

Executive Summary: Back to the Future: Using Historic Data to Improve Pavement Materials Price Projection

Problem

Federal and state budgets for road construction and maintenance continue to drop while our infrastructure is in constant need of improvement. However, predicting lifetime costs for long-term road projects is a challenge. Cost estimates for road projects frequently underestimate initial construction costs as well as future spending, creating problems for budget-strapped agencies.

Approach

Existing life cycle cost analysis (LCCA) models typically employ the rate of inflation for the entire economy to estimate the cost of the materials that will be used for future road maintenance. This assumption undermines the ability to compare design alternatives using LCCA. The CSHub has developed price projection models that allow for the forecast of one of those inputs, the future price of paving materials, by using historic data.

The process has four main steps:

1) Gather data on the historical price trends of asphalt, concrete, and their constituents.

Constituents include typical asphalt and concrete materials such as crushed stone, sand, gravel, and oil.

2) Determine whether pavement constituents exhibit similar trends to asphalt or concrete.

Only co-integrated constituents, those whose price rises and falls similar to pavement or concrete, are considered in this model.

3) Project the future price of pavement constituents and materials.

Co-integrated constituent costs are projected into the future, then bundled to create a cost projection for concrete and asphalt that quantifies uncertainty (i.e., a future cost might be \$100 +/- \$10).

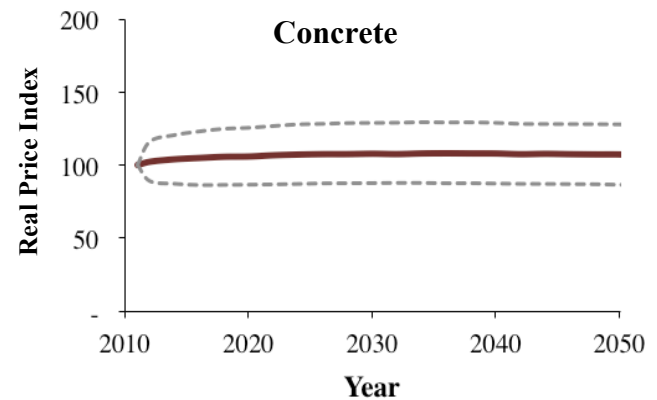
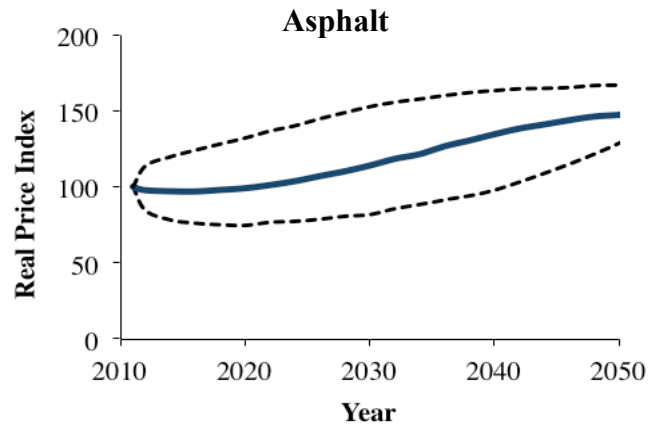
4) Validate price projections through backcasting.

Backcasting (also known as out-of-sample forecasting) involves comparing the accuracy of a projection to a known future. To test the validity of the model constructed in this paper, price projections are created set-back in time and compared to what

actually occurred (e.g., a price projection is made in 1970 and the predicted price in the year 2000 is compared to the actual price in that year).

Findings

Price projections for concrete and asphalt are included below; dotted lines show the 5th and 95th percentile values of the projection, representing the underlying uncertainty. Initial outcomes from the forecasting models are in line with or outperform results from existing modeling mechanisms.



More Information

A full report is available at cshub.mit.edu.



Key Points:

- Cost estimates for road projects can underestimate future expenses, putting a strain on limited budgets. The CSHub developed a method to project future material costs using historic data while considering uncertainty.
- According to initial results, the CSHub models are as accurate or better than existing models.



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