Public Transportation Protects Americans From Gas Price Volatility

Improving transportation options saves consumers money, increases affordability, reduces exposure to price volatility and is good for the economy. In fact, investments in public transit provide a large direct financial return to consumers: increased public expenditures are more than repaid, on average, in transportation cost savings. The predictability of these savings becomes even more important during periods of price volatility. Families cannot plan household budgets when faced with high volatility—they need stable alternatives. This paper highlights the role that public transit plays in protecting Americans from price volatility, as well as strategies that can buffer Americans from future gas price shocks.

High Price Volatility So Far In 2012

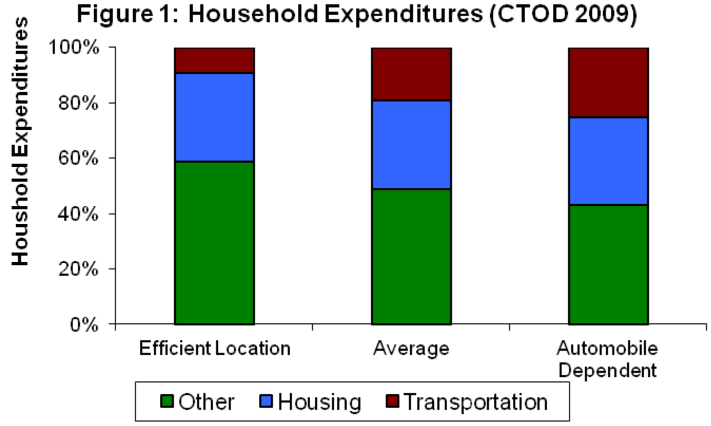
The Energy Information Administration projected in early February that regular-grade retail motor gasoline would average $3.55 per gallon in 2012, only a small increase over the average price of $3.52 in 2011.[1] An actual increase in retail motor gasoline prices in early 2012 creates concern about that prediction. On February 20, 2012 the per gallon price for regular-grade motor gasoline was $3.59, the highest price ever recorded that early in the year. The price continued to rise and peaked on April 2 at $3.94 but subsequently fell to $3.79 on May 7.[2] News media pointed out on February 27, 2012 that average nationwide gasoline prices had risen for the 20th consecutive day due to rising crude oil prices due to concerns about possible interruptions in international supplies.[3] These factors external to the American economy will impact the price of energy, even if we become less reliant on oil from unstable parts of the globe.

Costs To Households

Household transportation costs, and exposure to fuel price increases, vary significantly from one area to another, depending on the quality of transportation options available.

Figures 1 and 2 illustrate how households located in efficient locations (neighborhoods that have good walking, cycling, and public transit) spend a significantly smaller portion of household budgets on transportation than in more automobile-dependent locations.

Figure 1: Household Expenditures (CTOD 2009)



More efficient locations (accessible and multi-modal neighborhoods) reduce the portion of household budgets devoted to transportation, leaving more money to spend on other goods.

Figure 2: Typical Housing and Transportation Costs [4]

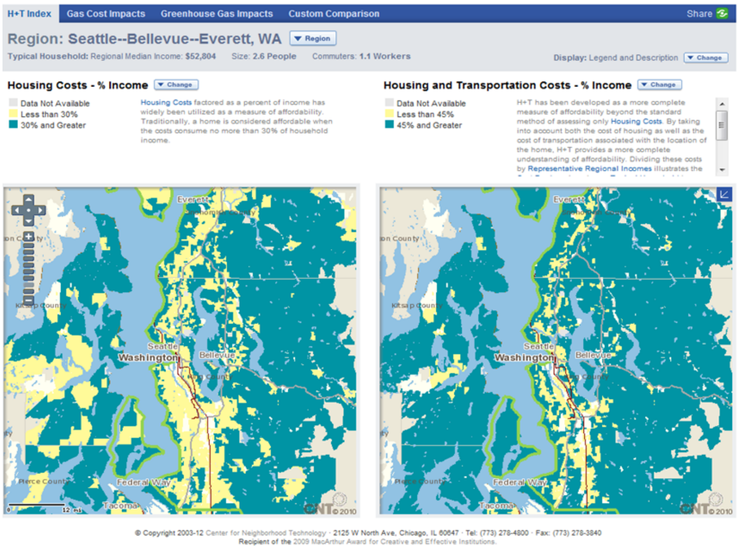
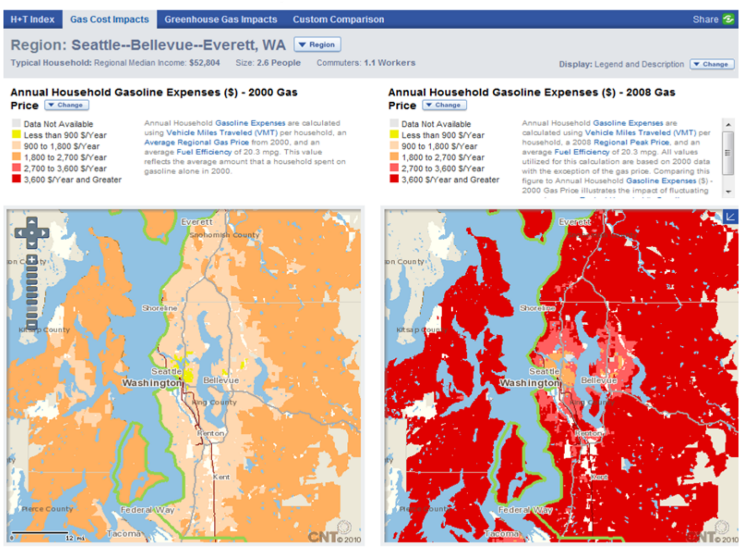


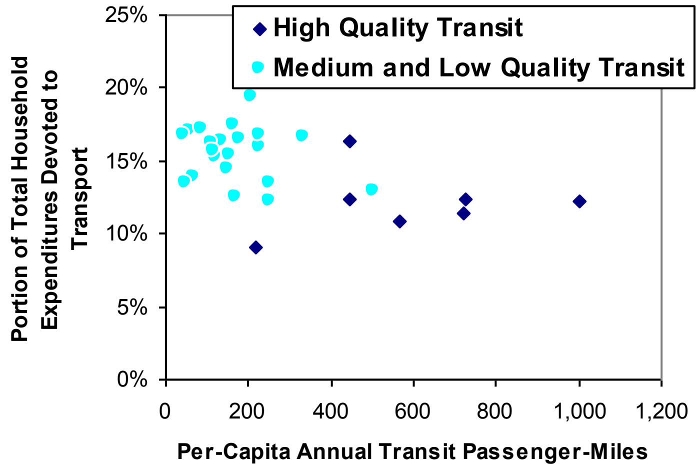
Figure 3: Typical Household Fuel Costs With Higher Fuel Prices [5]



In fact, living in a transit-oriented community tends to reduce total household transportation costs, according to research comparing U.S. cities based on the penetration of their transit system.[6, 7]

The portion of total household budgets spent on transportation (automobiles and transit) tends to decline with increased transit ridership and tends to be lower in cities with high quality transit.

Figure 4: Percent Transport Expenditures[8]



Price At Pump Impacts Foreclosure Levels

The per capita savings rate for cities with high quality public transit increases during price spikes at the pump. In fact, communities with inadequate transit access and long commutes—such as exurban communities—are at increased risk of mortgage foreclosure spikes following a gasoline price spike.[9] Furthermore, these communities become significantly less affordable than central city areas with higher housing costs.[10] Finally, home borrowers in location efficient areas—areas with high quality public transit and transit-supportive design—are at lower risk of foreclosure (7.2% vs 9.9%) than a home loan borrower in less transit-intensive areas.[11]

Does Gasoline Price Change Affect Driving?

Years ago, in the era of low-priced gasoline, the price elasticity of gasoline had been believed to be at or near zero.[12] A change in the price of gasoline was not expected to change the amount of gasoline that a driver would purchase. Recent research has found this not to be the case and has shown that increases in the price of gasoline result in decreased driving. The average price of gasoline in 2011 was $3.52 for regular grade, an increase of 27% over the $2.78 per gallon price in 2010.[13] The predicted decrease in driving did occur. The Federal Highway Administration reported that total vehicle miles of travel in 2011 decreased 1.2 percent nationwide. Every month from March through November saw a decline in driving compared to the same month in the previous year.[14]

The relationship between the price of gasoline and the amount of gasoline purchased has been repeatedly found to be true, but not always with a strong relationship. Researchers at the University of California at Davis found a short range price elasticity of -0.034 to -0.077 for gasoline price to the amount of gasoline purchased for the 2001 to 2006 period. For each 10 percent the price of gasoline increased, the amount of gasoline purchased decreased 0.34 percent to 0.77 percent. This is a decrease in the elasticity rate from earlier periods. For the 1975 to 1980 period the authors found that for each 10 percent rise in the price of gasoline, the amount purchased dropped between 2.1 percent and 3.4 percent.[15]

The Congressional Budget Office studied the effects of gasoline price changes in 2007, which ranged for average regular grade gasoline from a low of $2.165 in January to a high of $3.218 in May. They also found a low price elasticity for gasoline price and vehicle miles of travel. The report stated that: "Recent empirical research suggests that total driving, or vehicle miles traveled (VMT), is not currently very responsive to the price of gasoline. A 10 percent increase in gasoline prices is estimated to reduce VMT by as little as 0.2 percent to 0.3 percent in the short run and by 1.1 percent to 1.5 percent eventually."[16]

Although the elasticities between an increase in gasoline prices and the amount of gasoline purchased and vehicle miles driven appears small, they result in the reduction of large amounts of travel. In 2008 the price of gasoline per gallon increased 38.3 percent, from $3.011 in February to $4.165 in July. According to the CBO research, VMT should have decreased between 0.8 percent and 5.7 percent. In 2007, VMT had been 3.03 trillion miles and person miles of travel 4.96 trillion miles.[17]

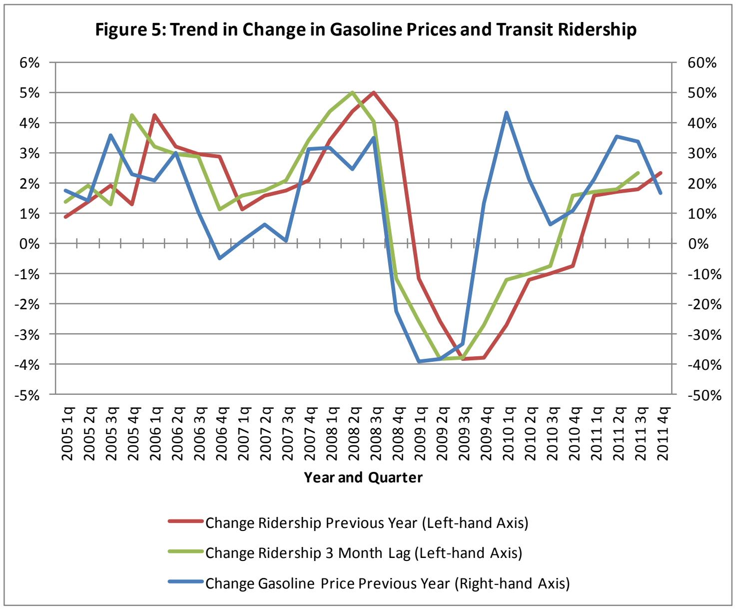
"A modest decrease in driving may translate into a significant increase in demand for transit service"

The elasticities therefore predict that the reduction in VMT for an entire year would be between 23 billion and 174 billion and the reduction in person miles of travel for an entire year would be between 38 billion and 285 billion. In fact, the actual drop in VMT between 2007 and 2008 was 56 billion or 1.9 percent and the drop in person miles of travel was 91 billion or 1.8 percent, both within the predicted range.[18] Although behavior was generally consistent with the models, many observed what seems to be a "tipping point" as gasoline prices approached and exceeded $4 per gallon. The dynamic relationship was explored further in the Maley and Weinberger research explained below.

Do Gasoline Price Increases Result in Increased Transit Ridership?

When gas prices cause a shift from automobiles to transit, the percentage growth in transit use will be much greater than the percentage decline in VMT. This is because the base of transit trips is much smaller than the base of automobile trips. In other words, a modest decrease in driving translates into a potential travel demand that could represent a significant increase in demand for transit service.

Figure 5 shows a visually apparent relationship between changes in gasoline prices and transit ridership, but it is not as simple as it may appear. Many other factors affect transit ridership, perhaps more than changes in gasoline prices. Over 55 percent of transit trips are commute trips to work, with nearly six million commuters using transit as their primary travel mode. An increase or decrease in the unemployment rate can



have an impact on transit ridership. Other positive impacts are associated with increased road congestion and increased parking prices while fare increases and service reductions have a negative impact on ridership.

However, regression analysis shows that 44% of the variation in ridership can be explained by changes in the price at the pump. This is considered a strong correlation and is statistically significant.[19]

Only 54 percent of American households have public transit service, so transit is not an alternative mode for all miles of reduced roadway travel in response to increased gasoline costs.[20] Nevertheless, research since the fuel price spikes of 2005 through 2008 has consistently shown larger elasticities between gas price increases and transit ridership than between gas price increases and roadway travel decreases.

APTA member transit systems have experienced first-hand the correlation between gas prices and ridership. In 2008, the price of regular grade gasoline per gallon went from $3.053 on December 31, 2007 to a peak of $4.114 on July 7, 2008 and then plummeted to $1.613 on December 29, 2008; the lowest price recorded since the 2008 peak.[21] The price increase from December 31, 2007 to July 7, 2008 was $1.061 or 35 percent. The drop in price in the second half of the year was $2.501 per gallon for regular grade gasoline or 61 percent.

Transit ridership responded to those fluctuations. In the first quarter of 2008, transit ridership increased 3.42 percent compared to the prior year. As motor gasoline prices increased during the second quarter of 2008, transit ridership rose 5.19 percent compared to the prior year. As gasoline prices started to fall in the third quarter, the lag between price change and transit ridership change was apparent as transit ridership increased 6.52 percent, its greatest quarterly increase during the year. Increases were present among all modes of public transportation and in systems of all sizes.[22]

Similarly, the price drops for gasoline in 2009 saw decreases in transit ridership. Gasoline prices were below 2008 levels all through 2009 and until near the end of 2010. Not surprisingly, transit ridership was lower than the preceding year every quarter in 2009 and 2010. When gasoline prices again exceeded $3.00 per gallon throughout 2011, transit ridership increased each quarter.

In July of 2008 APTA surveyed its transit agency members to understand the changes in ridership that may have resulted from increased motor gasoline prices. Overall, 86 percent of survey respondents reported that they had experienced ridership increases over the prior year. Among agencies experiencing increases, 62 percent had experienced increased ridership during both the peak and off-peak periods, 20 percent had experienced most of the increase during the peak period, and 18 percent had experienced most of the increase during off-peak periods.[23]

Among those agencies with ridership growth, 42 percent of agencies increased the frequency of service on existing routes, 29 percent expanded service into new areas, and 15 percent reallocated service to higher ridership routes.

Public transit agencies, however, may now find it more difficult to respond to the increased demand than they did in 2008. In a March 2011 survey of transit agency members,[24] APTA found that 35 percent of responding agencies expected a budget shortfall in 2011. Regardless of their budget situation, most transit agencies had taken or were considering actions that could effect ridership growth. Fifty-eight percent had implemented in the previous year or were considering fare increases and 71 percent had implemented in the past year or were considering service cuts.

Transit ridership elasticities show the important role that public transportation plays in the national transportation network.

Research of Transit Ridership to Gasoline Price Elasticities

The correlation between gasoline prices and the use of transit has been further affirmed by independent studies. Currie and Phung calculated elasticities using U.S. transit ridership data and fuel price data from January 1998 through October 2005.[25] They found an aggregate elasticity of 0.12 for all transit modes; ridership increased 1.2% for every 10% increase in gas prices. Light rail had higher than average elasticities of 0.27 to 0.38, the bus elasticity was low at 0.04, and the heavy rail elasticity was 0.17. The authors found their results to be consistent with most international evidence. All elasticities reported in this section are summarized on Table 2.

Haire and Machemehl compared ridership change and fuel prices for transit systems in five cities from January 1999 through June 2006.[26] Comparisons with statistically significant correlation coefficients showed an elasticity of transit ridership to fuel price change to be 0.2439 for motorbus, 0.0665 for light rail, 0.2653 for heavy rail, 0.2726 for commuter rail, and 0.2379 for all transit modes combined.

Jeremy Mattson studied the effect of gas prices on ridership in small urban and rural areas. Using a lag model to arrive at a cumulative elasticity, he found results ranging from 0.081 to 0.164. With panel data for 11 agencies from 1997 to 2006, he obtained an aggregate value of 0.12. He found that the elasticity varied somewhat by city size: "The longer-run elasticities are 0.12, 0.13, 0.16, and 0.08 for the large, medium-large, medium-small, and small cities, respectively."[27]

Maley and Weinberger examined the relationship of gasoline prices to transit ridership in the Philadelphia area.[28] The data are from Southeastern Pennsylvania Transportation Authority (SEPTA) services with analyses made of Regional Rail Services, which are commuter railroad, and City Transit Division Services, which include bus, heavy rail, and light rail operations. The period covered was January 2001 through June 2008.

They found the relationship between ridership and gasoline prices to be non-linear. From this they projected elasticities for higher than actually recorded gasoline per gallon prices. Their results show an increasing elasticity as gasoline prices increased. For Regional Rail the elasticity in a per gallon gas price range of $3 to $4 was 0.27, from $4 to $5 was 0.33, and from $5 to $6 was 0.38. For City Transit the elasticity in a per gallon gas price range of $3 to $4 was 0.15, from $4 to $5 was 0.19, and from $5 to $6 was 0.23. As shown on Table 1, the gas price elasticities within the $4 to $5 per gallon gas price range are 22 percent or 15 percent more than they are for the $3 to $4 range. If per gallon gasoline prices were to reach the $5 to $6 range, the elasticities would increase an additional 27 percent or 21 percent.

Yanmaz-Tuzel and Ozbay studied ridership on New Jersey Transit from 1998 through 2008, looking at gas price increases in 2005 and 2008. Their results show a several month lag in the response of travelers to gasoline price increases. They find a short-term elasticity of gasoline prices to ridership of 0.12 to 0.22 and a medium-term elasticity of 0.028 to 0.176. The modes included are not specified indicating the data are system totals.[29]

Table 1: Maley and Weinberger: Projected Increases in Transit Ridership Elasticities for Increasing Gas Prices

System	Measurement	Projected per Gallon Gas Price Range		
		from $3 to $4	from $4 to $5	from $5 to $6
SEPTA Regional Rail	Transit Ridership Elasticity	0.27	0.33	0.38
	Increase from Lower Range	---	22%	27%
SEPTA City Transit	Transit Ridership Elasticity	0.15	0.19	0.23
	Increase from Lower Range	---	15%	21%

Stover and Bae used regression methods to compare gasoline prices and transit ridership for 11 counties in the state of Washington from 2004 through 2008. Data from all agencies in a panel model resulted in an elasticity of 0.17.[30]

Litman surveyed available literature on transit price elasticities and cross-elasticities in 2011.[31] Based on his research he recommended generic values. For the short-term elasticity between transit ridership and auto operating costs he recommends 0.05 to 0.15 and for the long-term elasticity he recommends 0.2 to 0.4.

Lane studied the time effect of gasoline prices and transit ridership from January 2002 through March 2009 for 33 cities.[32] He considered lags in the relationship where an increase or decrease in motor gasoline price may be associated with a change in transit ridership one or more months later due to the delay in travelers making the decision to shift modes. Taking the highest elasticity recorded in each of the 33 areas, Lane studied and weighed them by the transit ridership by mode in those areas, giving the elasticity for each mode. The "rail" elasticity for an area reported by Lane was applied equally to all rail modes in that area. The average elasticity for commuter rail was 0.218, for heavy rail was 0.166, for light rail was 0.258, and for bus was 0.141, resulting in an overall elasticity of 0.161.

The elasticities reported in these studies are listed and reported on Table 2 with an average value calculated from them. They can be used to estimate the amount ridership could increase at specific gas price levels.

Note that each of these studies is based on the actual ridership change during periods of price change in the past decade. The results are based on elasticities that are constrained, *i.e.* the amount that ridership could grow in response to actual gasoline price changes was constrained by the amount of transit service available and the excess capacity of that service. Since a large portion of growth in demand was for trips during the peak hour when transit vehicles are most crowded, that excess capacity was not large. Similarly, there was demand for service in areas where there is currently no public transportation services available. Data shows that 46% of Americans do not have the option of public transportation available to them.[33]

Table 2: Summary of Transit Ridership to Gas Price Elasticities in Recent Research

Study	Elasticity				
	Commuter Rail	Heavy Rail	Light Rail	Bus	All Modes
Currie and Phung, 2007	---	0.170	0.270 to 0.380	0.040	0.120
Haire and Machemehl, 2007	0.273	0.265	0.066	0.2449	0.238
Mattson, 2008	---	---	---	0.12	---
Maley and Weinberger, 2009	0.270	0.150	0.150	0.150	---
Yanmaz-Tuzel and Ozbay, 2010	---	---	---	---	0.12 to 0.22
Stover and Bae, 2011	---	---	---	---	0.17
Litman, 2011	---	---	---	---	0.05 to 0.40
Lane, 2011 (Calculated from weighted data, see text)	0.218	0.166	0.258	0.141	0.161
Average Value	0.254	0.188	0.266	0.139	0.181

These studies measure actual experience and fall considerably short of measuring potential demand during times of rising gas prices. There are no available studies that have modeled how to account for unmet demand for transit service. During past gasoline price spikes, capacity constraints at many transit systems resulted in many persons being left at bus stops or on rail station platforms because demand exceeded the capacity of transit vehicles during peak travel periods.

A Model for Predicting National Transit Ridership Increases

How can we apply the experience of 2011, combined with research over the past decade, to create a model for projecting future increases?

The baseline for our calculation is the annual transit ridership for 2011 reported in APTA's Public Transportation Ridership Report.[34] The annual ridership for 2011 is increased by three scenarios of low, average, and high growth calculated from elasticities reported for all transit service in the studies shown on Table 2. The low scenario elasticity based on those studies is 0.14, the average scenario elasticity is 0.181, and the high scenario elasticity is 0.23. These elasticities are used to calculate the ridership growth at a given increase above the average per gallon price of $3.521 in 2011, reported by the Energy Information Administration for regular grade motor gasoline.[35] The estimates for $4.00 and $4.50 are arrived at by multiplying the elasticity value by the percentage price change and the "Baseline" ridership. At each price level the "Additional" ridership is the ridership above the "Baseline" level.

The increase in the cost per gallon from $3.521 in 2011 to a theoretical $4.00 is $0.479, which is a 13.6 percent increase. The estimates of ridership impact were calculated by mode and the amounts summed, including a calculation for modes not included on Table 2, to obtain total ridership. For example, the elasticity of commuter rail at the bottom of Table 2 is 0.254. Twenty-five and four tenths percent of the 13.6 percent gasoline price increase is 3.45 percent. The 2011 commuter rail ridership is multiplied by 3.45 percent to obtain an additional ridership in the average scenario for commuter rail, 16.0 million unlinked trips, as reported in the commuter rail column on Table 4 on the line "$4.00, Additional." Those 16.0 million unlinked trips are added to the base number of 462.3 million trips for commuter rail to obtain a projected ridership level of 478.2 million unlinked trips at a $4.00 per gallon gasoline price for commuter rail, as reported in the commuter rail column on Table 4 on the line "$4.00, Total." Based of the research of Maley and Weinberger, the elasticity above $4.50 and above $5.50 are increased by the proportions they determined as reported on Table 1. These increased elasticities are based on "shock" levels, round dollar amounts that appear to be plateaus that "shock" consumers into changing travel behavior.

The columns on Table 3 are scenarios calculated from the low, average, and high elasticities reported in the studies on Table 2.

Table 3: Potential Increase in Transit Ridership as Gasoline Prices Rise Based on Published Elasticities

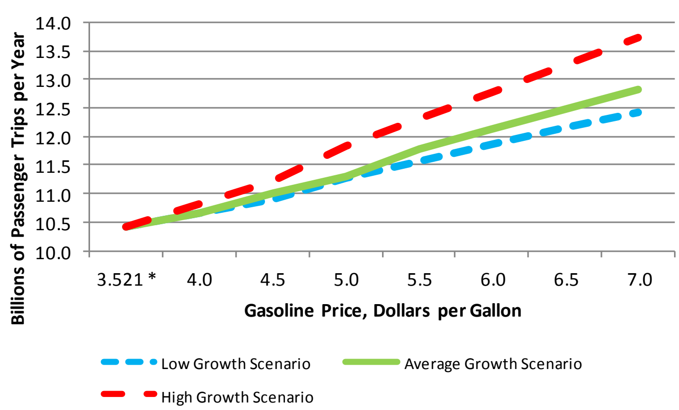
Price of Gasoline per Gallon	Trip Measurement	Calculated Number of Annual Unlinked Passenger Trips, Millions			
		Low Scenario	Average Scenario	Percent Increase, Average Scenario	High Scenario
Baseline, Millions of Trips at $3.521 *	2011 Total Annual Trips	10,407.4	10,407.4	---	10,407.4
$4.00	Additional	242.3	289.2	2.3 %	398.0
	Total	10,649.7	10,696.6		10,805.4
$4.50	Additional	495.2	591.1	5.7 %	813.5
	Total	10,902.5	10,998.5		11,220.9
$5.00	Additional	861.4	1,028.4	8.6 %	1,415.1
	Total	11,268.8	11,435.8		11,822.5
$5.50	Additional	1,152.6	1,376.0	13.2 %	1,893.5
	Total	11,560.0	11,783.4		12,300.9
$6.00	Additional	1,443.8	1,723.7	16.6 %	2,371.9
	Total	11,851.2	12,131.1		12,779.3
$6.50	Additional	1,735.0	2,071.3	19.9 %	2,850.3
	Total	12,142.4	12,478.7		13,257.7
$7.00	Additional	2,026.2	2,419.0	23.2 %	3,328.7
	Total	12,433.6	12,826.4		13,736.1

Figure 6 illustrates that an increase in transit ridership is related to an increase in the price of gasoline. As the per gallon price of gasoline increases, transit ridership is expected to increase within the depicted range based on the experience reported in studies of recent gasoline price increases. Last year, APTA published a paper similar to this one estimating possible changes.[36] That paper made estimates based on the final motor gasoline price per gallon for 2010, $3.052 reported on December 27, 2010. The annual price in 2011 was $3.521. An increase to $3.50 was projected in that paper to result in a low estimate of 210 million more unlinked transit trips, and average estimate of 280 million more unlinked transit trips, and a high estimate of 340 million more unlinked transit trips. The actual increase of unlinked transit trips in 2011 compared to 2010 was 235 million, very close to the projection considering the large number of factors that effect transit ridership change.

If gasoline prices reach $4 per gallon, transit ridership is predicted by this model to increase in the average scenario by 289 million annual unlinked trips—nearly 1 million additional riders each weekday; if gasoline prices reach $5 per gallon transit, ridership is predicted by this model to increase by 1.03 billion annual unlinked trips—over 3 million additional riders each weekday, and if gasoline prices reach $6 per gallon, transit ridership would increase by 1.72 billion annual unlinked passenger trips—nearly 6 million additional riders each weekday. In the high scenario, a $6 dollar per gallon gasoline price is expected to result in 2.37 billion more transit trips for an annual total of 12.8 billion trips.

Table 4 reports the possible growth of transit ridership from increase in the per gallon price of

Figure 6: Projected Range of Annualized Transit Ridership as Gasoline Prices Change, Based on Published Elasticities



motor gasoline by transit mode and Figure 3 illustrates the possible growth for bus and a combination of commuter, heavy, and light rail.

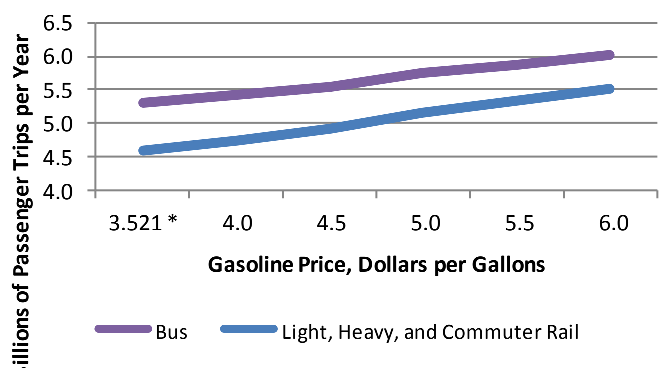
Bus demand is projected to increase to 5.7 billion unlinked passenger trips should the price of gasoline increase to $5.00. At a $5.00 per gallon price, commuter rail ridership is projected to increase to 532 million unlinked passenger trips, light rail to 565 million unlinked passenger trips, and heavy rail to 4.05 billion passenger trips.

Table 4: Potential Increase in Transit Ridership by Mode as Gasoline Prices Rise Based on Published Elasticities

Price of Gasoline per Gallon	Trip Measurement	Calculated Number of Annual Unlinked Trips – Average Scenario, Millions				
		Commuter Rail	Heavy Rail	Light Rail	Bus	Total All Modes (a)
Baseline, Millions of Trips at $3.521 *	2011 Total Annual Trips	462.3	3,648.3	487.9	5,300.8	10,407.4
$4.00	Additional	19.5	113.9	21.6	122.5	289.2
	Total	481.8	3,762.2	509.5	5,423.3	10,696.6
$4.50	Additional	39.8	232.8	44.2	250.4	591.1
	Total	502.1	3,881.1	532.1	5,551.1	10,998.5
$5.00	Additional	69.3	404.9	76.8	435.5	1,028.4
	Total	531.6	4,053.3	564.7	5,736.3	11,435.8
$5.50	Additional	92.8	541.8	102.8	582.8	1,376.0
	Total	555.0	4,190.2	590.7	5,883.5	11,783.4
$6.00	Additional	116.2	678.7	128.8	730.0	1,723.7
	Total	578.5	4,327.1	616.7	6,030.8	12,131.1
$6.50	Additional	139.6	815.6	154.7	877.2	2,071.3
	Total	601.9	4,463.9	642.7	6,178.0	12,478.7
$7.00	Additional	163.1	952.5	180.7	1,024.5	2,419.0
	Total	625.3	4,600.8	668.6	6,325.3	12,826.4

*Average price of regular grade gasoline during 2011.
(a) Includes modes not listed separately.

Figure 7: Projected Annualized Transit Ridership as Gasoline Prices Change, Average Scenario



Implications: Public Transit Is Critical Part of National Transportation System

Contrary to attempts to separate public transportation, it clearly acts as part of the national transportation network, offering primary and redundant services that make the nation more economically efficient. Since its users are part of the national transportation network and often view public transportation as a supplement or alternative to highways—particularly in congested regions or during times of high gas prices—public transit should benefit from the same user fees used to fund our highway network. The correlation between gas prices and transit ridership shows that transit offers significant benefits to the functioning of the road network. This correlation suggests that public transportation should continue to receive funds from the motor fuels tax.

Many New Riders Will Continue to Use Transit When Gas Prices Fall

Researchers have found that the decline in ridership when gas prices fall is not as great as the increase in ridership when gas prices rise; the long-term effect is an increase in ridership. Maley and Weinberger observed this phenomenon in their study of gas prices and transit ridership in Philadelphia described earlier in this report. They found that "although the data analyzed in this study stopped being collected in June 2008, with prices and ridership both growing, gas prices did fall again at the end of that summer. However, even as gas prices plunged from over $4/gal to under $2/gal, SEPTA continued to post ridership increases over the same months from the previous year. This sustained growth could be evidence that once prices compel people to form new transit habits, some find a reason to keep them."[37]

Ridership increases because travelers change from their private vehicle to riding transit when they perceive an extreme change in their travel costs from higher gasoline prices. Ridership then declines more slowly as gasoline prices fall because they have developed the habit of riding transit. Some of them have found transit travel to be more desirable than they had expected, and therefore they retain the transit travel habit until an event they perceive as significant causes them to change it.

Chen, Varley, and Chen observed and measured this phenomenon in their study of the impact of changes in gasoline prices and transit fares on transit ridership in the New York City region. They concluded that "at the aggregate level, ridership seems to respond to rises in gasoline price, but not to falls."[38] They compared the rise and fall of transit ridership to gasoline price changes over three time lags: ridership one month after the price change, two months after, and three months after. When the price of gasoline increased, ridership grew at an elasticity between 0.19 and 0.38. When gasoline prices fell, the elasticities to transit ridership ranged from 0.05 to 0.06. The elasticities associated with falling gasoline prices were not statistically significant, but the idea that elasticities are different when prices rise and fall was confirmed.

This effect would mean that part of the growth in ridership calculated on Tables 3 and 4 would be retained when gasoline prices fall. It is estimated that an increase in gasoline prices from the $3.521 average for 2011 to $4.00 would result in an annual ridership increase from 10,407 million to 10,697 million trips. Using the Chen, Varley, Chen values for gas price decline, if the average price for gasoline for the year returned to $3.521, the annual new ridership would be 10,603 million; a retained increase of nearly 200 million trips. If the price per gallon dropped from $4.00 to $3.90, the annual new ridership would be 10,677 million, a retained increase of 270 million trips.

Additional Ridership Will Require More Investment

Meeting the additional demands for public transportation service in the short-term as well as the continuing long-term, will require more public transportation choices and an investment in new capacity. A comprehensive 2008 Cambridge Systematics report, "State and National Public Transportation Needs Analysis," concluded that $59.2 billion annually is needed to address future public transportation capital needs.[39] And certain segments of the population will have special needs, as is documented in "Funding the Public Transportation Needs of an Aging Population" which: a) identifies the range of actions that will be needed to expand mobility options for older people, including accessible public transportation services; b) quantifies the demand for these public transportation services; and c) estimates the funding that will be needed to provide them.[40] Furthermore, Generation Y, those between 20 and

30, prefer areas that are transit rich. Capturing these preferences will be critical to economic vitality through 2050.[41]

We must also be prepared to address immediate capacity issues. In 2008, 85 percent of transit agencies reported experiencing capacity constraints on parts of their systems. Of those agencies, 63 percent experienced capacity constraints during peak periods, 49 percent experienced capacity constraints on short segments of high ridership routes, 13 percent on numerous routes, and 8 percent experienced during off-peak hours.[42] Over one-half of the systems operated service that was crowded beyond their local service standards, despite 48 percent of agencies adding service. Thirty-nine percent reported that overcrowded conditions were such that they were turning away passengers.

Little has been done to correct this situation. Federal funding for public transit has been nearly stable since 2009. In 2011, 71 percent of transit agencies reported flat or decreased local government financial assistance and 83 percent reported flat or decreased state financial assistance.[43] During 2011, 54 percent of larger systems and 30 percent of other systems implemented or approved for implementation a transfer of funds from capital to operations to meet their budget needs. Fifty-eight percent of large systems and 38 percent of other systems implemented or approved implementation of the use of reserves to meet budget needs. These are not long-term strategies that prepare agencies to meet ridership demands resulting from increased motor gasoline prices and other forces that are leading Americans to chose public transportation as their travel mode.

Congress is currently considering long-term surface transportation authorization bills. The new authorization must recognize that immediate and long-term transportation options are critical, and should provide necessary investments to add immediate capacity to transit to provide greater financial security to Americans.

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Acknowledgements

Authors: Darnell Grisby, Director; John Neff, Senior Policy Researcher; Matt Dickens, Policy Analyst. Project Consultant: Todd Litman

For More Information

Darnell Chadwick Grisby
Director, Policy Development and Research
202.496.4817 | **dgrisby@apta.com**

For General Information

Policy Development and Research
Darnell Grisby, Director
202.496.4887 | **dgrisby@apta.com**
www.apta.com/resources/statistics

APTA Policy Department
Art Guzzetti, Vice President-Policy
202.496.4814 | **aguzzetti@apta.com**

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