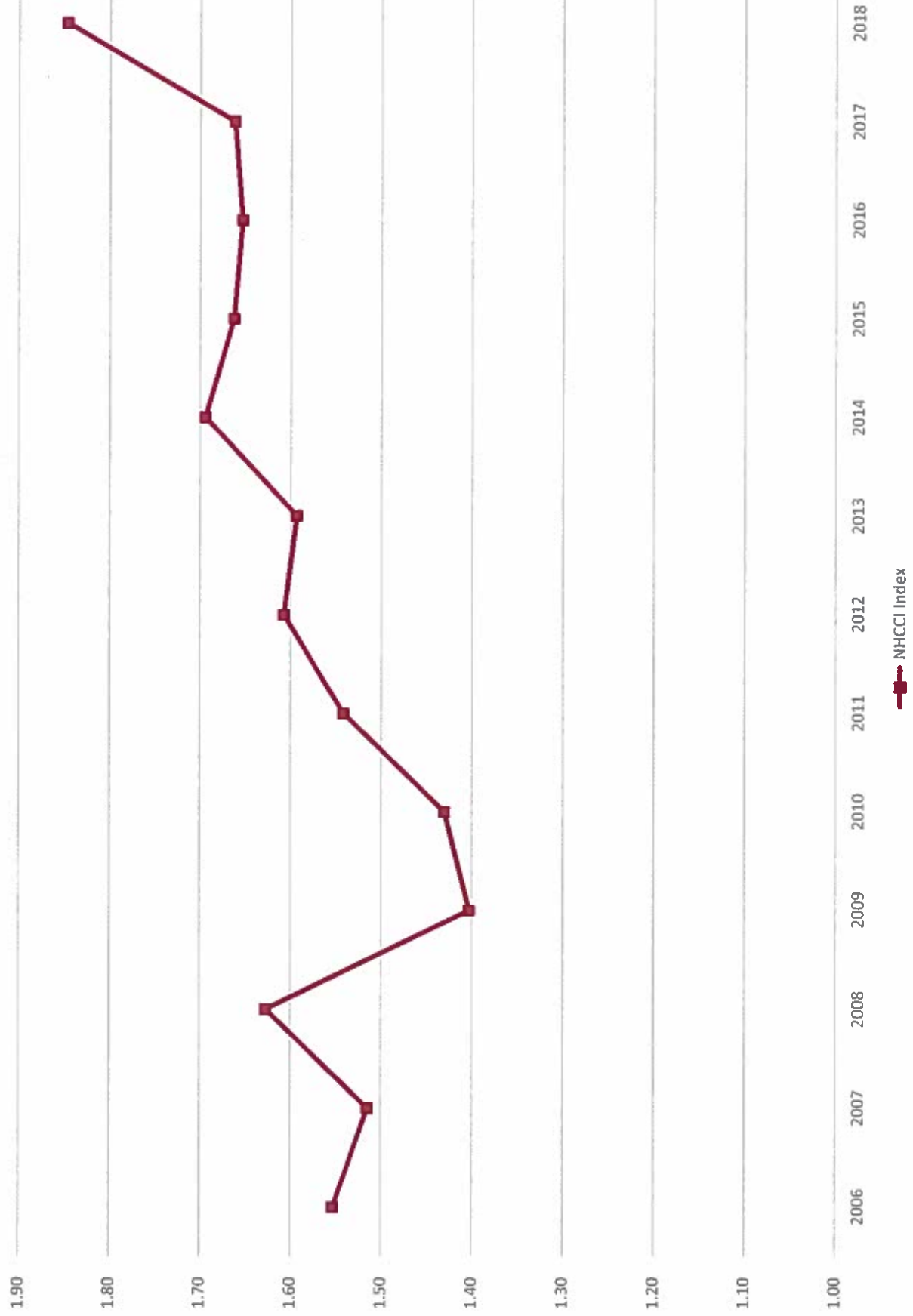


National Highway Construction Cost Index



There is no way to separate price increases due to inflation from price increases due to increased productivity without additional data, specifically data on labor utilization in relation to the construction materials.

What is productivity?

Productivity is a measure of output per unit input, typically labor input. Productivity gains come about over time as equipment and materials are improved such that output increases. Productivity is principally driven by technological change. The following types of technological change may be found in the highway construction industry:

Equipment Technology

- Amplification of human energy – technology designed to make an activity physically easier to perform (shift energy requirements from human to machine).
- Level of control – relates to advances in machinery and hand tools to transfer control and energy application from the human to machine (robotics).
- Functional range – expands a tool's or machine's range of capabilities (micro processors and hydraulics improving control precision and equipment reach).
- Information processing – designing construction equipment to provide greater and more accurate information regarding internal and external processes (improved engine performance and machine self diagnostics).
- Ergonomics – technology that helps human operator best cope with the work environment (reduction of exposure to noise, dust, weather, etc.)

Materials Technology

- Reduction in unit weight – reduced material weight has advantages in handling and transporting, and benefits in reducing structural load and space requirements.
- Strength – technological advances in new admixtures and design of concrete mixtures to increase material strength.
- Curability – advances that reduce amount of time required for material to cure and reach desired strength.
- Installation flexibility – improvements in materials that broaden environmental conditions under which materials can be installed (epoxy coatings, water-proofing, cold weather admixtures, etc.).

Information Technology

- IT automation – use of an electronic or computerized tool by a human being in order to manipulate or produce a product. Robotics is not included in this definition.
- IT integration – the sharing of information between project participants or sharing of information sourced from separate systems.¹

What is a Fisher Index?

The Fisher Ideal index, proposed by Irving Fisher in 1922, is one of the superlative indexes that give good approximations to the theoretical or "exact" cost-of-living index and yet are relatively simple to compute and use. Compared to fixed-weighted Laspeyres or Paasche Indexes, Fisher Ideal index takes the weights of both the base period and the current period into account. By doing so, Fisher Ideal index has the ability to accommodate the effects of substitutions, something the Laspeyres and Paasche indexes do not do. A major advantage of Fisher Ideal index is its "dual" property, i.e. a Fisher Ideal *price* index implies a Fisher Ideal *quantity* index, and vice versa. In other words, the product of a Fisher Ideal price index between two periods and a Fisher Ideal quantity index between the same two periods is equal to the total change in value (measured in current dollars) between those two periods.

These advantages strongly suggest that the Fisher Ideal index formula is an excellent choice for building the NHCCI. The Bid Price Index was a Laspeyres index showing the price change relative to a 1980 bundle of highway construction goods.

How can I compare the NHCCI to my State's construction cost index or other construction cost indexes?

States and interested parties need to be able to convert the NHCCI into a form comparable to other indexes. Direct comparison will not yield an accurate picture because other indexes use different methodologies and/or utilize a different base year (the Fisher Index NHCCI does not have a 'base year'). The accurate platform for comparing the NHCCI to other indexes requires converting both indexes into a percent change. This can be accomplished by the following formula [(Index in year 2) – (Index in year 1)] / (Index in year 1), where the year moves forward by 1 for each calculation.

¹ Source: *Advancing the Competitiveness and Efficiency of the U.S. Construction Industry*, Committee on Advancing the Competitiveness and Productivity of the U.S. Construction Industry, National Research Council, Appendix D, "Technical Change and its Impact on Construction Productivity," Paul Goodrum, at <http://www.nap.edu/catalog/12717.html>

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National Highway Construction Cost Index (NHCCI)

Frequently Asked Questions About Indexes

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What is an index?

In economics, an index number measures changes in a representative group (or bundle) of products over time. The base year index equals 100 and the index number is usually expressed as 100 times the ratio to the base value. The time unit is typically a month, a quarter, or a year. Indexes of interest to those who deal with highway construction costs and prices would include general monetary inflation, cost of materials and labor inflation, and measures of productivity in the highway construction field. To accurately assess what is really happening in changing prices or costs one needs to separate the components of the index to determine how several factors affect the observed results.

What is the National Highway Construction Cost Index (NHCCI)?

The NHCCI is a measure of the average change over time in the prices paid by State transportation departments for roadway construction materials and services. If the average change over time increases it is called 'inflation' if the average price over time decreases it is called 'deflation.'

How is the NHCCI different than the Bureau of Labor Statistics Producer Price Index (PPI) for Streets and Highways?

The NHCCI measures the average change over time for the prices paid for roadway construction materials put in place. The PPI for Streets and Highways measures the average change over time in the selling prices received by producers. The PPI measures from the perspective of the seller while the NHCCI measures from the perspective of the buyer. Sellers' and buyers' prices may differ due to government subsidies, sales and excise taxes, and distribution costs. The NHCCI also includes the contractor's mark-up over the original producer's price. For example an asphalt supplier may charge \$x per ton while the contractor's fees for design, management and oversight means that the State pays \$x + contractor fee.

What happened to the BLS PPI for Streets and Highways?

As of July, 2010 the Bureau of Labor Statistics (BLS) has discontinued the producer price index (PPI) for Streets and Highways (BHWW).

What is inflation?

The following description covers two types of inflation:

1. Monetary inflation
2. Cost of materials inflation

Monetary inflation is primarily a result of national money supply considerations. Governments can produce a money supply ("print money" is too simplistic an explanation) sufficient to allow economic activity to take place, and this supply should grow in proportion to the growth in economic activity. There is (in normal conditions) a one or two percent inflation rate in a healthy economy. This type of inflation is often measured by some broad measure such as the Consumer Price Index produced by the Bureau of Economic Analysis (BEA) in the Department of Commerce. Historical monetary data adjusted for this type of inflation are called "real dollars" as opposed to "nominal dollars."

Cost of material inflation measures a specific industry's cost of labor and materials. This type of inflation is market driven, if there is a shortage of some particular type of economic input, prices can rise drastically in the industries that use those inputs. By any measure, cost of highway materials (cement, steel, and asphalt) have risen dramatically in the past few years (2006 and 2008). However, with the recession beginning in September 2009 adversely affecting the economy, the NHCCI shows that have prices dropped drastically and are only now (in early 2010) beginning to rise again.

Can the NHCCI be used to measure changes in productivity?