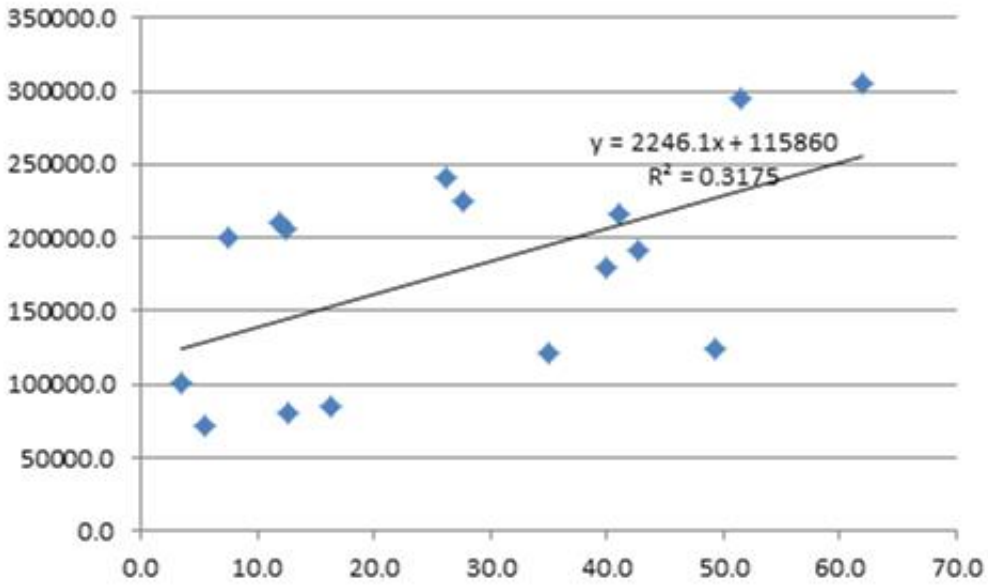
Potholes. Like rude cab drivers, crowded subway cars, and "no right turn on red," they seem like just another annoying aspect of getting around New York City. And Manhattan potholes are legendary – as Dave Letterman quipped, "There is a pothole so big on Eighth Avenue that it has its own Starbucks inside." The City of New York repaired more 241,500 potholes in 2013 – a truly amazing number. And the position of the city regarding potholes is that they are an inevitable side-effect of harsh winter weather and that nothing can be done about them other than repairing them after they occur. But an analysis by Lucius Riccio of the Columbia Business School published in *OR/MS Today*suggests that this is not true – potholes can be prevented and it is probably economic to do so.

Civil engineers have long known that repeated "freeze-thaw" cycles foster the development of potholes. Hence, the more severe the winter, in general, the more potholes that can be expected. Dr. Riccio looked at 15 years of pothole data from New York and found that this relationship held true. The figure below shows a plot of the amount of snowfall in each year (a surrogate for the severity of the winter) and the number of potholes filled. The R2 is about .32 – a significant and positive relationship.

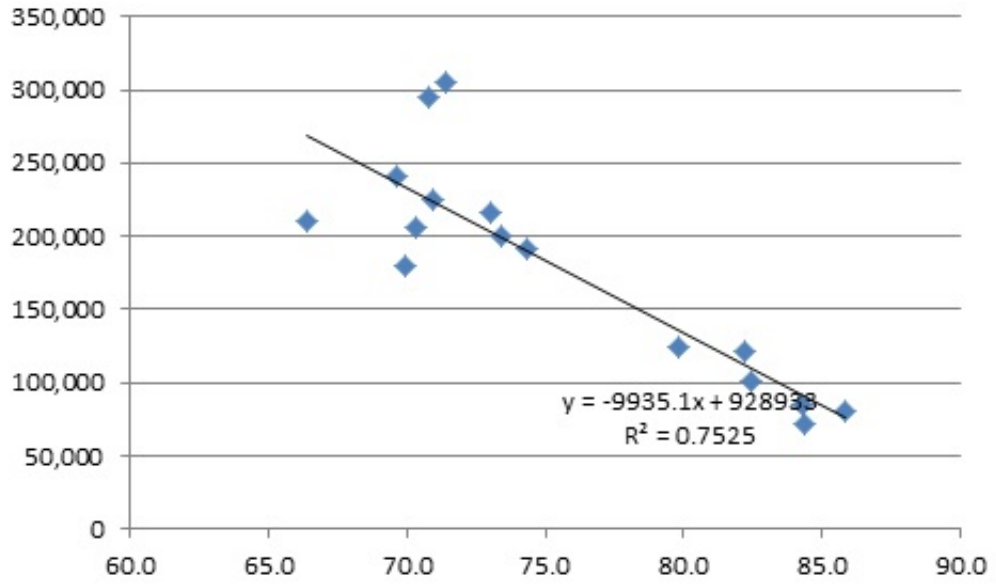
Potholes filled



Inches of snow

But Riccio's analysis shows that there is an even more significant predictor of the number of potholes – the condition of the roads themselves. Figure 2 shows a plot of the number of potholes filled as a function of the number of streets whose condition was rated "good" by the city. The R2 is even stronger at .75.

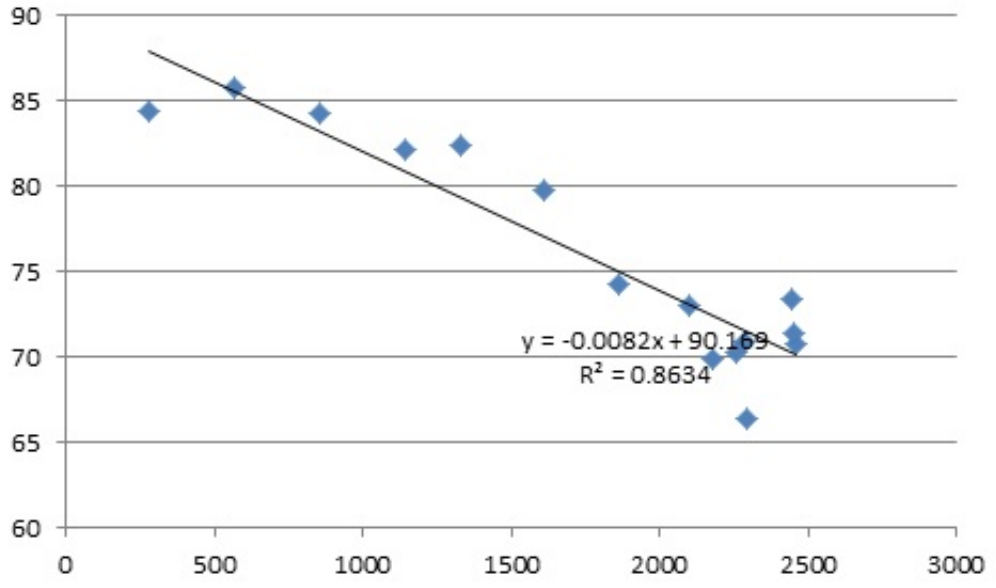
Potholes filled



Street condition

Here, the x-axis shows the percentage of NYC streets rated in good condition by the City. Clearly, this has an even stronger relationship with the number of potholes with an R2 over .75. And, as Riccio shows, the street ratings are closely tied with the *resurfacing gap* – the cumulative difference between the amount of resurfacing required to maintain the streets in good condition and the amount of resurfacing that was actually done. Plotting the number of potholes fixed against the cumulative resurfacing gap shows an even stronger correlation.

Potholes filled



Cumulative gap

Riccio's conclusion is that the connection between maintenance and the formation of potholes is incredibly strong. He does not analyze the economics in detail, but it appears likely that increased expenditure on resurfacing would likely result in fewer potholes and less overall expenditure on the roads.

Aside from my intrinsic interest as a New Yorker in smoother cab rides, I find Riccio's analysis to be an estimable use of "little data" analytics. All of the data used in his study can be found in his article. The results can be replicated by anyone with an Excel spreadsheet. It is worthwhile remembering in this "Era of Big Data" that "little data" can often provide important insights.