ACS based method of calculating commuting costs varies by geography, while the current SIPP based method does not, our interest is on the effects of SPM rates by geography. As we saw in Table A - 5 and Table A - 6, there are differences by residence and region in the SPM rates and the representation of groups in the poverty populations. We can also look at poverty rates by state. The Census Bureau recommends using the ACS for state-level poverty estimates. With the CPS, the Census Bureau recommends the use of 3-year averages to compare estimates across states.[29] The year 2011 was the first year for which 3 years of SPM estimates were available, however, the ACS based work expenses are only available for one year, 2011.

Discussion and Limitations

No single survey ideally lends itself to measuring commuting costs. Some of the differences in estimated commuting costs between the ACS and SIPP are expected given differences in their sample sizes, collection methods, and other survey properties.

The SIPP survey does a meticulous job of accounting for work-related costs at an individual level. Individuals interviewed in the SIPP can report multiple commute modes as well as the daily costs associated with each mode. Additionally, respondents in the SIPP may report additional expenses not captured in the ACS, such as parking and toll costs as well as larger lump sum work-related costs such as licenses, union dues, special tools, or work-related uniforms.

The largest limitation of the SIPP is its relatively small sample size, consisting of approximately 42,000 households in Wave 1 for the 2008 Panel. Given the limited sample size of the SIPP, predicting costs based geographic characteristics is severely limited, as state estimates from the SIPP are limited to the most populous 5 to 10 states, and reliable sub-state estimates are not available.

The major advantages of the ACS is its periodicity and geographic reach. The ACS provides comparability from year to year, and the availability of individual worker records affords greater geographic specificity when assessing the spatial relationship between the residences and workplace locations. Still, several key pieces of information are not available from ACS data, including information about multi-modal work trips, reported mileage when driving alone, reported costs associated with public transit, teleworking, and non-commute related sources of work-related costs.

[29] See *Current Population Survey, 2011 ASEC Technical Documentation*, www.census.gov/apsd/techdoc/cps/cpsmar12.pdf accessed September 2012.

Additionally, neither the SIPP or ACS provide information on the costs associated with vehicle maintenance, or variation in congestion levels across places, which may also contribute to work-related expenses.

When calculating individual commute costs in the SIPP, workers or those who own their own business report each of the modes by which they commute to work, their reporting options include driving alone, carpooling, public transit, biking/walking, and some other way. Individuals who report driving their own vehicle to work report the miles driven per week and any associated weekly parking or toll costs. Individuals who commute by any other mode are asked to report their weekly costs across all alternate commute modes. All individuals are then asked to report any costs incurred for work-related licenses, union dues, tools, uniforms, etc. In this way, all costs in the SIPP are self-reported, except for gas costs, which are calculated based on self reporting of miles driven.

Conversely, the ACS asks, "How did this person usually get to work last week?" Although commutes may involve multiple transportation modes (e.g., driving to a train station and then taking a train), respondents are restricted to indicating the single travel mode used for the longest distance traveled. ACS respondents may select from one of seven "public transportation" modes, including bus, trolley, streetcar, subway, elevated rail, railroad, or ferry. All ACS-based cost estimates are based on fixed costs associated with individual modes and assigned to individual respondents based on commute mode reported.

The ACS-based commuting cost estimates presented in this paper take advantage of the large ACS 5-year sample size to calculate costs at relatively small geographies, including individual metropolitan areas and non-metropolitan portions of individual states. It also allows for the assignment of costs based on the travel mode of individual workers. For both the ACS and SIPP, workers who drive to work have relatively high commuting costs as a product of miles traveled and the standard federal reimbursement rate for mileage. The ACS-based method illuminates metropolitan-level differences in travel mode usage and how it contributes to differences in commuting costs across regions and population groups. Areas with high proportions of people who drive to work, particularly areas where workers drive long distances, have relatively high average commuting costs, even with outliers removed. Use of the average with the ACS method may explain why commuting cost estimates are slightly higher than those of SIPP, which uses a percentage of the median cost, regardless of the available transit mix of a particular geography.

Workers consider an array of factors when calibrating their most efficient and affordable commute strategy. The characteristics of the work trip are functions of workers' housing choices, neighborhood preferences, job choices, and transportation options, among others. A worker's residential location, including the type of community (e.g., urban, suburban, rural, etc.) may play an important role in determining transportation options. Some workers endure long commutes in exchange for optimizing their housing situation or having access to a certain type of transportation such as rail transit. To the extent that residential patterns may vary along social and economic dimensions such as age, income, job type, race and ethnicity, and presence of children, transportation choices and therefore commuting costs may also vary along similar socio-economic dimensions across labor markets.

Differences in the relative impact of commuting costs on poverty rates across population groups are, in many ways, related to the spatial distribution of the population. For example, people who own their homes and have mortgages experienced a relatively large increase in their poverty rate. This might be expected given that many of the areas where workers face long drives to work and relatively high commuting costs, including several at the top of Table A-4 are likely to be largely suburban communities with relatively high proportions of homeowners. These are also areas with limited public transportation availability. The percentage of the nation's poor living in suburbs has increased in recent decades (Kneebone and Berube 2013). To the extent that the transportation needs of the poor may differ from their more affluent counterparts, the changing spatial distribution of poverty raises important questions about how communities' transportation needs shift over time and how this relates to household expenditures. The geographic breadth of the ACS data makes it possible to detect changes in commuting patterns that may be closely related to changes in demographic patterns.

Because commuting costs are only applied to people in the workforce, the poverty rates for communities with relatively high proportions of people between the ages of 16 and 64 are influenced most. The intersection between age and other demographic variables is an important consideration when assessing the relative impact of the application of commuting costs across population subgroups. For example, after commuting cost is taken into consideration, the poverty rate of Hispanics increased notably compared to non-Hispanics. This may be due to the relatively high proportion of Hispanics that are of working age.

Other sources of national transportation data provide valuable information about transportation costs for work and non-work travel, but all have important limitations as sources of commuting cost data. The National Household Travel Survey (NHTS) provides some commute-specific information such as distance between home and the workplace, but also includes information on non-work travel. While NHTS provides a rich array of information on various trip types and other aspects of travel, its relatively small sample size of about 150,000 households limits its utility at geographies smaller than regions and large states. The Consumer Expenditure Survey (CE) provides information about total household transportation-related expenditures including the cost of vehicle purchases, gasoline and oil, other vehicle expenses, and public transportation expenses. The CE does not differentiate between work-related expenses and other travel, an important limitation to its utility for commuting cost assessments. The CE is also limited in its geographic granularity, providing limited information at the metropolitan area level and smaller.

Future Research

The design of experimental research into commuting costs for the SPM has been guided by several goals, including the incorporation of ongoing government data sources, a relatively simple formula that is easy to replicate, and the ability to adjust for geographic variation in commuting costs. With these goals in mind, the Census Bureau will continue to explore additional adjustments and data inputs into the commuting cost model. The model should capture meaningful geographic variation in costs, while retaining sufficient sample size and homogeneity. Future research the geographic delineation of areas for which average commuting costs are determined. Treatment of less common commute modes such

as biking, walking, and “other” should also receive additional attention. We will also explore other methods for arriving at estimates such as comparing mean and median outcomes for commuting costs.

Compared to their more affluent counterparts, the poor devote a larger share of their income to transportation costs, as transportation is a relatively inelastic household expense that commands a certain minimum investment to carry out day-to-day activities (Sawhill 2012). In the absence of a national survey with a large sample size that directly measures work-related transportation costs, arriving at an accurate commuting cost measure requires an indirect approach using a variety of data sources. Due to limitations in data availability, accounting for some factors that clearly produce notable variation in commuting costs, such as variation in fuel efficiency across vehicles, will remain a challenge. The commuting cost measure presented should be viewed as a crude estimation of major costs that are relatively universal. Accounting for differences in built environment and infrastructural characteristics, and the social and economic forces that influence housing and transportation choices is beyond the scope of this paper, but these factors should be considered as contributors to differences in commuting costs across communities.

Appendix

Table A - 1. Components of total work-related expenses, CY2010 and CT2011

	Commuting Expenses												Other				Total Weekly Expenses			
	Weekly Driving Expenses				Weekly Transportation Expenses for All Other Commute Modes				Weekly Parking/Tolls				Weekly 'Other' Expenses							
	Mean		Median		Mean		Median		Mean		Median		Mean		Median		Mean		Median	
	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE
CY 2010[1]	67.0	0.5	42.6	0.7	3.3	0.2	0.0	(X)	1.9	0.2	0.0	(X)	1.8	0.1	0.0	(X)	61.1	0.5	32.0	0.3
CY 2011[2]	68.0	0.5	50.6	0.5	2.9	0.1	0.0	(X)	1.5	0.1	0.0	(X)	1.8	0.1	0.0	(X)	60.9	0.5	37.3	0.4

[1] Data for Calendar year 2010 derived from the Wave 7 SIPP Topical Module.

[2] Data for Calendar year 2011 derived from the Wave 10 SIPP Topical Module.

Note: All estimates are presented in 2011 Dollars.

(X) Standard errors omitted due to collinearity.

Source: U.S. Census Bureau, Survey of Income and Program Participation, 2008 Panel. For information on confidentiality protection and sampling and nonsampling error, see <http://www.census.gov/sipp/source.html>.

Table A - 2. CY 2011, Average Residual by Characteristic

	Characteristic	Average Residual[1]	SE
All	All People	29.2	0.5
Metro status	Metro	29.5	0.5
	Non metro	28.9	1.2
Union status	Union member	39.3	1.3
	Non union member	27.8	0.5
Industry	Agriculture, forestry, fishing...	19.0	9.5
	Mining	90.7	38.7
	Construction	58.8	4.3
	Manufacturing	21.3	5.9
	Wholesale trade	64.7	14.2
	Retail Trade	23.9	4.3
	Transportation and warehousing...	97.3	27.6
	Information	16.2	7.8
	Finance, insurance, real estate...	46.3	5.9
	Professional, scientific, management...	28.2	3.1
	Educational services, health care...	15.4	3.4
	Arts, entertainment, recreation...	22.3	5.0
	Other services (except public admin.)	17.7	5.3
	Public administration	27.1	23.3
Class of worker	Private for profit employee	29.9	0.6
	Private not for profit employee	20.8	1.2
	Local government worker	24.5	1.2
	State government worker	32.5	2.0
	Federal government worker	41.3	2.5
	Family worker without pay	-8.3	2.6
Commute mode	Drove own vehicle	40.4	0.5
	Rode in someone else's vehicle	-15.2	1.0
	Public transportation	-2.6	1.0
	Walked/biked	-28.0	1.2
	Other mode	-22.0	0.9
	Mixed modes	19.5	2.8

Continued....

See table notes at end of table.

...Continued

State	Alabama	35.9	4.1
	Alaska	3.1	13.0
	Arizona	22.7	2.7
	Arkansas	24.1	4.9
	California	35.1	1.4
	Colorado	22.5	3.2
	Connecticut	22.1	3.2
	Delaware	22.1	6.7
	DC	2.3	5.1
	Florida	24.0	1.8
	Georgia	35.2	2.3
	Hawaii	17.8	4.3
	Idaho	20.9	6.2
	Illinois	24.2	2.5
	Indiana	23.9	2.1
	Iowa	18.2	5.3
	Kansas	18.7	3.7
	Kentucky	34.5	5.7
	Louisiana	27.1	4.0
	Maine	38.3	8.2
	Maryland	39.4	3.1
	Massachusetts	25.9	2.1
	Michigan	30.6	3.6
	Minnesota	31.6	2.7
	Mississippi	45.3	5.4
	Missouri	36.8	3.2
	Montana	12.7	7.2
	Nebraska	24.7	7.2
	Nevada	32.9	4.7
	New Hampshire	42.5	8.3
	New Jersey	35.3	3.0
	New Mexico	9.9	3.0
	New York	21.8	1.9
	North Carolina	28.3	3.4
	North Dakota	-0.1	5.0
	Ohio	34.1	2.9
	Oklahoma	23.0	3.7
	Oregon	19.0	3.0
	Pennsylvania	27.8	2.3
	Rhode Island	14.2	5.6
	South Carolina	34.9	4.3
	South Dakota	14.0	7.0
	Tennessee	43.2	3.3
	Texas	34.9	1.5
	Utah	24.6	3.9
	Vermont	16.5	6.6
	Virginia	37.8	2.0
	Washington	22.3	2.3
	West Virginia	24.7	5.8
	Wisconsin	24.5	2.9
	Wyoming	23.3	12.5
Sex	Male	37.0	0.7
	Female	20.4	0.5
Employment status	Employee	28.7	0.5
	Self employed	32.8	2.1
	Both employee and self employed	34.7	2.7
	Contingent worker	15.9	5.4

[1] Residuals are calculated as reported weekly costs - assigned weekly costs, using the status quo value of $31.68 for CY 2011

Source: U.S. Census Bureau, Survey of Income and Program Participation, 2008 Panel. For information on confidentiality protection and sampling and nonsampling error, see <http://www.census.gov/sipp/source.html>.

Table A - 3. Regressors used to calculate median costs and probability of reporting costs across OLS and logit models

Status Quo	NONE	status quo, medians regardless of any individual charicteristics
Continuous	ejobcntr	number of jobs, in refmonth
	rmwkwjb	number of weeks with a job, in refmonth
	ebuscntr	number of businesses owned (self employed), in refmonth
	ehrsall	usual hours worked at all jobs, in refmonth
	ejbhrs1	usual hours worked at job1, in refmonth
	rfnkids	number of childen <18 in family, in refmonth
	rfownkid	number of own childen <18 in family, in refmonth
	tfearn	total earned income for family, in refmonth
	tftrninc	total family means tested cash transfers, in refmonth
	eage	age, in refmonth
Factor	tmetro	metro status, in refmonth
	eunion1	union status at job1, in refmonth
	tbsind1	industry code at job1, in refmonth
	eclwrk1	class of worker at job1, in refmonth
	industry	recode of ejbind1 (industry classifcation of job1), in refmonth
	occupation	recode of tjbocc1 (occupation classification of job1), in refmonth
	commute_mode	recode of epvwk1-epvwk5 (commute mode to job/business), in refmonth
	tfipsst	state, in refmonth
	esex	sex, in refmonth
	evocat	ever atteneded vocational/tech school
	eeducate	highest degree received
	efkind	family type, in refmonth
	ghgeoplc	geographic place description , in refmonth
	gcbur	city/balance/urgban/rural code, in refmonth
	emp_status	recode of ebuscntr and ejobcntr (number of bussinesses/jobs), in refmonth
Interactions	i.commute_mode*i.tmetro	commute mode by metro status
	i.tfipsst*i.tmetro	state by metro status
	i.tfipsst*i.gcbur	state by place
	i.occupation*i.eunion1	occupation by union status
	i.industry*i.eunion1	industry by union status
	i.tfipsst*i.eunion1	state by union status

Table A - 4. Metro Areas Among Those with Highest Commuting Costs

Metro Areas Among Those with Highest Commuting Costs

	Metropolitan Statistical Area	Total Workers	Average Round Trip Daily Commuting Cost	Margin of Error	Percent Workers who Drove Alone or Carpooled	Margin of Error
1	Riverside-San Bernardino-Ontario, CA	1,210,471	$16.77	$0.14	93.9	0.2
2	Poughkeepsie-Newburgh-Middletown, NY	223,967	$16.21	$0.24	85.5	0.7
3	Stockton, CA	196,312	$15.48	$0.33	94.1	0.5
4	Vallejo-Fairfield, CA	146,658	$15.43	$0.34	91.5	0.7
5	Leominster-Fitchburg-Gardner, MA	58,436	$14.92	$0.46	94.4	0.9
6	Flint, MI	133,426	$14.59	$0.28	96.8	0.3
7	Hagerstown-Martinsburg, MD-WV	56,295	$14.28	$0.53	94.8	0.8
8	Monroe, MI	56,249	$13.93	$0.32	97.2	0.5
9	Greeley, CO	87,869	$13.85	$0.42	93.9	0.7
10	Rochester-Dover, NH-ME (Maine portion not	52,552	$13.85	$0.50	90.2	1.2
11	Anderson, IN	44,913	$13.51	$0.35	94.9	0.8
12	Barnstable Town, MA	84,903	$13.18	$0.39	94.4	0.6
13	Danbury, CT	68,250	$13.10	$0.38	91.2	1.0
14	Kingston, NY	58,411	$13.09	$0.40	90.2	1.1
15	Jackson, MI	54,474	$13.07	$0.47	96.1	0.6
16	Madera-Chowchilla, CA	31,082	$13.01	$0.64	94.2	1.0
17	Dover, DE	51,297	$13.00	$0.51	93.8	0.9
18	Ocean City, NJ	33,952	$12.98	$0.62	88.6	1.4
19	Allentown-Bethlehem-Easton, PA-NJ	293,945	$12.93	$0.16	94.0	0.3
20	Atlanta-Sandy Springs-Marietta, GA	1,732,498	$12.91	$0.06	91.7	0.2
21	Worcester, MA-CT (Connecticut portion not	225,160	$12.86	$0.18	93.6	0.4
22	Merced, CA	69,135	$12.84	$0.54	91.0	1.0
23	Birmingham-Hoover, AL	360,076	$12.77	$0.17	96.8	0.2
24	Port St. Lucie, FL	115,001	$12.69	$0.44	96.5	0.5
25	Modesto, CA	153,885	$12.64	$0.38	94.3	0.5
26	Houston-Sugar Land-Baytown, TX	1,938,502	$12.55	$0.07	92.4	0.2
27	York-Hanover, PA	173,839	$12.39	$0.20	95.4	0.4
28	Decatur, AL	50,368	$12.38	$0.38	98.3	0.5
29	Anderson, SC	55,858	$12.25	$0.33	96.9	0.5
30	Dallas-Fort Worth-Arlington, TX	2,243,373	$12.08	$0.06	94.9	0.1
31	Deltona-Daytona Beach-Ormond Beach, FL	161,176	$12.06	$0.24	94.4	0.6
32	Detroit-Warren-Livonia, MI	1,504,443	$12.05	$0.05	95.4	0.1
33	Nashville-Davidson--Murfreesboro--	562,034	$12.05	$0.11	95.8	0.2
34	Phoenix-Mesa-Scottsdale, AZ	1,424,829	$11.94	$0.07	92.9	0.2
35	Lakeland-Winter Haven, FL	170,095	$11.91	$0.24	94.7	0.5
36	Oxnard-Thousand Oaks-Ventura, CA	288,134	$11.83	$0.19	94.2	0.3
37	Baltimore-Towson, MD	1,088,597	$11.70	$0.07	87.9	0.2
38	Janesville, WI	61,260	$11.69	$0.29	95.5	0.5
39	Kankakee-Bradley, IL	38,985	$11.62	$0.59	92.7	0.9
40	Waterbury, CT	78,401	$11.61	$0.33	94.4	0.6
41	Michigan City-La Porte, IN	38,464	$11.57	$0.42	95.9	0.6
42	Santa Rosa-Petaluma, CA	170,161	$11.56	$0.27	90.8	0.6
43	Raleigh-Cary, NC	398,199	$11.56	$0.13	95.1	0.3
44	Florence-Muscle Shoals, AL	43,350	$11.50	$0.38	97.4	0.5
45	St. Louis, MO-IL	1,058,132	$11.44	$0.06	93.6	0.2
46	Punta Gorda, FL	38,306	$11.34	$0.55	95.2	1.1
47	Palm Bay-Melbourne-Titusville, FL	183,516	$11.30	$0.23	96.2	0.4
48	Olympia, WA	90,559	$11.25	$0.35	92.0	0.7
49	Vineland-Millville-Bridgeton, NJ	49,654	$11.13	$0.48	93.2	0.9
50	Racine, WI	71,822	$11.11	$0.31	94.6	0.6

Source: Author's calculation using 2007-2011 ACS

Based on the 264 large metro areas included in Current Population Survey (CSP) public data file

Table A - 5. Number and Percent of People in Poverty by Different Poverty Measures: 2011

(Numbers in thousands, confidence intervals (C.I.) in thousands or percentage points as appropriate. People as of March of the following year. For information on confidentiality protection, sampling error, nonsampling error, and definitions, see www.census.gov/apsd/techdoc/cps/cpsmar12.pdf)

	Number** (in thousands)	SPM with ACS work expenses				SPM				Difference SPM vs SPM with ACS work expenses			
		Number		Percent		Number		Percent					
		Est.	90 percent C.I.† (+/-)	Est.	90 percent C.I.† (+/-)	Est.	90 percent C.I.† (+/-)	Est.	90 percent C.I.† (+/-)	Number		Percent	
All People	308,827	54,182	961	17.5	0.3	49,567	902	16.1	0.3	-4614	*	-1.5	*
Sex													
Male	151,175	25,297	510	16.7	0.3	23,057	473	15.3	0.3	-2240	*	-1.5	*
Female	157,653	28,885	527	18.3	0.3	26,511	502	16.8	0.3	-2374	*	-1.5	*
Age													
Under 18 years	74,108	14,652	388	19.8	0.5	13,349	376	18.0	0.5	-1302	*	-1.8	*
18 to 64 years	193,213	33,100	640	17.1	0.3	29,971	578	15.5	0.3	-3129	*	-1.6	*
65 years and older	41,507	6,430	232	15.5	0.6	6,247	229	15.1	0.5	-183	*	-0.4	*
Type of Unit													
In married couple unit	186,235	20,889	673	11.2	0.3	18,488	631	9.9	0.3	-2401	*	-1.3	*
In female householder unit	63,347	20,125	544	31.8	0.8	18,969	516	29.9	0.7	-1156	*	-1.8	*
In male householder unit	32,307	7,543	325	23.3	0.9	7,071	313	21.9	0.9	-472	*	-1.5	*
In new SPM unit	26,939	5,625	341	20.9	1.1	5,039	305	18.7	1.0	-586	*	-2.2	*
Race and Hispanic Origin													
White	241,586	37,741	754	15.6	0.3	34,339	732	14.2	0.3	-3402	*	-1.4	*
White, not Hispanic	195,148	23,309	599	11.9	0.3	21,406	586	11.0	0.3	-1903	*	-1.0	*
Black	39,696	10,991	440	27.7	1.1	10,180	405	25.6	1.0	-810	*	-2.0	*
Asian	16,094	2,944	208	18.3	1.3	2,715	215	16.9	1.3	-228	*	-1.4	*
Hispanic (any race)	52,358	16,252	522	31.0	1.0	14,589	502	27.9	1.0	-1663	*	-3.2	*
Nativity													
Native born	268,851	42,744	805	15.9	0.3	39,280	754	14.6	0.3	-3465	*	-1.3	*
Foreign born	39,976	11,437	400	28.6	0.9	10,288	387	25.7	0.9	-1150	*	-2.9	*
Naturalized citizen	17,934	3,637	196	20.3	1.0	3,280	184	18.3	0.9	-357	*	-2.0	*
Not a citizen	22,042	7,800	338	35.4	1.3	7,007	330	31.8	1.3	-793	*	-3.6	*
Tenure													
Owner	206,718	22,034	656	10.7	0.3	19,955	615	9.7	0.3	-2079	*	-1.0	*
Owner/Mortgage	136,699	12,607	508	9.2	0.4	11,114	479	8.1	0.3	-1493	*	-1.1	*
Owner/No mortgage/rentfree	73,418	10,230	433	13.9	0.5	9,580	397	13.0	0.5	-650	*	-0.9	*
Renter	98,710	31,345	782	31.8	0.7	28,873	735	29.3	0.6	-2471	*	-2.5	*
Residence													
Inside MSAs	261,455	47,023	952	18.0	0.3	43,203	894	16.5	0.3	-3821	*	-1.5	*
Inside principal cities	100,302	23,422	739	23.4	0.6	21,681	714	21.6	0.6	-1740	*	-1.7	*
Outside principal cities	161,153	23,602	766	14.6	0.4	21,521	702	13.4	0.4	-2081	*	-1.3	*
Outside MSAs	47,372	7,158	546	15.1	0.8	6,365	492	13.4	0.7	-793	*	-1.7	*
Region													
Northeast	55,035	8,834	362	16.1	0.7	8,232	334	15.0	0.6	-602	*	-1.1	*
Midwest	66,115	9,403	373	14.2	0.6	8,431	347	12.8	0.5	-972	*	-1.5	*
South	115,068	20,183	691	17.5	0.6	18,372	642	16.0	0.6	-1812	*	-1.6	*
West	72,610	15,761	518	21.7	0.7	14,533	511	20.0	0.7	-1228	*	-1.7	*
Health Insurance coverage													
With private insurance	197,323	16,952	516	8.6	0.3	15,000	476	7.6	0.2	-1953	*	-1.0	*
With public, no private insurar	62,891	20,764	496	33.0	0.7	19,587	486	31.1	0.7	-1176	*	-1.9	*
Not insured	48,613	16,466	480	33.9	0.9	14,981	451	30.8	0.8	-1485	*	-3.1	*
Work Experience													
Total, 18 to 64 years	193,213	33,100	640	17.1	0.3	29,971	578	15.5	0.3	-3129	*	-1.6	*
All workers	144,163	16,055	402	11.1	0.3	13,585	349	9.4	0.2	-2470	*	-1.7	*
Worked full-time, year-round	97,443	6,313	212	6.5	0.2	4,967	177	5.1	0.2	-1347	*	-1.4	*
Less than full-time, year-rour	46,720	9,742	302	20.9	0.6	8,618	278	18.4	0.6	-1124	*	-2.4	*
Did not work at least 1 week	49,049	17,045	410	34.7	0.7	16,386	400	33.4	0.7	-659	*	-1.3	*
Disability Status													
Total, 18 to 64 years	193,213	33,100	640	17.1	0.3	29,971	578	15.5	0.3	-3129	*	-1.6	*
With a disability	14,968	4,291	189	28.7	1.1	4,133	186	27.6	1.1	-158	*	-1.1	*
With no disability	177,309	28,704	589	16.2	0.3	25,746	527	14.5	0.3	-2957	*	-1.7	*

*Statistically different from zero at the 90 percent confidence level.

**Includes unrelated individuals under the age of 15.

†A 90 percent confidence interval is a measure of an estimate's variability. The larger the confidence interval in relation to the size of the estimate, the less reliable the estimate. Confidence intervals shown in this table are based on standard errors calculated using replicate weights. For more information see "Standard Errors and Their Use" at <www.census.gov/hhes/www/p60_243sa.pdf>.

-Federal surveys give respondents the option of reporting more than one race. Therefore, two basic ways of defining a race group are possible. A group such as Asian may be defined as those who reported Asian and no other race (the race-alone or single-race concept) or as those who reported Asian regardless of whether they also reported another race (the race-alone-or-in-combination concept). This table shows data using the first approach (race alone). The use of the single-race population does not imply that it is the preferred method of presenting or analyzing data. The Census Bureau uses a variety of approaches. Information on people who reported more than one race, such as White ***and*** American Indian and Alaska Native or Asian ***and*** Black or African American, is available from Census 2010 through American FactFinder. About 2.9 percent of people reported more than one race in Census 2010. Data for American Indians and Alaska Natives, Native Hawaiians and Other Pacific Islanders, and those reporting two or more races are not shown separately.

-The "Outside metropolitan statistical areas" category includes both micropolitan statistical areas and territory outside of metropolitan and micropolitan statistical areas. For more information, see "About Metropolitan and Micropolitan Statistical Areas" at <www.census.gov/population/www/estimates/aboutmetro.html>.

-The sum of those with and without a disability does not equal the total because disability status is not defined for individuals in the Armed Forces.

Source: U.S. Census Bureau, Current Population Survey, 2012 Annual Social and Economic Supplement.

Table A - 6. Distribution of People in Total and Poverty Population: 2011

(Numbers in thousands, confidence intervals (C.I.) in thousands or percentage points as appropriate. People as of March of the following year. For information on confidentiality protection, sampling error, nonsampling error, and definitions, see www.census.gov/apsd/techdoc/cps/cpsmar12.pdf)

	Total Population		SPM ACS work exp		SPM		Difference SPM vs SPM with ACS work expenses	
	Est.	90 percent C.I.† (+/-)	Est.	90 percent C.I.† (+/-)	Est.	90 percent C.I.† (+/-)		
All People	308,827	-	54,182	961	49,695	905		
	(percent of column total)							
Sex								
Male	49.0	0.0	46.7	0.4	46.5	0.4	-0.2	*
Female	51.0	0.0	53.3	0.4	53.5	0.4	0.2	*
Age								
Under 18 years	24.0	0.0	27.0	0.4	26.9	0.5	-0.1	
18 to 64 years	62.6	0.1	61.1	0.5	60.5	0.5	-0.6	*
65 years and older	13.4	0.1	11.9	0.4	12.6	0.4	0.7	*
Type of Unit								
In married couple unit	60.3	0.4	38.6	1.0	37.3	1.0	-1.3	*
In female householder unit	20.5	0.3	37.1	0.8	38.3	0.9	1.1	*
In male householder unit	10.5	0.2	13.9	0.5	14.3	0.6	0.3	*
In new SPM unit	8.7	0.2	10.4	0.6	10.2	0.6	-0.2	*
Race and Hispanic Origin								
White	78.2	0.0	69.7	0.8	69.3	0.8	-0.4	*
White, not Hispanic	63.2	0.1	43.0	0.8	43.2	0.9	0.2	
Black	12.9	0.0	20.3	0.7	20.5	0.7	0.3	*
Asian	5.2	0.1	5.4	0.4	5.5	0.4	0.0	
Hispanic (any race)	17.0	0.0	30.0	0.8	29.4	0.8	-0.6	*
Nativity								
Native born	87.1	0.2	78.9	0.6	79.2	0.6	0.4	*
Foreign born	12.9	0.2	21.1	0.6	20.8	0.6	-0.4	*
Naturalized citizen	5.8	0.1	6.7	0.3	6.6	0.3	-0.1	
Not a citizen	7.1	0.2	14.4	0.6	14.1	0.6	-0.3	*
Tenure								
Owner	66.9	0.4	40.7	1.0	40.3	1.0	-0.4	*
Owner/Mortgage	44.3	0.4	23.3	0.8	22.4	0.9	-0.8	*
Owner/No mortgage/rentfree	23.8	0.4	18.9	0.7	19.3	0.7	0.4	*
Renter	32.0	0.4	57.9	1.0	58.3	1.0	0.4	*
Residence								
Inside MSAs	84.7	0.9	86.8	1.0	87.2	1.0	0.4	*
Inside principal cities	32.5	0.6	43.2	1.1	43.7	1.2	0.5	*
Outside principal cities	52.2	0.8	43.6	1.2	43.4	1.2	-0.1	
Outside MSAs	15.3	0.9	13.2	1.0	12.8	1.0	-0.4	*
Region								
Northeast	17.8	0.1	16.3	0.7	16.6	0.7	0.3	*
Midwest	21.4	0.1	17.4	0.7	17.0	0.7	-0.3	*
South	37.3	0.1	37.3	1.0	37.1	1.0	-0.2	
West	23.5	0.1	29.1	0.8	29.3	0.8	0.2	
Health Insurance coverage								
With private insurance	63.9	0.3	31.3	0.8	30.3	0.8	-1.0	*
With public, no private insurance	20.4	0.3	38.3	0.7	39.5	0.7	1.2	*
Not insured	15.7	0.2	30.4	0.7	30.2	0.7	-0.2	
Work Experience								
Total, 18 to 64 years	62.6	0.1	61.1	0.5	60.5	0.5	-0.6	*
All workers	46.7	0.2	29.6	0.5	27.4	0.5	-2.2	*
Worked full-time, year-round	31.6	0.2	11.7	0.3	10.0	0.3	-1.6	*
Less than full-time, year-round	15.1	0.2	18.0	0.5	17.4	0.5	-0.6	*
Did not work at least 1 week	15.9	0.2	31.5	0.5	33.1	0.6	1.6	*
Disability Status								
Total, 18 to 64 years	62.6	0.1	61.1	0.5	60.5	0.5	-0.6	*
With a disability	4.8	0.1	7.9	0.3	8.3	0.3	0.4	*
With no disability	57.4	0.2	53.0	0.6	51.9	0.6	-1.0	*

*Statistically different from zero at the 90 percent confidence level.

**Includes unrelated individuals under the age of 15.

†A 90 percent confidence interval is a measure of an estimate's variability. The larger the confidence interval in relation to the size of the estimate, the less reliable the estimate. Confidence intervals shown in this table are based on standard errors calculated using replicate weights. For more information see "Standard Errors and Their Use" at <www.census.gov/hhes/www/p60_243sa.pdf>.

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-The sum of those with and without a disability does not equal the total because disability status is not defined for individuals in the Armed Forces.

Source: U.S. Census Bureau, Current Population Survey, 2012 Annual Social and Economic Supplement.

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