Washington Research Council

POLICY brief

BRIEFLY

Increases in congestion may have added more than 0.5 percent per year to the Seattle area inflation rate over the last 17 years. The resulting higher prices cost local consumers more than $9 billion in 2000.

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Congestion Inflates Local Cost of Living

In recent years consumer prices have risen more rapidly in the Seattle area than in the nation as a whole. Seattle's traffic congestion is notorious. In this brief we provide evidence that congestion is a cause of inflation on the local level. Over the last 17 years, increases in congestion may have added more than 0.5 percent per year to the Seattle area inflation rate.

Consumer Price Index

Each month, researchers from the U.S. Department of Labor's Bureau of Labor Statistics (BLS) record the prices that consumers pay for about 80,000 specific goods and services. From this data, the BLS calculates a number of consumer price indexes. The most prominent of these is the *Consumer Price Index for All Urban Consumers* (the national CPI), which the press reports monthly.

The BLS also calculates CPIs for 26 metropolitan areas. Seattle is one of these metropolitan areas. Prior to 1993, the geographic region covered by the Seattle CPI comprised King, Pierce, and Snohomish Counties. In 1993, the region expanded to include also Kitsap, Island, and Thurston Counties.

Table 1 shows how CPIs have increased over the last 17 years for 24 of the 26 metro areas. (The two omitted areas are Anchorage, for which we have no congestion data, and Washington D.C., for which the BLS began calculating a CPI only in 1997.) For each area the table gives the values of the CPI in 1983 and 2000, the total percentage increase over the 17-year period, and the average annual increase.[1]

The Seattle CPI increased from 99.3 in 1983 to 179.2 in 2000. This represented a total increase of 80.5 percent, the 5th largest percentage increase among the 24 cities. San Diego was the city with the largest price increase. The average annual increase from 1983 to 2000 in the Seattle CPI was 3.47 percent, 0.25 percent per year more than the average annual increase in the national CPI.[2]

TABLE 1

Consumer Price Indexes for All Urban Consumers

1982-84 = 100

	CPI		Increase 1983-1999		
	1983	2000	Total	Annual Average	Rank
Atlanta	99.9	170.6	70.8%	3.15%	13
Boston	99.8	183.6	84.0%	3.59%	2
Chicago	100.0	173.8	73.8%	3.25%	9
Cincinnati	100.8	164.8	63.5%	2.89%	22
Cleveland	101.2	168.0	66.0%	2.98%	18
Dallas	99.7	164.7	65.2%	2.95%	20
Denver	100.5	173.2	72.3%	3.20%	11
Detroit	99.8	169.8	70.1%	3.13%	14
Honolulu	99.3	176.3	77.5%	3.38%	8
Houston	100.0	154.2	54.2%	2.55%	24
Kansas City	100.5	166.6	65.8%	2.97%	19
Los Angeles	99.1	171.6	73.2%	3.23%	10
Miami-Hialeah	99.9	167.8	68.0%	3.05%	16
Milwaukee	100.2	168.6	68.3%	3.06%	15
Minneapolis-St. Paul	99.5	170.1	71.0%	3.15%	12
New York	99.8	182.5	82.9%	3.55%	4
Philadelphia	99.4	176.5	77.6%	3.38%	7
Pittsburgh	101.1	168.0	66.2%	2.99%	17
Portland-Vancouver	99.1	178.0	79.6%	3.45%	6
San Diego	99.0	182.8	84.6%	3.61%	1
San Francisco-Oakland	98.4	180.2	83.1%	3.56%	3
Seattle-Everett	99.3	179.2	80.5%	3.47%	5
St. Louis	100.1	163.1	62.9%	2.87%	23
Tampa*	99.7	163.8	64.3%	2.92%	21
National	99.6	172.3	73.0%	3.22%	

*BLS began the Tampa index in 1987; the southern urban CPI is used for prior years.

Source: Bureau of Labor Statistics

TABLE 2

Texas Transportation Institute Travel Time Index

	Index		1982-1999	
	1982	1999	Change	Rank
Atlanta	1.14	1.63	0.49	7
Boston	1.18	1.71	0.53	3
Chicago	1.30	1.69	0.39	13
Cincinnati	1.07	1.47	0.40	12
Cleveland	1.04	1.31	0.27	19
Dallas	1.09	1.47	0.38	14
Denver	1.17	1.61	0.44	9
Detroit	1.18	1.59	0.41	11
Honolulu	1.15	1.34	0.19	20
Houston	1.44	1.61	0.17	22
Kansas City	1.02	1.20	0.18	21
Los Angeles	1.57	2.06	0.49	7
Miami-Hialeah	1.25	1.58	0.33	15
Milwaukee	1.08	1.40	0.32	17
Minneapolis-St. Paul	1.06	1.58	0.52	4
New York	1.18	1.70	0.52	4
Philadelphia	1.16	1.44	0.28	18
Pittsburgh	1.10	1.16	0.06	24
Portland-Vancouver	1.09	1.65	0.56	1
San Diego	1.13	1.64	0.51	6
San Francisco-Oakland	1.35	1.77	0.42	10
Seattle-Everett	1.26	1.81	0.55	2
St. Louis	1.13	1.46	0.33	15
Tampa	1.23	1.38	0.15	23

Source: Texas Transportation Institute

Travel Time Index

Table 2 shows the 1999 *Travel Time Index* (TTI) for the dominant city in each of these 24 metropolitan areas. The TTI is an index of metropolitan traffic congestion calculated by the Texas Transportation Institute.[3] The index measures the time it takes to make a trip at the peak hour relative to the travel time when traffic is flowing freely, including both delay due to the volume of vehicles on the roads and delay resulting from accidents. A TTI value of 1.50 indicates that, on average, trips taking 20 minutes under free flow conditions take 30 minutes at the peak hour.[4]

Seattle had the second highest 1999 TTI of these 24 cities, 1.81, behind only Los Angeles. The table also shows for each city the amount that the TTI increased over the 17 years between 1982 and 1999. The increase for Seattle was 0.55. This was the second largest increase, behind Portland-Vancouver.

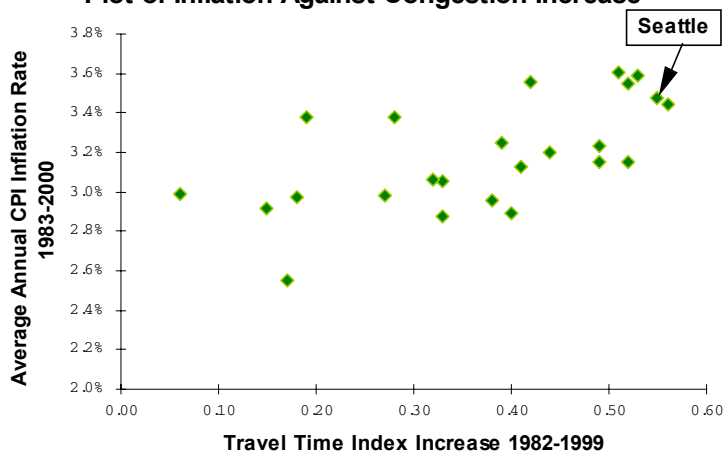
Correlation between CPI and TRI

Are Seattle's high rankings in both inflation and congestion related?

Chart 1 plots for the 24 cities the average annual increase in consumer prices from 1983 to 2000 against the increase in TTI from 1982 to 1999. A positive relationship appears clearly visible. The simple correlation between the average rate of increase in CPI and increase in TTI is 0.623.

CHART 1

Plot of Inflation Against Congestion Increase



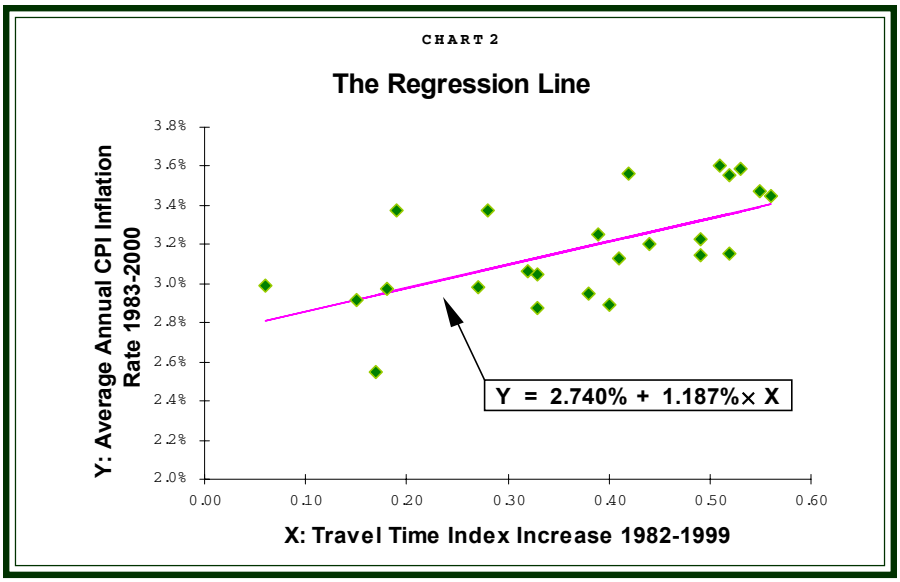
The standard method for testing for the statistical significance of a correlation coefficient requires an assumption that is not likely to hold in this case.[5] Spearman's rank-order correlation coefficient is an alternate measure of correlation that can be used to test whether the association between CPI and TTI is statistically significant. Like the standard correlation coefficient, the Spearman coefficient ranges between –1 and +1.

The Spearman rank-order correlation coefficient for CPI and TTI for the 24 cities is 0.672. This value is significant at the one percent level: That is, the odds are better than 99 in 100 that changes in CPI and changes in TTI are related.[6]

Regression

Another approach to investigating the relationship between consumer prices and congestion is to use a linear regression to find the equation that best fits the scatter of points in Chart 1. That equation is:

$$(\text{rate of CPI change}) = 2.740\% + 1.187\% \times (\text{TTI change})$$



The actual change in TTI for Seattle from 1982 to 1999 was 0.55. The equation "predicts" an annual average inflation for Seattle of 3.39 percent for the 1983 to 2000 period, a bit less than the actual 3.47 percent actually experienced. The equation is graphed on Chart 2.

The "adjusted r-squared" for the regression, a measure of the share of the variation in rates of CPI change that is accounted for by changes in congestion, is 0.360.

The t statistic for slope coefficient (1.187 percent) is 3.74; this value is significant at the 1 percent level. Again, this shows that there exists a statistically significant relationship between CPI and TTI.

Evaluation of costs to consumers

The regression indicates that increasing congestion added an average of 0.65 percent to the annual inflation rate in the Seattle area between 1983 and 2000. Based on this, it is possible to quantify the cost to Seattle area consumers of increasing congestion.

Had inflation averaged 0.65 percent less, the Seattle area CPI would have been 160.4 for 2000, rather than 179.2. That is, without the congestion increase, the price level in the Seattle area would have been 10.5 percent lower in 2000.

The Commerce Department's Bureau of Economic Analysis (BEA) estimates that individuals consume about 80 percent of personal income. The BEA has not yet published county estimates of personal income for the year 2000. However, statewide personal income for the year is estimated to be $184 billion, and in recent years King, Pierce and Snohomish counties have averaged about 60 percent of the state total. Therefore we estimate that residents of the three counties spent a bit more than $88 billion on consumption in the year 2000

Multiplying by the 10.5 percent that residents would have saved had congestion remained at the 1982 level puts the cost to three counties' residents in 2000 of the congestion increases at $9.3 billion.

A caveat must accompany this estimate, however. Although the regression result provides strong evidence of a positive relationship between congestion and inflation, there is considerable uncertainty as to the magnitude of the relationship. While the point estimate of the slope is 1.187 percent, the 95 percent confidence interval for the slope coefficient extends from 0.528 percent to 1.846 percent. The corresponding bounds on the costs to three-county residents are $4.3 billion and $14.0 billion.

Discussion

Over the years the BLS has made a number of changes to improve the CPI's accuracy. Even with these improvements, analysts have argued that the CPI actually overstates increases in the cost of living by as much as 1.5 percent

per year. (The 1997 Economic Report of the President provides a discussion of the sources of error in the CPI.[7])

The Research Council believes that the Commerce Department's Implicit Price Deflator for Personal Consumption Expenditures (IPD) provides a more accurate measure of increases in the cost of living than either the national or the Seattle CPI. In recent years the IPD, which the state uses to index the Initiative 601 spending limit, has increased by less than the CPI.[8]

Nevertheless, the margin between the Seattle and national CPIs in recent years does correctly indicate that inflation as been greater in the Seattle area than for the nation as a whole.

The evidence of a correlation between increases in congestion and increases in consumer prices is strong. As it is often noted, correlation does not necessarily imply causality. However, in this case it is reasonable to conclude that increasing congestion does drive consumer prices up. Congestion increases the costs of doing business in many ways, and these higher costs will find their way into the prices that consumers pay.

We have estimated that increases in congestion over the 1982 level cost the residents of King, Pierce and Snohomish Counties $9.3 billion in 2000. This estimate should be treated with a bit of caution, however, because the slope coefficient upon which it is based is precisely estimated. Still, it is safe to conclude that congestion imposes substantial costs on those that live in the Seattle area.

(Endnotes)

[1] The BLS introduced a major improvement in the CPI in 1983, revamping the method of calculating housing costs. The years prior to 1983 featured higher inflation rates, and consequently greater variation among metropolitan area inflation rates, than did later years.

[2] The average rate of increase is calculated as $(1/17)\ \log_e(CPI_{2000}/CPI_{1983})$.

[3] David Schrank and Tim Lomax, *The 2001 Urban Mobility Report*, Texas Transportation Institute, The Texas A&M University System, 2001.

[4] The Institute calculates TTIs for 68 cities for the years 1982 through 1999. In some cases, more than one of these cities are located within the metropolitan area covered by a single CPI. For example, area for the Dallas CPI includes Fort Worth. The Institute calculates separate TTIs for Dallas and for Fort Worth.

[5] The change in TTI is unlikely to have the normal distribution.

[6] The critical value for Spearman's rho at the .01 significance level with 24 observations for the two-tailed test is 0.521. See David J. Sheskin, *Handbook of Parametric and Nonparametric Statistical Procedures, 2nd Edition,* Boca Raton: Chapman & Hall/CRC, 2000, pages 863-880.

[7] *Economic Report of the President, 1997*, Washington D.C.: U.S. Government Printing Office, 1997, pages 67-72.

[8] See our Policy Briefs *Generous pay Raises for Teachers*, PB 99:19, 4/9/99, and *Initiative 732: Expensive Cola,* PB 00:25, 9/27/00.

108 S. Washington St., Suite 406

Seattle WA 98104-3408

PH 206-467-7088

FX 206-467-6957

www.researchcouncil.org

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