SEPTA Service:
A Value Proposition for Philadelphians



ECONSULT SOLUTIONS INC.

November 2018

Key Findings: City Property Value

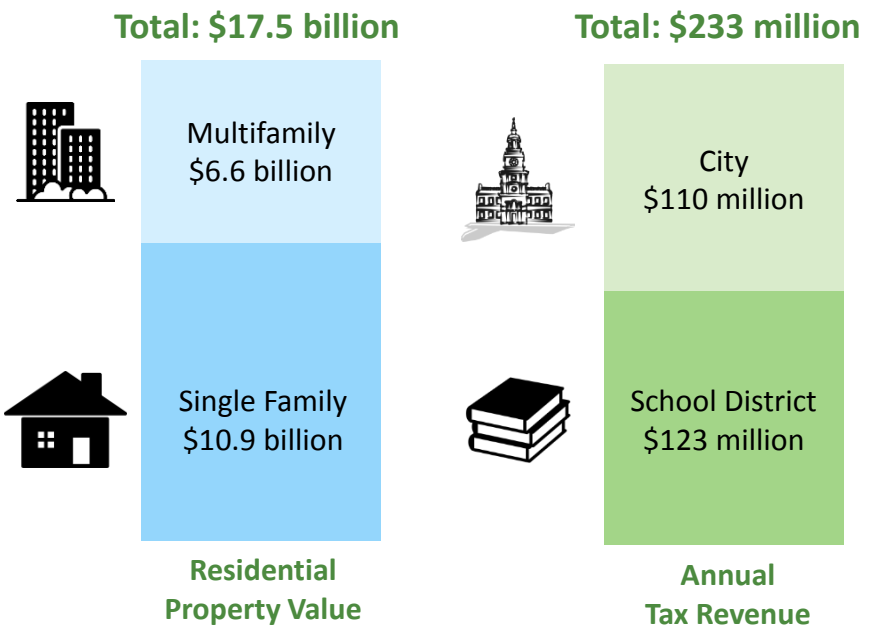
SEPTA' s transit service is a valued amenity for residents of the city and region. The amenity value it provides is reflected in housing markets, where homeowners demonstrate a willingness to pay more for an otherwise similar house with better service access.

This study analyzes SEPTA service throughout Philadelphia and uses thousands of housing market transactions to quantify the incremental housing value that access to this service provides. In aggregate, **proximity to SEPTA's service increases residential property values by $17.5 billion within the City of Philadelphia, accounting for 17.4% of total residential property value in the city.**

This increase in taxable value generates a combined **$233 million in annual property tax revenue** for the City and School District of Philadelphia.

These estimates do not reflect the additional value losses that would accrue if a diminution of SEPTA service made Philadelphia a less attractive place to work and do business.

SEPTA service accounts for 17.4% of residential housing value in the City of Philadelphia



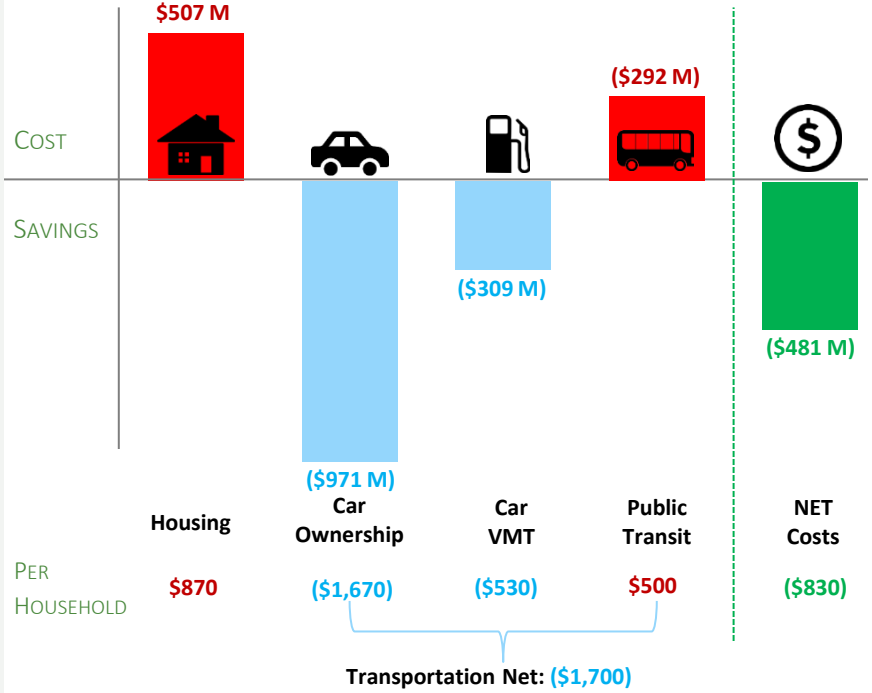
Key Findings: Affordability Implications

The transit housing premium builds wealth for homeowners throughout Philadelphia, but may increase annual housing costs for owners and renters. However, transit access also reduces transportation costs by allowing households to reduce car ownership and usage in favor of more economical transit trips.

This study illustrates the total affordability impacts on household budgets across Philadelphia of increases in housing cost and transportation cost savings due to SEPTA service. **Transportation cost savings are nearly twice large as additional housing costs, resulting in a net savings on housing and transportation of $830 per household, or $481 million in aggregate.**

In addition to annual cost benefits, housing values appreciate while car values depreciate. This means that households that can reduce their car ownership costs and use the savings to cover the premium for transit proximate housing build asset value more effectively.

Increases in housing costs from transit proximity are more than offset by transportation cost savings for the average household



Key Findings: Regional Property Value

The single family and multifamily premiums estimated for the City of Philadelphia can be combined with existing ESI estimates of premiums for single family housing located within three miles of Regional Rail stations throughout the suburban counties to yield a comprehensive regional estimate.

The aggregate housing premium in the suburban counties is estimated at more than $15 billion, representing 7% of all housing value across Bucks, Chester, Delaware and Montgomery Counties. In aggregate, **SEPTA service generates $33 billion in housing value across the southeast region, representing 11% of total regional housing value**.

The map on the following page illustrates the estimated percentage premium by location.

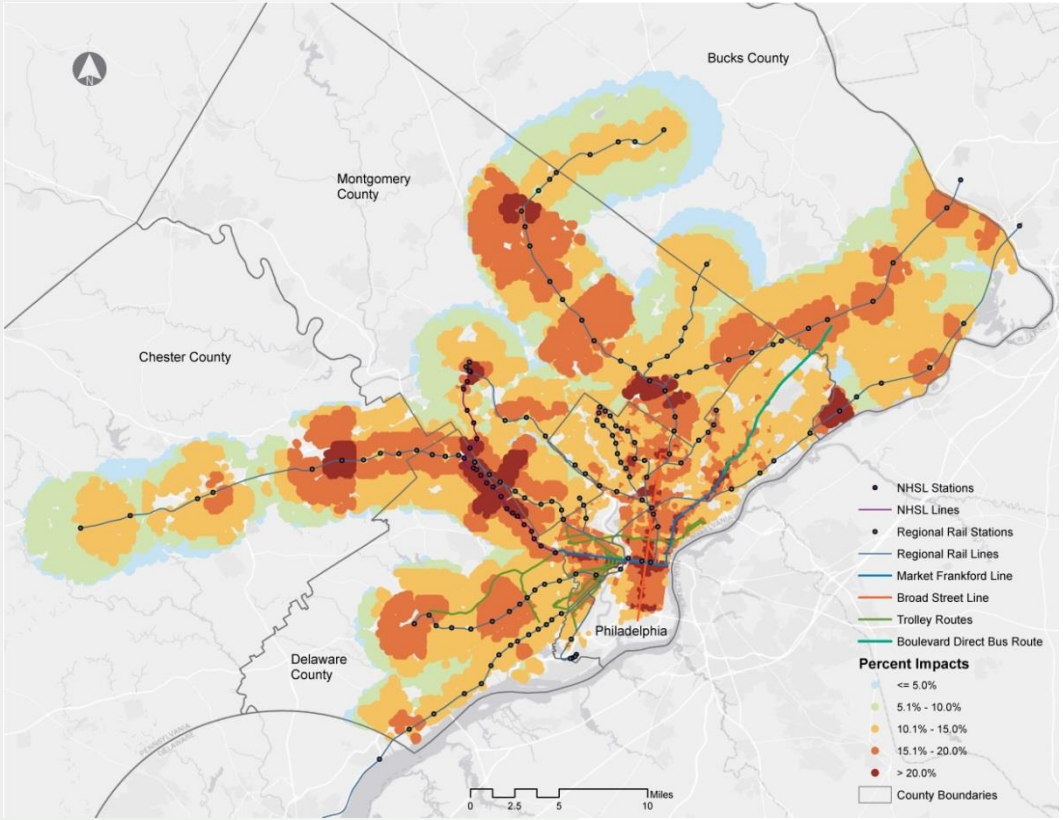
These estimates are limited to the value of access to service, and do not reflect the potential additional value loss due to the reduced economic competiveness of the region absent transit service.

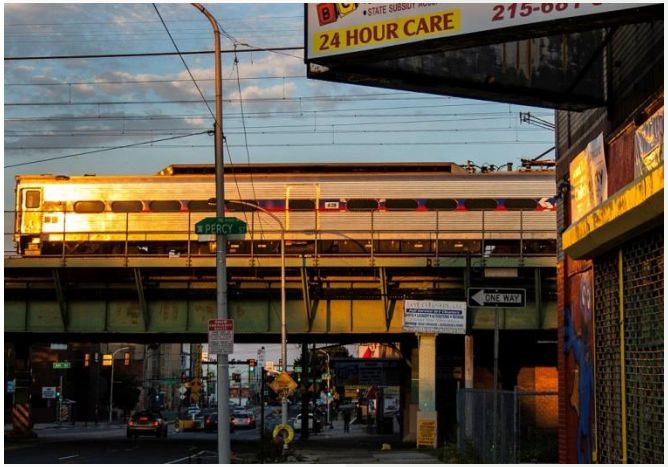
SEPTA service accounts for $33 billion in residential housing value across the five-county southeast region

County	Total Premium	Share of Housing Value	Premium per HH
Bucks	$2.9 B	7%	$12,500
Chester	$1.9 B	4%	$10,300
Delaware	$3.7 B	11%	$18,300
Montgomery	$6.6 B	8%	$21,400
Philadelphia*	$17.5 B	17%	$30,100
Region	**$32.7 B**	**11%**	**$21,600**

*Philadelphia estimates include both single family and multifamily housing, while suburban county estimates include single family only

Key Findings: Regional Housing Value Premiums





Methodology

Approach: Suburban Property Values

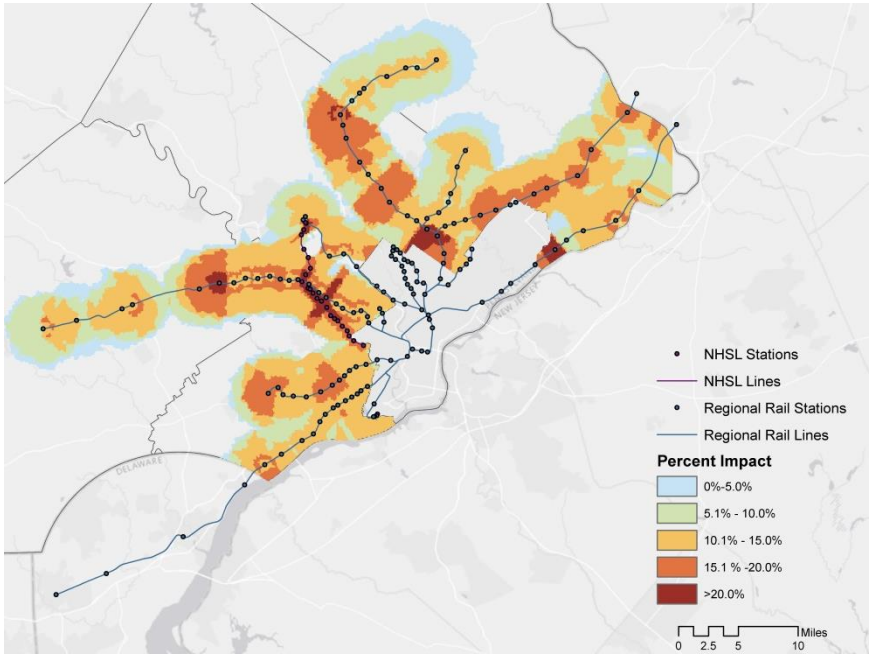
Suburban Premium

ESI's 2018 economic impact report quantified the "value premium" for suburban homes from Regional Rail and Norristown High Speed Line service.* This analysis used hedonic regression modeling to measure price differentials in market transactions for otherwise similar homes based on proximity to rail service. This analysis found that SEPTA rail service adds around $15 billion in property value, representing 7% of total residential property value across Bucks, Chester, Delaware and Montgomery counties.

The approach could not be applied directly within the City of Philadelphia, where the ubiquity of transit service made it impossible to directly compare similar homes within and without service.

SEPTA Drives the Economy of Pennsylvania, March 2018

SUBURBAN RESIDENTIAL PROPERTY VALUE SUPPORTED BY SEPTA SERVICE



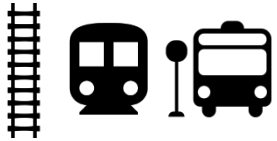
Approach: City Housing Impacts

A three step approach was utilized to study the impact of SEPTA service on housing within the City of Philadelphia:

- Step 1: A relative transit score was calculated for each property within the city, on a continuous scale.
- Step 2: These score differentials were exploited through hedonic regression analysis to isolate the impact of transit access of residential property values, as expressed through arms length housing market transactions.
- Step 3: An affordability analysis was undertaken to determine the net impact on household budgets by comparing increases in housing costs from the transit value premium to savings on transportation costs through reduced reliance on cars.

Impacts are compared to a baseline of zero transit service, but consider only the direct amenity value to households of transit access, and not the downstream consequences (increased congestion, loss of competitiveness, increased pollution, etc.) from eliminating transit.

1 – Relative Transit Scores



2 – Property Value Impacts



3 – Affordability Implications

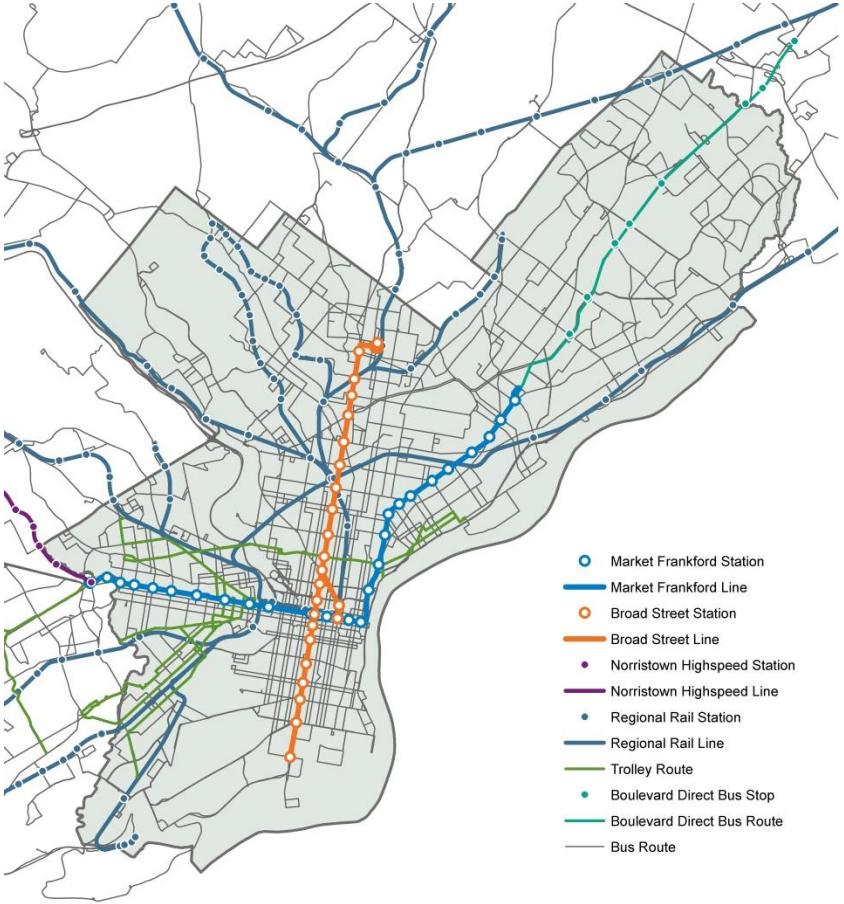


Scores by Transit Stop

First, a relative score was assigned to every transit stop in the city, comprised of:

- 7,794 bus stops
- 386 trolley stops
- 52 subway and elevated stops
- 53 regional rail stops

Scores are a function of the volume, frequency and types of service at each location, with controls for neighborhood characteristics. The relative weight of each characteristic, including service mode type, was determined based on regression analysis which measured the impacts of the service characteristics on ridership. Based on this analysis, subway/elevated service is the most valued mode, followed by direct bus service, regional rail, trolley and bus.



Relative Scores by Transit Stop

The table at right provides an illustration of relative transit scores for sample transit stops, ranging from 5 to 100.

A bus stop with typical service has a relative transit score of approximately 5. Trolley service from a single route has a relative transit score of approximately 10. Frequent bus service increases scores materially, depending on the number of routes and frequencies at a given stop, with a score of 20 at Chelten Ave and Greene Street.

Higher scores are observed at stops that combine modes and feature heavy rail. The Broad & Spring Garden BSL stop scores a 40 and the Frankford Transportation Center a 60.

The highest scores in the city are at 30th and Market (80) and 15th and Market (100), where frequent service from a wide variety of modes is combined.

TRANSIT SCORES AT SAMPLE TRANSIT STOPS

Transit Score	Location	Nearby Service
5	Germantown Av & Bells Mill Rd	Bus
10	49th St & Baltimore Av	Trolley
20	Chelten Av & Greene St	Frequent Bus Service
40	Broad & Spring Garden	Subway, Bus
60	Frankford Transportation Center	Subway, Direct Bus, Bus
80	30th & Market	All
100	15th & Market	All

Scores by Property

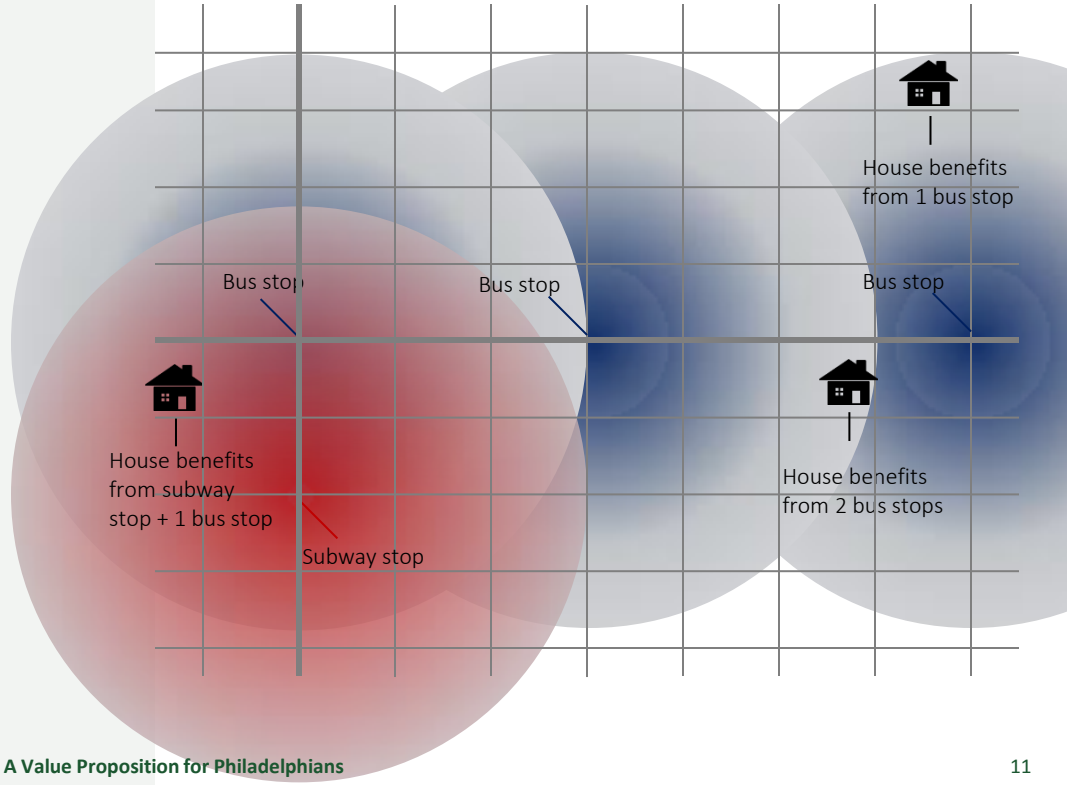
Next, spatial analysis was applied to assign a relative transit score to each property in the city based its distance relationship to transit stops of varying quality.

Using the Kernel Density Tool in ArcMap,* a continuous surface is fit to each parcel in the city by decaying the score of each transit stop to neighboring parcels out to 3/8 of a mile. The surface value is highest at the location of the point and diminishes with increasing distance from the point, reaching zero at the "search radius distance" (3/8 mile) from the point.

The score for a given parcel is the sum of all nearby transit stops, decayed at various rates based on proximity.

*The kernel function is based on the quartic kernel function described in Silverman (1986, p. 76, equation 4.5).

Sample Transit Score Calculation by Residential Property



Transit Scores: Heat Map

The heat map at right shows relative transit scores throughout the City of Philadelphia.

Scores are highest where multiple modes of travel intersect, most notably in the downtown core. The effect of subway stops are apparent along the lengths of the MFL and BSL lines, with additional value at terminal stations and key connection points.

Higher scores are also visible along trolley lines, and at bus stops served by multiple or frequent routes.

CITY OF PHILADELPHIA RELATIVE TRANSIT SCORES BY PROPERTY



Distribution of Transit Scores

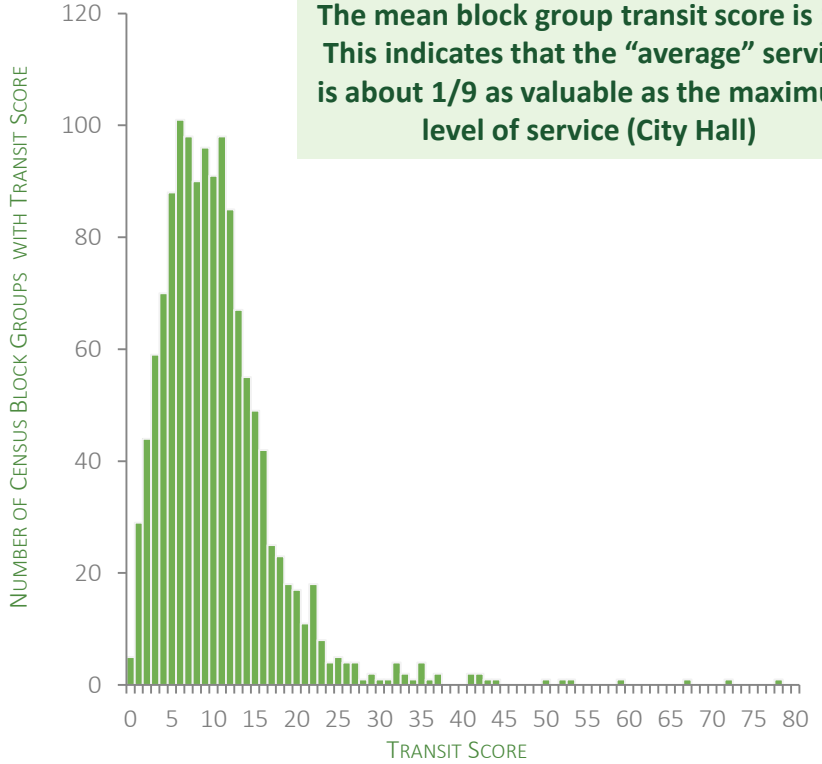
The graphic at right shows average transit scores by Census block group, of which there are 1,336 in the City of Philadelphia. The mean score across block groups is 11, while the median score is a 9.

Importantly, transit scores are calculated entirely in reference to other SEPTA service within the city of Philadelphia. Therefore, a service level above or below the median does not imply that service quality is "good" or "bad" in a normative sense (relative to the needs of a neighborhood).

The mean score of 11 implies that SEPTA service in the average block group is about 1/9 as valuable as the top single point of service (City Hall), which is set to 100 by definition.*

* Note that the mean must reflect the relative value differences between service in order to accurately calculate property value and affordability impacts. For this reason, the mean cannot be artificially scaled to 50, since this would incorrectly imply that maximum service is only 2x as valuable as the average service throughout the city.

Distribution of Average Transit Scores by Census Block Group



The mean block group transit score is 11. This indicates that the "average" service is about 1/9 as valuable as the maximum level of service (City Hall)

Relative Scores by Neighborhood

The table at right provides an illustration of relative transit scores for sample neighborhoods.

Differentials reflect differences in modes and frequency types. Neighborhoods served by fixed rail and moderate levels of bus service like Fox Chase and West Oak Lane average 5 and 7.5 respectively.

Neighborhoods with good access to subway / elevated service and other modes (trolley, bus) like Fishtown and Powelton average 10 and 12.5 respectively.

Neighborhoods that combine subway access with frequent bus service like Fairmount and South Philadelphia average 15 and 17.5 respectively.

The highest scores are seen in Center City, where a variety of modes converge.

TRANSIT SCORES WITHIN EXAMPLE NEIGHBORHOODS

Transit Score	Neighborhood	Nearby Service
5	Fox Chase	Regional Rail, Bus
7.5	West Oak Lane	BSL, Regional Rail, Bus
10	Fishtown	MFL, Trolley, Bus
12.5	Powelton	MFL, Trolley, Bus
15	Fairmount	BSL, Frequent Bus Service
17.5	South Philadelphia	BSL, Frequent Bus Service
35	Center City West	All



Housing Value Premiums



Hedonic Regression Modeling

Hedonic regression analysis seeks to isolate the explanatory power of single variable of interest (like proximity to transit) by holding constant other relevant housing characteristics (like square footage, # of bedroom, year built, etc.). This technique is commonly applied to housing market transaction data to evaluate the value premium associated with various amenities (or disamenities).

Our analysis uses more than 313,000 arms length transactions of single family houses in Philadelphia from 2000 to 2018, including more than 66,000 in the 2014-2018 period since the passage of the Act 89 transportation funding package. Controls are included for housing characteristics as well as neighborhood characteristics.

The model seeks to **isolate the difference in the observed transaction price of a given house attributable to transit access** as measured by its transit quality score, holding all other housing and neighborhood features constant. This estimated value premium is then applied to all single family houses in the City of Philadelphia, whether or not they have transacted within the observation period.



Property Value Impacts: Results

Hedonic analysis reveals a positive relationship between transit scores and housing values within the City of Philadelphia. Holding other factors constant, **a 10 point increase in transit score translates to a 5.8% increase in the sale price of a single family house.**

This transit premium can be conceptualized by considering the predicted price of a house with identical structural characteristics (size, number of rooms, year built, etc.) in different locations with varying transit scores.

A house that sells for $200,000 without any nearby service would see an increase in price due to transit proximity to $208,800 in West Oak Lane, $214,700 in Powelton, and $220,100 in South Philadelphia.

10 pts in transit score = 5.8% in housing value





SAMPLE PROPERTY VALUE BY TRANSIT SCORE

Transit Score	Example Neighborhood	Property Value	Premium (%)
0	--	$200,000	--
5	Fox Chase	$205,800	3%
7.5	West Oak Lane	$208,800	4%
10	Fishtown	$211,600	6%
12.5	Powelton	$214,700	7%
15	Fairmount	$217,300	9%
17.5	South Philadelphia	$220,100	10%

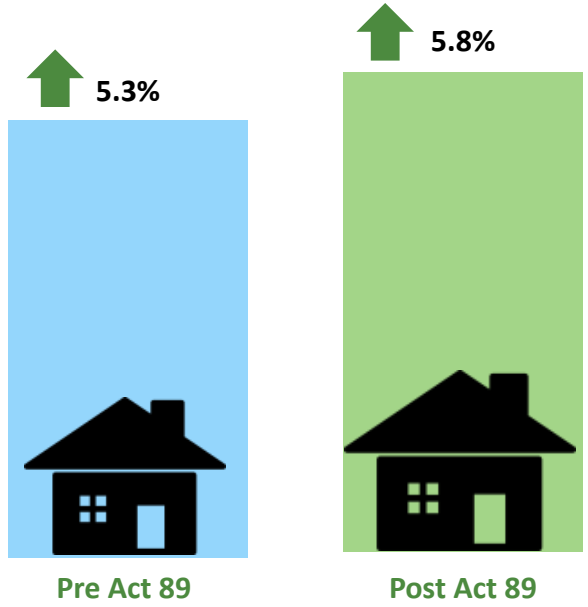
Value Premium: Pre and Post Act 89

Premiums for transit proximity are higher using transactions from the 2014-2018 period following the passage of the Act 89 state transportation funding package than the premiums observed in transactions prior to this period. Act 89 funding increased the certainly and stability of SEPTA's capital and operating funding, increasing the long-term amenity value of proximity to service.

Housing premiums for the 2014-2018 period averaged 5.8% for each ten points of transit score, relative to 5.3% for each 10 points of transit score for transactions occurring from 2000-2013, suggesting an increase in the relative value of transit.

While this difference is statistically significant, this method does not establish that Act 89 is the sole cause of this difference. For instance, increases in the employment base of the city could also enhance the attractiveness of houses that are well-served by transit. The more recent (Post Act 89) estimates are considered to be most reflective of current conditions, and are therefore used to estimate value premiums throughout this report.

HOUSING VALUE PREMIUM PER 10 POINTS OF TRANSIT SCORE

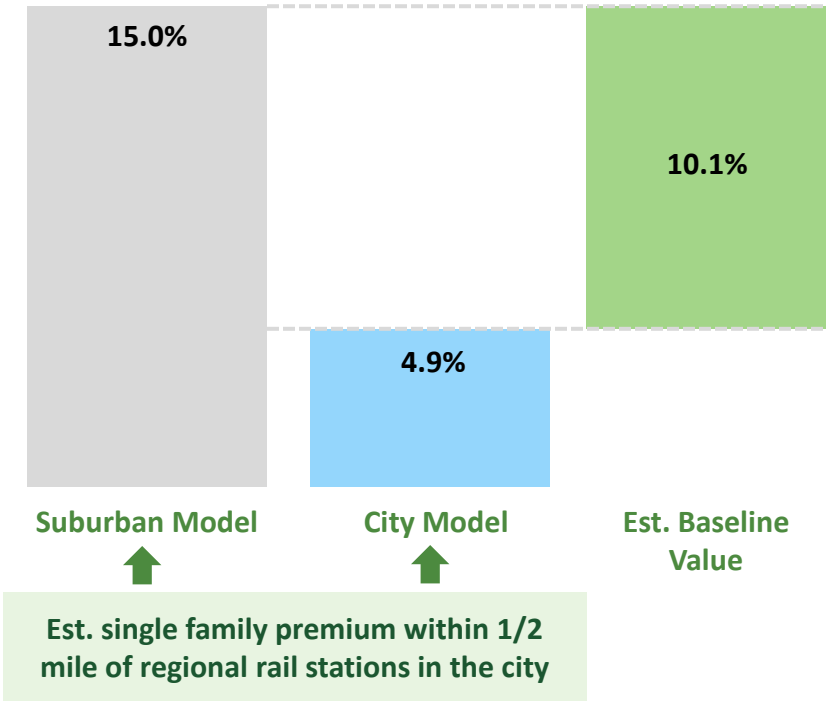


Baseline Residential Value Impact

The relative transit scores developed in this analysis exploit differences in service proximity between houses within the City of Philadelphia to observe differences in price. However, due to the ubiquity of SEPTA service within the City, it is impossible to observe a true comparison of houses with and without transit access, in contrast to less dense suburban areas. Accordingly, an additional step is needed to define the "baseline" value generated by transit access to all housing across the city, which is additive to the proximity value conferred by greater access at specific locations.

This baseline value is estimated by comparing results near Regional Rail stations within the city to results generated under ESI's suburban Regional Rail analysis, which by its nature was able to identify houses with little or no transit access as a comparison point. **The net differential between the higher estimated premiums near stations in the suburbs and those in the city is understood to reflect the baseline value of transit, which is estimated at 10.1%.**

ESTIMATE OF BASELINE HOUSING VALUE IN THE CITY



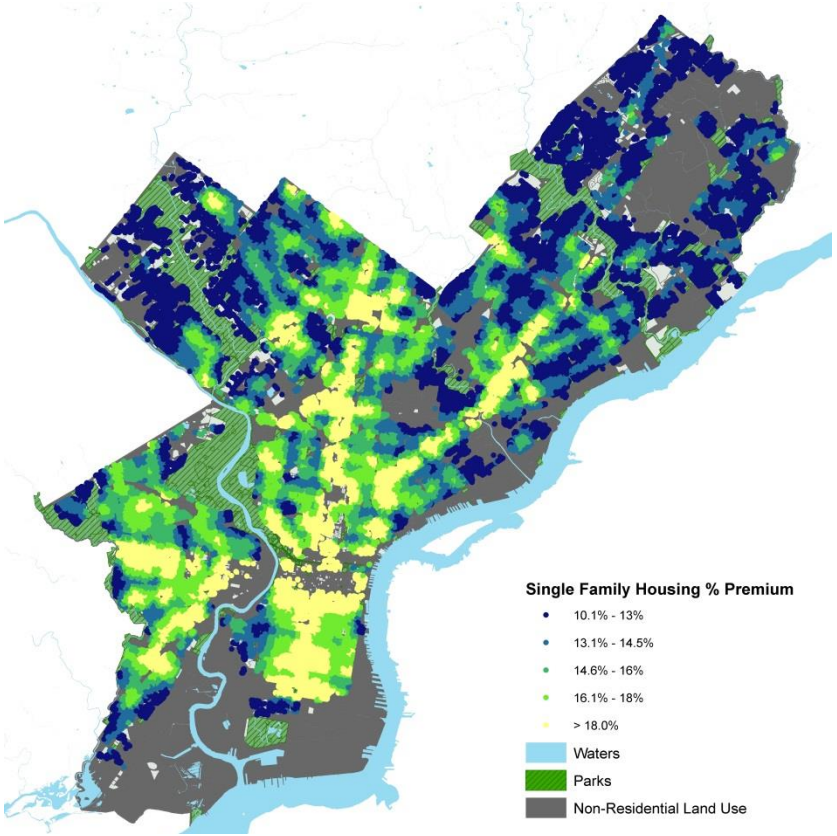
Single Family Property Value Impacts by Location

The map at right displays the single family property value impacts of SEPTA's transit service in the city. Property value impacts are shown on a percentage basis, with higher values shown in brighter colors. Impacts are largest in the immediate vicinity of stations where transit scores are the highest, and then dissipate out to a 3/8 mile buffer.

Proximity to SEPTA's service increases single family home values by $10.9 billion within the City of Philadelphia, accounting for 15.4% of total single family residential property value in the city.

Of this premium, $3.8 billion is attributable to relative proximity value, while another $10.9 billion is attributable to the baseline value throughout the city.

.



Multifamily Property Value Impacts by Location

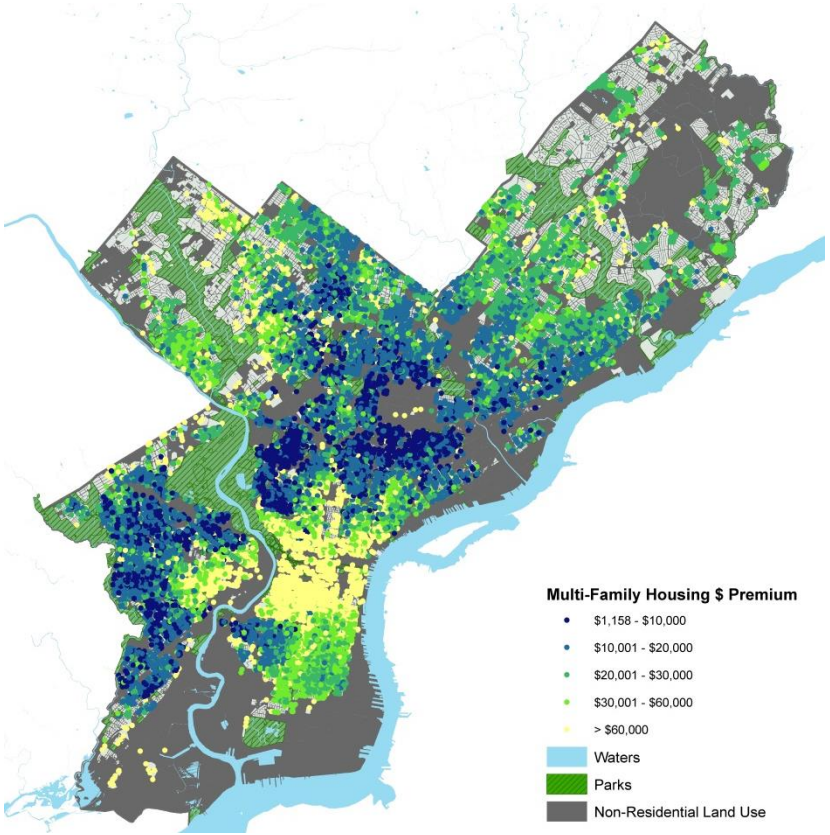
Transit access also carries amenity value for residents in multifamily housing (apartments, condominiums, etc.). The popularity of these housing types in the City of Philadelphia means that this value premium is also significant.

Since the same volume of transactions cannot be observed in this market, impacts are estimated by applying transit premium by location calculated for single family housing to the assessed value of multifamily buildings.*

Proximity to SEPTA's service is estimated to **increase multifamily property values by $6.6 billion, accounting for 22.1% of total multifamily property value in the City of Philadelphia.**

The higher percentage premium for multifamily housing is driven by locational differences, with this type of housing clustering in areas that are well-served by transit.

* Mixed use buildings were included at 70% of assessed value to represent the residential portion. Total citywide assessed value for multifamily is around $30 billion.



Property Value Impacts: Aggregate Value

Single family and multifamily impacts can be combined to represent total residential property value impacts from SEPTA service:

- The $10.9 billion increment in single family residential property value represents 15.4% of the aggregate single family residential property value, with an average value premium of $25,700 per house.
- The $6.6 billion in multifamily residential property value represents 22.1% of the aggregate multifamily residential property value, with an average value premium of $117,800 per building, and $41,700 per household.

Combined, **proximity to SEPTA's service increases residential property values by $15.9 billion within the City of Philadelphia, accounting for 17.4% of total residential property value in the city.**

Of this value, 7.3% is attributable to location specific premiums, and 10.1% to the baseline value premium across the city.

IMPACT OF SEPTA SERVICE ON RESIDENTIAL PROPERTY VALUES WITHIN THE CITY OF PHILADELPHIA

	Single Family	Multifamily	Total
Current Value	$71.0 bil	$29.9 bil	$100.9 bil
Transit Proximity Premium	5.3%	12.0%	7.3%
Transit Baseline Premium	10.1%	10.1%	10.1%
Transit Premium (%)	15.4%	22.1%	17.4%
Transit Premium ($)	$10.9 bil	$6.6 bil	$17.5 bil
Premium per HH	$25,700	$41,700	$30,100

Regional Residential Value Premium

The aggregate residential property value estimate for the City of Philadelphia can be combined with ESI estimates of single family housing value across the four suburban counties to yield a collective estimate of residential property value impacts from SEPTA service across southeastern Pennsylvania.

Based on hedonic analysis of post Act 89 single family transactions within a three mile catchment of Regional Rail stations, the aggregate housing premium from SEPTA service is estimated at more than $15 billion across Bucks, Chester, Delaware and Montgomery counties. Combined with the $17.5 billion in value within Philadelphia, SEPTA service **generates $32.7 billion in housing value across the southeast region, representing 11% of total regional housing value**. This figure is up from $24 billion based on analysis of transactions taking place prior to Act 89.

These estimates are limited to the value of access to service, and do not reflect the potential additional value loss due to the reduced economic competiveness of the region absent transit service.

IMPACT OF SEPTA SERVICE ON RESIDENTIAL PROPERTY VALUES WITHIN THE FIVE COUNTY REGION

	Post Act 89			Pre Act 89		
County	Total Premium	% of Value	Premium per HH	Total Premium	% of Value	Premium per HH
Bucks	$2.9 B	7%	$12,500	$2.2 B	5%	$9,300
Chester	$1.9 B	4%	$10,300	$1.4 B	3%	$7,500
Delaware	$3.7 B	11%	$18,300	$2.9 B	8%	$14,300
Montco	$6.6 B	8%	$21,400	$5.1 B	6%	$16,400
Phila*	$17.5 B	17%	$30,100	$12.9 B	13%	$22,200
Region	**$32.7 B**	**11%**	**$21,600**	**$24.4 B**	**7%**	**$16,100**

*Philadelphia estimates include both single family and multifamily housing, while suburban county estimates include single family only

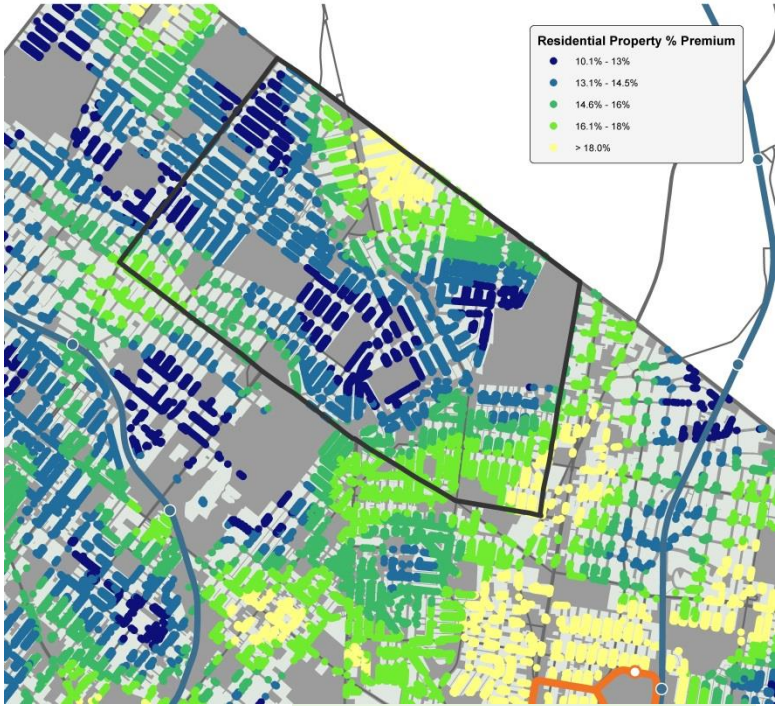
Property Value Impacts: West Oak Lane

Housing premiums can also be calculated for specific neighborhoods to illustrate the impact at a more granular level.

West Oak Lane is served by eight bus routes (6, 18, 22, 80, H, K, L, XH). It is also near the Fern Rock Transportation Center (terminus of the Broad Street Line), and the Chestnut Hill East and Lansdale/Doylestown Regional Rail lines.

In aggregate, SEPTA service adds $166 million in single family and multifamily housing value within this neighborhood, which represents 14.7% of total housing value.

The highest premiums (shown at right) are evident near the Fern Rock station and near Regional Rail stations.



TRANSIT PREMIUM

Total: $166 million
Share of Total Value: 14.7%
Per Household: $11,950

*Block groups included in this neighborhood are: 421010262001 – 421010262004, 421010263011 – 421010263014, 421010263021 – 421010263024, 421010264001 – 421010264007, 421010265001 – 421010265006, 421010266001 – 421010266008, 421010267001- 421010267007

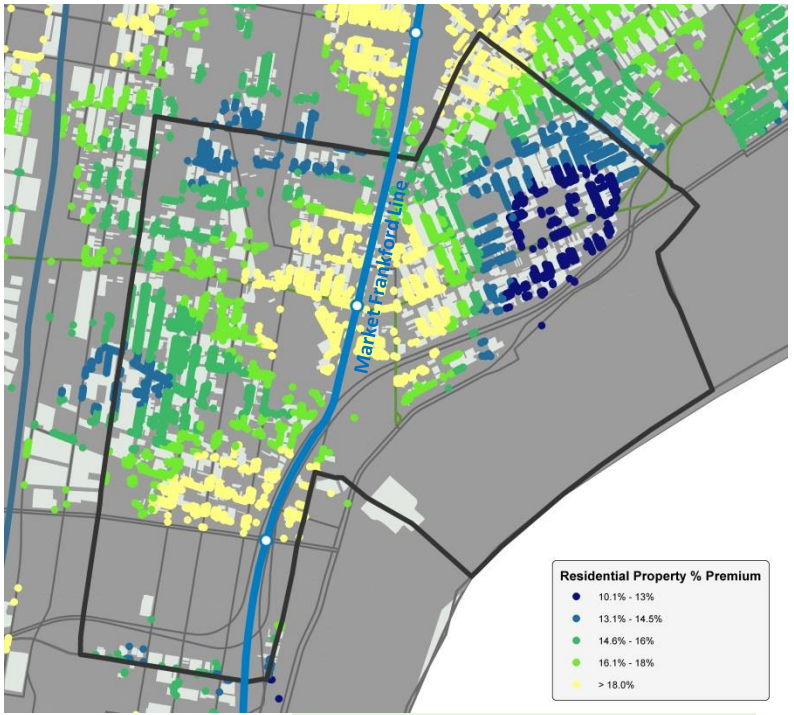
Property Value Impacts: Fishtown

Fishtown is served by the Market-Frankford Line, Trolley Route 15, and seven bus routes (5, 25, 43, 57, 15B, 78, and MFO).

In aggregate, SEPTA service adds $584 million in single family and multifamily housing value within this neighborhood, which represents 16.9% of total housing value.

The highest premiums (shown at right) are evident near MFL stations (Spring Garden and Girard).

*Block groups included in this neighborhood are: 421010142001, 421010142002, 421010143001, 421010143002, 421010144001, 421010144002, 421010144003, 421010158001 - 421010158006, 421010367001, 421010367002



TRANSIT PREMIUM

Total: $584 million
Share of Total Value: 16.9%
Per Household: $74,100

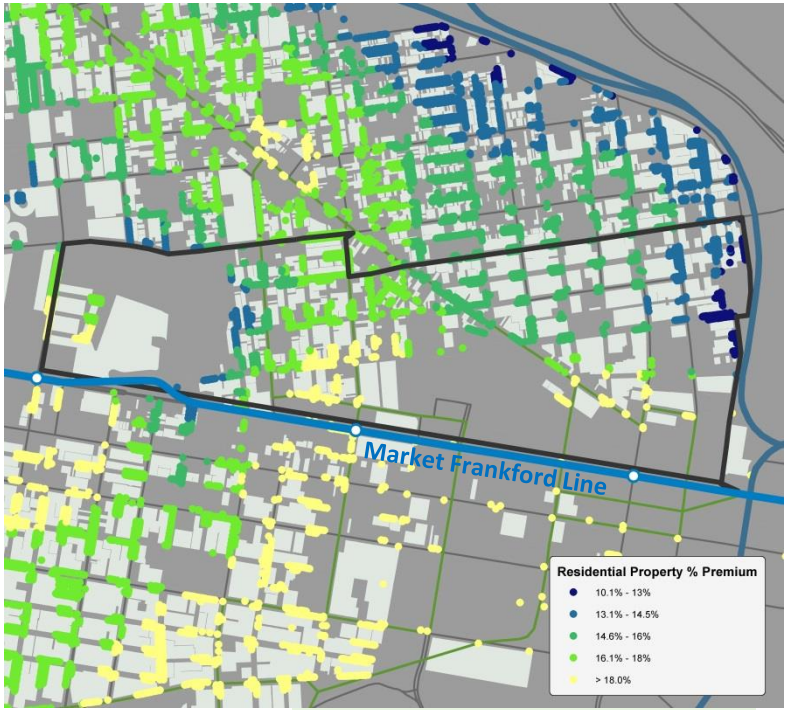
Property Value Impacts: Powelton

Powelton is served by the Market Frankford Line, five trolley routes (10, 11, 13, 34 and 36) and five bus routes (30, 31, 40, LUCYG and LUCYGR). It is also adjacent to Regional Rail service at 30th Street Station.

In aggregate, SEPTA service adds $162 million in single family and multifamily housing value within this neighborhood, which represents 17.2% of total housing value.

The highest premiums (shown at right) are near the 34th Street MFL station, and where Lancaster Avenue approaches 30th Street station.

*Block groups included in this neighborhood is 421010090001 - 421010090004, 421010091001, 421010091002, 421010091003, 421010092001, 421010092002



TRANSIT PREMIUM

Total: $162 million
Share of Total Value: 17.2%
Per Household: $44,300

Property Value Impacts: South Philadelphia

South Philadelphia is served by the Broad Street Line and eight bus routes (7, 29, 45, 47, 47M, 68, 79 and G).

In aggregate, SEPTA service adds $277 million in single family and multifamily housing value within this neighborhood, which represents 19.7% of total housing value.

The highest premiums (shown at right) are evident around the BSL stations (at Oregon and Snyder) and along Oregon Ave, where there is frequent bus service.

*Block groups included in this neighborhood are: 421010040011 – 421010040014, 421010040021 – 421010040024, 421010041011 – 421010041014, 421010041021 - 421010041024



TRANSIT PREMIUM

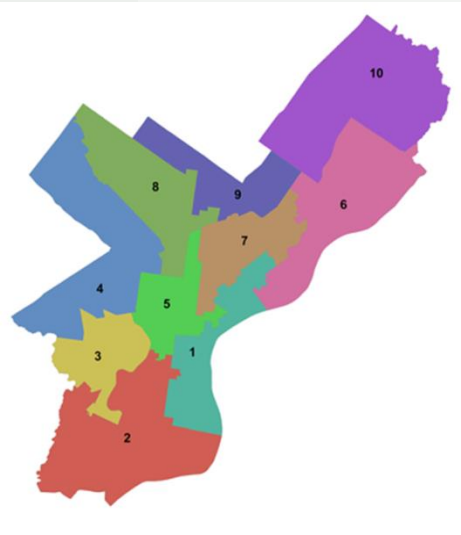
Total: $277 million
Share of Total Value: 19.7%
Per Household: $31,300

Property Value Impacts by Council District

Impacts can also be aggregated into Philadelphia's ten City Council Districts (shown at right). Significant housing value premiums are evident in each Council District.

The largest premiums on a per household basis are seen in District 1, District 5, District 2 and District 3, which feature the greatest density of BSL and MFL service.

Notably, a large share of the multi-family housing premium occurs in these Districts, while in the remaining districts the premium is primarily captured by single family properties.



IMPACT OF PROXIMITY TO SEPTA SERVICE ON RESIDENTIAL PROPERTY VALUES WITHIN THE CITY OF PHILADELPHIA BY COUNCIL DISTRICT

District	Total Premium	Single Family	Multi-Family	% of Tot Value	Premium per HH
1	$3.96 bil	$2.14 bil	$1.82 bil	21.8%	$60,600
2	$2.61 bil	$1.63 bil	$980 mil	19.5%	$41,800
3	$1.21 bil	$510 mil	$710 mil	18.2%	$22,800
4	$1.37 bil	$1.06 bil	$310 mil	13.5%	$23,100
5	$3.05 bil	$1.17 bil	$1.88 bil	21.6%	$53,600
6	$1.06 bil	$920 mil	$130 mil	13.4%	$19,000
7	$0.82 bil	$710 mil	$110 mil	15.8%	$16,300
8	$1.20 bil	$940 mil	$260 mil	14.5%	$20,500
9	$0.85 bil	$700 mil	$160 mil	14.8%	$14,500
10	$1.39 bil	$1.16 bil	$230 mil	12.3%	$22,800
City	$17.5 bil	$3.34 bil	$3.41 bil	17.4%	$30,100

Tax Revenue Impacts

Higher property values translate into higher revenues for the School District and City of Philadelphia. Applying the transit value premium to the taxable assessed value of each residential property in the city, it is estimated that transit contributes $16.0 billion in additional taxable value each year, which is subject to the city and school district property tax rates.

In addition, the transit premium leads to higher housing sales prices. Using observed single family home sales from 2014-2016, it is estimated that transit increases aggregate sales value by $89 million a year, which is subject to city and state real estate transfer tax rates.

Combined, the incremental value from the transit premium generates $123 million annually in tax revenue for the School District and $110 million annually for the City of Philadelphia.

Importantly, these fiscal impacts do not include the wage business tax revenues that result from transit's contribution to the attractiveness of the city as a place to do business.



$123 million
School District property tax revenue



$110 million
City tax revenue

$101 million
Property tax

$9 million
RE transfer tax

The transit premium yields $233 million in additional School District and City tax collections each year



Affordability Implications



Housing and Transportation Costs

The housing premium from transit benefits many Philadelphia residents by increasing the value of their most important financial asset. It may also increase their annual housing costs:

- For homeowners, higher values may mean a higher mortgage, higher property taxes, and higher expenses like insurance
- For renters, higher values mean more expensive rental rates

However, it is mistake to isolate housing costs from the other costs that a household faces. Most notably, transportation costs are often tied to housing costs due to **location efficiency.** This concept captures the fact that certain housing locations result in lower transportation costs, whether through shorter commutes or the availability of lower cost options like public transit.

Due to this dynamic, combining housing and transportation costs gives a more accurate picture of impacts on a household budget than considering housing costs alone.



Transit Access and Transportation Savings

Within Philadelphia, transit scores are clearly related to transportation behavior and costs. The table at right shows transportation activity for a moderate income household in census block groups aggregated into quartiles based on their mean transit scores, using from the Center for Neighborhood Technology's Housing and Transit Index.

As the transit score of a block group increases, transit usage grows, while the average number of autos owned and miles driven falls. As a result, auto ownership and operating costs per household fall, while public transit costs increase.

On net, **transportation costs fall as transit access improves.**

TRANSIT SCORE IMPACT ON TRANSPORTATION USAGE AND COST FOR A MODERATE INCOME HOUSEHOLD

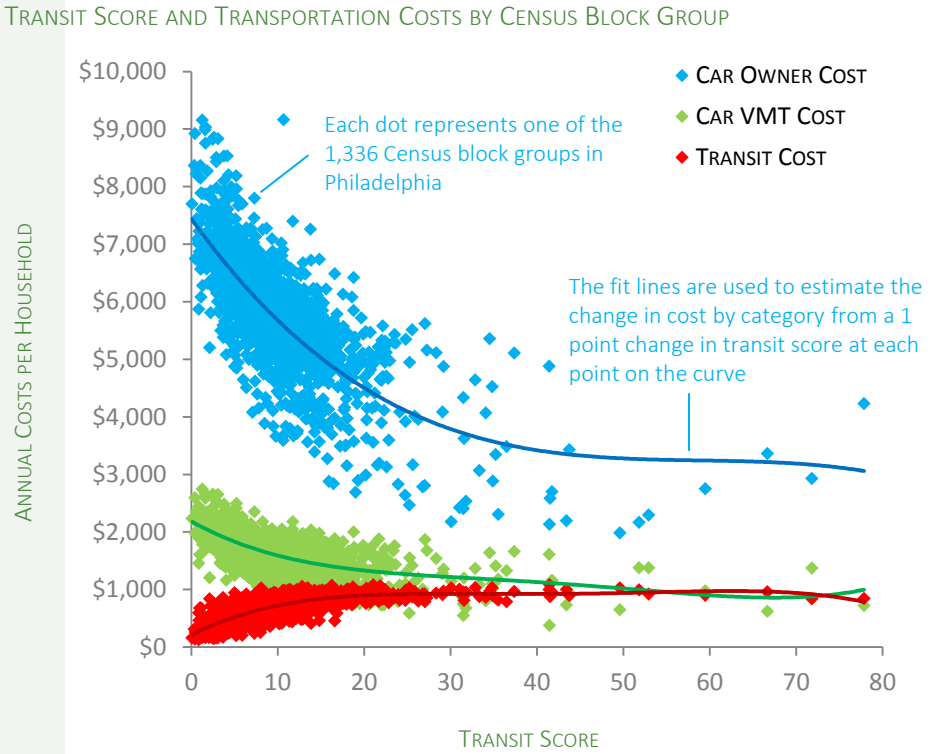
	Average Transit Score by Census Block Group			
	First Quartile (Lowest)	Second Quartile	Third Quartile	Fourth Quartile (Highest)
Transit Commute %	18%	26%	31%	35%
Annual Transit Trips	320	450	540	620
Autos Owned*	1.3	1.0	0.9	0.8
Annual VMT	13,000	11,400	10,500	9,300
Annual Auto Ownership Cost	$6,800	$6,000	$5,500	$4,700
Annual Auto VMT Cost	$1,900	$1,700	$1,500	$1,400
Annual Transit Cost	$400	$600	$800	$900
Annual Transportation Cost	$9,100	$8,300	$7,800	$7,000

* Calculated directly from ACS 2012-2016 data

Modeling Transportation Costs

The relationship between transit scores and transportation costs is defined more precisely through a regression analysis of all 1,336 block groups in Philadelphia. The scatterplot at right shows the declining relationship between transit scores and car ownership costs (in blue) and car operating costs (in green) as well as the increasing relationship between transit scores and public transit costs (in red).

Regression analysis defines the polynomial "fit lines" for these relationships, which are utilized to model the percentage impact of each one unit change in transit score. When applied to each block group this calculation is unique on two dimensions, incorporating the starting point costs for each block group (as estimated by CNT) and the point on each curve (which are non-linear as shown) at which the change in transit score occurs.



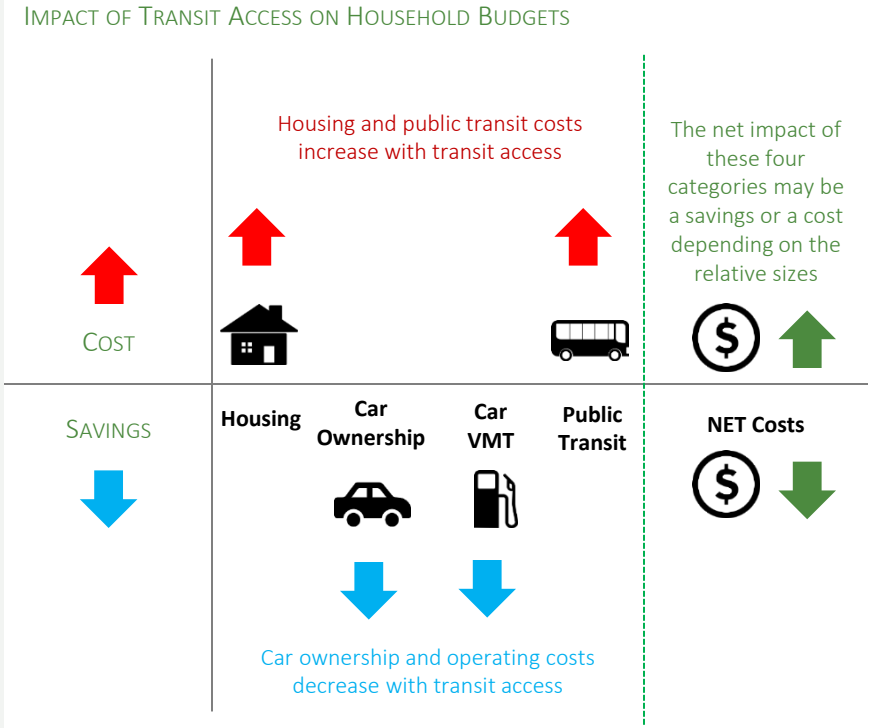
Measuring Household Budget Impacts

The relationships between transit service and housing value established in this analysis can be used to understand the net impact of SEPTA service on household budgets across Philadelphia.

As reviewed above, transit access decreases car ownership and operating costs (by reducing usage) while increasing public transit costs (by increasing usage).

Transit access also increases housing costs at a given location by increasing housing value. Importantly, only the portion of the housing value attributable to proximity are considered, since the baseline value does not distinguish between locations, and must be fully compensated by an increase in equilibrium wages across the city in order to be sustainable over the long-term.

Net budget impacts for housing and transportation costs for a given household or neighborhood can be positive or negative, depending on whether savings outweigh cost increases.

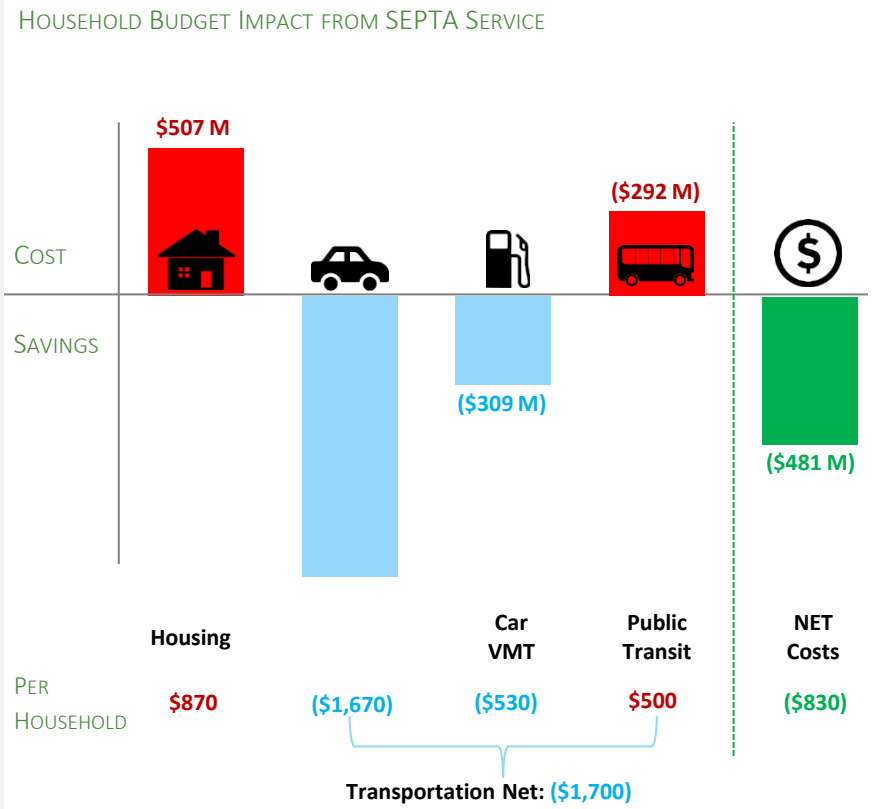


Household Budget Impact from SEPTA Service

Housing cost impacts are calculated by applying the estimated transit premium to annual housing costs by block group drawn from Census Bureau data to yield incremental increases in housing costs. Estimated additional costs from the transit proximity premium average $870 per household, or $507 million in aggregate.

Household budget impacts on transportation costs are based on current costs for a moderate income household estimated by CNT by block group and the relationships between transit access and transportation costs described above.

On a citywide basis, **transportation cost savings from SEPTA service are nearly twice as large as additional housing costs.** Transportation savings average $1,700 per household, resulting in a **net savings on housing and transportation of $830 per household, or $481 million in aggregate.**

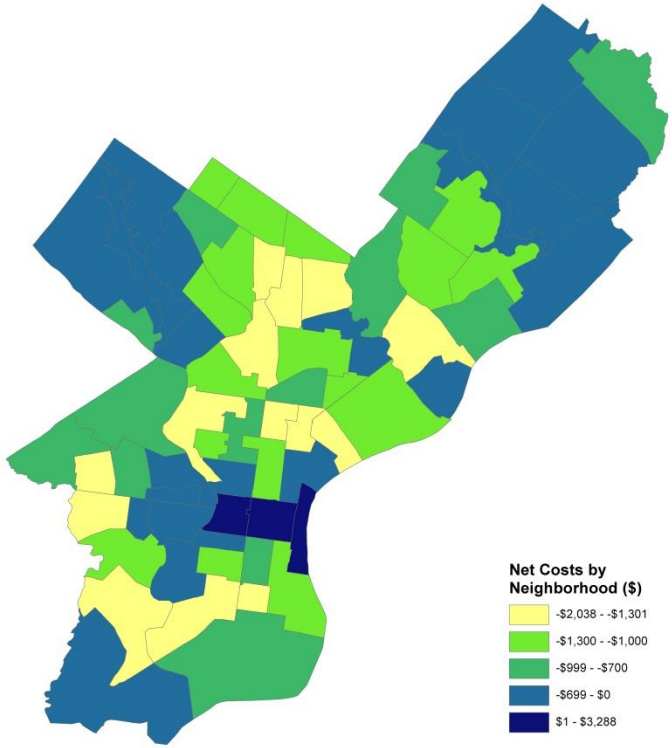


Household Budget Impacts by Neighborhood

Household budget impacts from SEPTA service can also be calculated at the neighborhood level. The map at right shows net savings on housing and transportation costs for a moderate income household by neighborhood across Philadelphia.

Net budget impacts are positive (meaning savings from reduced car ownership and usage outweigh increased housing and public transit costs) for all neighborhoods outside of Center City.

Savings levels vary due to both the level of transit service and the characteristics of the neighborhood. The highest values are seen in neighborhoods where housing costs are low and transit can replace auto trips for relatively long commutes. These dynamics are visible in neighborhoods in West Philadelphia, North Philadelphia and South Philadelphia. Where initial housing costs are high and car usage relatively low (as within and around Center City), savings are less significant.



Household Budget Impacts: West Oak Lane

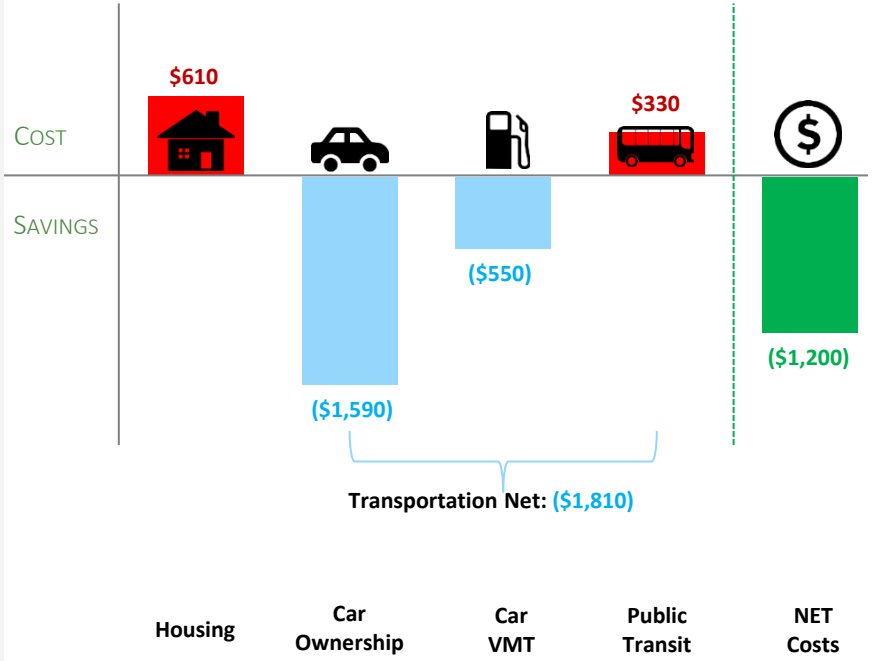
Neighborhood level results by category help to illustrate how these savings dynamics vary in different parts of the city.

Annual housing costs in West Oak Lane increase by $610 per household due to the value increase from the transit premium.

Net transportation savings from SEPTA service for a moderate income household in this neighborhood are $1,810, due to significant savings in car ownership costs and greater savings in car operating costs than increases in public transit costs.

Net housing and transportation savings from SEPTA service average $1,200 per household.

HOUSEHOLD BUDGET IMPACT FROM SEPTA SERVICE (PER HOUSEHOLD)
WEST OAK LANE



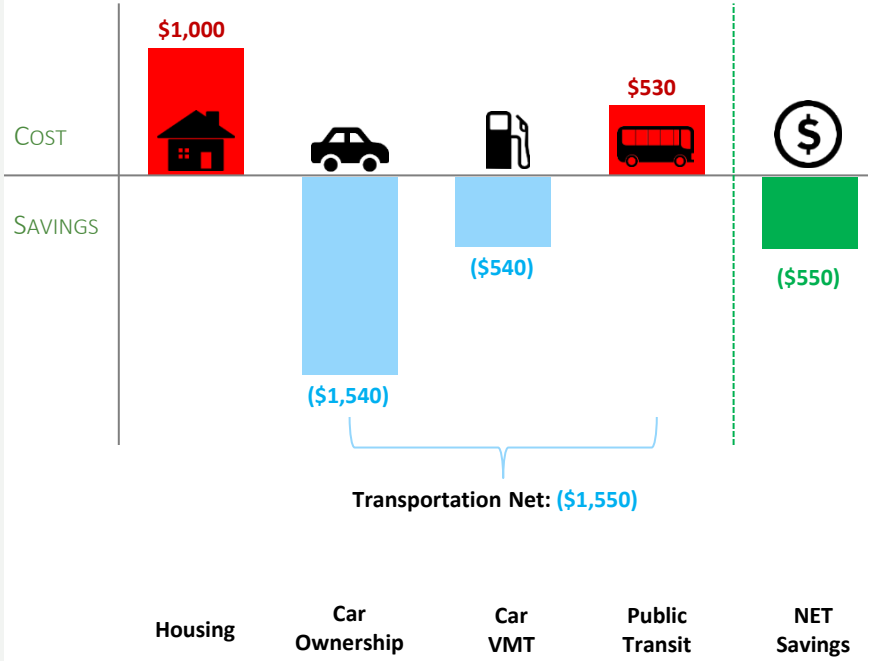
Household Budget Impacts: Fishtown

Annual housing costs in Fishtown increase by $1,000 per household due to the value increase from the transit premium. Relative to West Oak Lane, Fishtown has both higher initial housing costs and a higher premium from SEPTA service.

Net transportation savings from SEPTA service for a moderate income household in Fishtown are $1,550. Savings are driven by reduced car ownership, with savings in car operating costs effectively offset by increases in public transit costs (likely due to high transit usage and relatively short trips).

Net housing and transportation savings from SEPTA service average $550 per household.

HOUSEHOLD BUDGET IMPACT FROM SEPTA SERVICE (PER HOUSEHOLD)
FISHTOWN



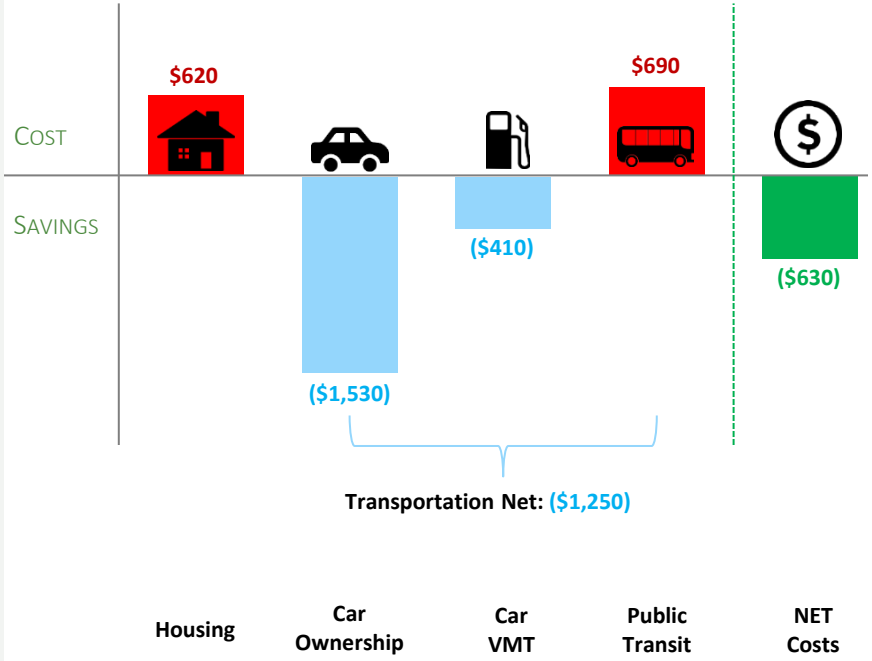
Household Budget Impacts: Powelton

Annual housing costs in Powelton increase by $620 per household due to the value increase from the transit premium. Housing costs in this neighborhood are relatively low due to its large share of renters.

Net transportation savings from SEPTA service for a moderate income household in Powelton are $1,250, with significant savings from car ownership some additional costs from transit service (in excess of car operating savings).

Net housing and transportation savings from SEPTA service average $630 per household.

HOUSEHOLD BUDGET IMPACT FROM SEPTA SERVICE (PER HOUSEHOLD)
POWELTON

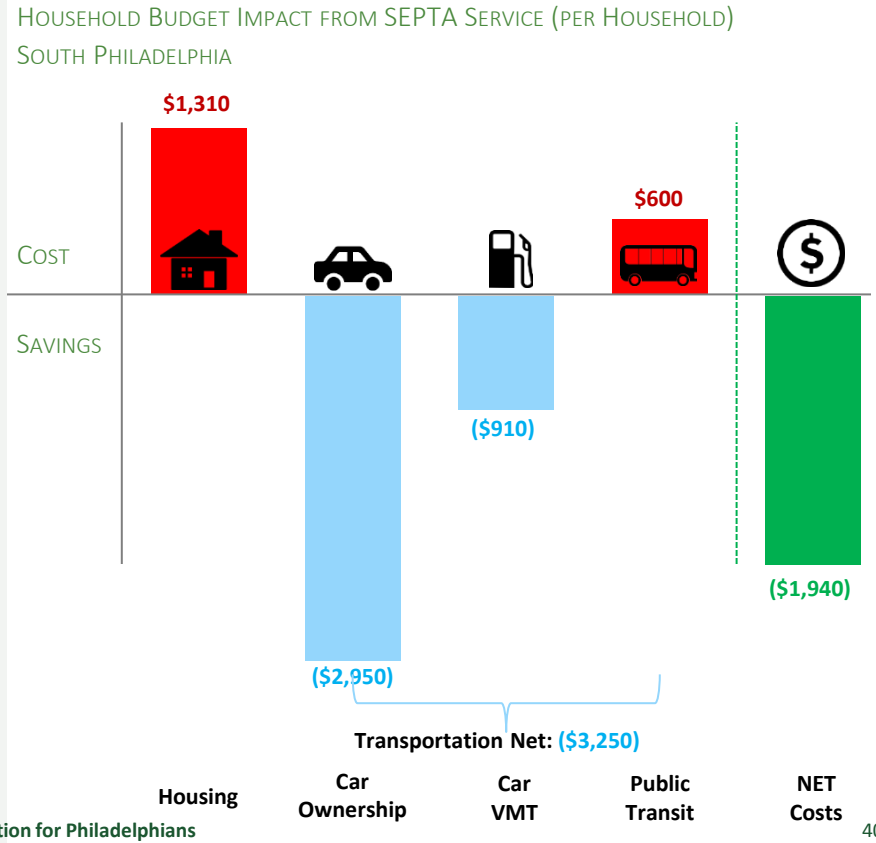


Household Budget Impacts: South Philadelphia

Annual housing costs in South Philadelphia increase by $1,310 per household due to the value increase from the transit premium. This increase is due to a combination of above average housing values and high levels of transit service.

Net transportation savings from SEPTA service for a moderate income household in South Philadelphia are $3,250. Car ownership savings alone are nearly $3,000 per household, with additional savings from reduced car operating costs relative to public transit costs.

Net housing and transportation savings from SEPTA service average $1,940 per household.

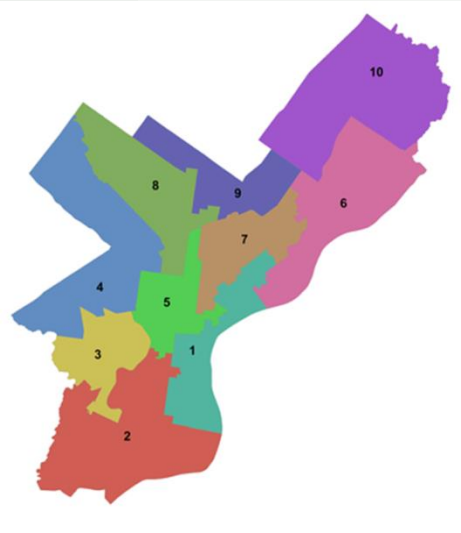


Household Budget Impacts by Council District

Similarly, those City Council Districts with low housing costs, quality transit, and longer commutes are home to the households that enjoy the greatest savings.

This is most evident Districts 7, District 8, and District 9, spanning North and Northwest Philadelphia, which enjoy the greatest savings per household.

Savings are lowest in Council District 5. However, savings are much higher in the portion of District 5 that falls outside of Center City, at about $1,000 per household.



HOUSEHOLD BUDGET IMPACT FROM SEPTA SERVICE (PER HOUSEHOLD) BY COUNCIL DISTRICT

District	Housing	Car Owner	Car VMT	Public Transit	Net Costs
1	$1,640	($2,270)	($690)	$560	($760)
2	$1,440	($1,900)	($600)	$550	($510)
3	$820	($1,910)	($570)	$660	($1,000)
4	$520	($1,330)	($440)	$420	($830)
5	$1,500	($2,040)	($640)	$1,110	($70)
6	$430	($1,140)	($410)	$250	($860)
7	$600	($1,780)	($570)	$480	($1,270)
8	$620	($1,750)	($540)	$480	($1,190)
9	$630	($1,640)	($550)	$370	($1,190)
10	$380	($900)	($310)	$150	($690)
City	$870	($1,670)	($530)	$500	($830)

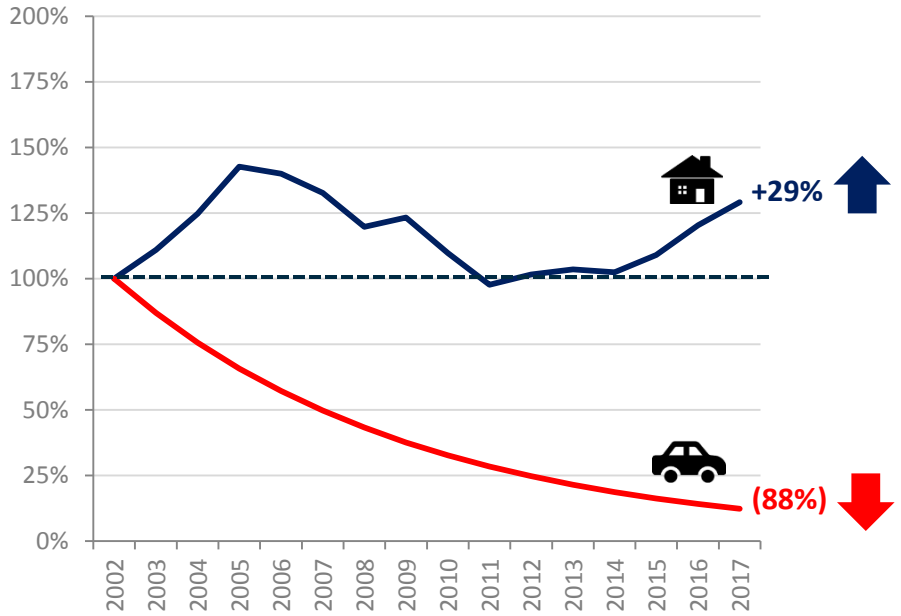
Household Benefits

Above and beyond the annual savings on combined housing and transportation costs, homeowners benefiting from the transit premium receive substantial benefits from the appreciation of their most important financial asset, their homes.

While housing markets are cyclical, housing values generally appreciate faster than inflation. Based on data from ESI's Philadelphia Housing Index, average housing values grew 29% citywide from 2002-2017 (in real terms). By contrast, vehicles are a depreciating asset for a household, losing value each year of their usable life. The graph at right models car depreciation at a standard 15% per year, and shows a loss of 88% of asset value over a 15 year period.

This differential in value over time means that a household that purchases a more expensive house with transit access instead of the combination of a less expensive house and a car will see greater accumulation of asset value (and thus net wealth) over time.

RELATIVE ASSET VALUE – HOUSE VS. CAR (2002-2017 - INFLATION ADJUSTED)

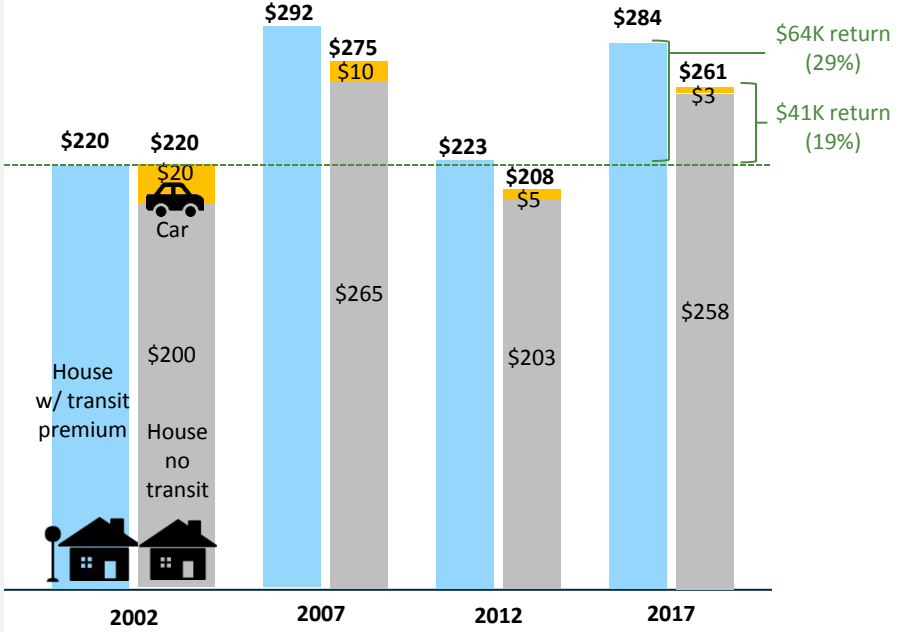


Household Benefits

For example, imagine that a household had the option in 2002 to purchase a $220,000 house well-served by transit, or a $200,000 house without transit service and a $20,000 car (for an equivalent upfront investment of $220,000).

- Over the fifteen year period from 2002-2017, housing within Philadelphia appreciated by 29% (in real terms). Therefore, a $220,000 house in 2002 would be worth $284,000 in 2017, for a $64,000 increase in wealth.
- The same 29% appreciation on a $200,000 house would yield a housing value of $258,000 as of 2017. However, a $20,000 car purchased in 2002 and depreciating at a standard 15% per year would be worth only $2,500 in 2017. Combined, these assets total $261,000, for a return of 19% on the original investment. This represents an increase in wealth of $41,000, or $23,000 less than the increase achieved by investing in housing served by transit.

SAMPLE ASSET VALUE – HOUSE WITH TRANSIT PREMIUM VS. CAR (IN $2017 000S)



Societal Benefits

In addition to the benefits to individual households, the redistribution of value engendered by the transit access premium has positive implications for society.

The availability of transit and its associated housing premium in effect transfers wealth from the automotive sector (broadly defined to include manufacturing, repair, fuel, etc.) to the housing sector. This transfer has equity benefits, as housing assets are more broadly shared, and are generally held locally, while a significant share of automotive activity is imported. In addition, this housing value generates significant state and local tax revenues.

There are also significant positive downstream impacts from increased transit usage and reduced reliance on cars, including environmental impacts, reduced congestion and a greater density of activity. These benefits make the region a more attractive place to live and work, enhancing its competitiveness, prospects for growth and quality of life.



Summary of Findings

Housing Premium

SEPTA service adds $17.5 billion in housing value, accounting for 17.4% of total residential value in the City of Philadelphia

This housing value premium generates $223 million in additional School District and City tax collections each year

Affordability Implications

Transportation cost savings from transit access are nearly 2x housing cost increases, saving the average household $830 per year in combined housing and transportation costs

In addition to annual cost savings, the transit premium also helps homeowners build wealth through appreciating home values