

Forecasting Prices with Limited Data

Problem

In order to probabilistically project future prices of paving materials, it is paramount to have price data that extends back over a period of many decades so that the price behavior and parameters for a given price model are accurately characterized. Unfortunately, the datasets with the earliest historical real prices for paving materials only date back to the 1950s. If one is to use probabilistic price projections in a life cycle cost analysis (LCCA), it is important that both model parameters and price behavior can be accurately characterized to increase the likelihood that a decision-maker makes the most informed investment decision.

Approach

One approach to more accurately project future paving material costs in the absence of many decades of price data is to correlate the paving material costs to other related material and energy costs with longer time-histories. Publically available data include prices for concrete and asphalt constituent materials (e.g., cement, sand and gravel, crushed stones) for a significantly longer time-horizon than is available for just the paving materials (see below). Our research has investigated the degree to which this information can be leveraged to characterize the price-link between paving materials (concrete and asphalt) and constituent and related (e.g., energy) materials. This has been accomplished through a technique called cointegration, which enables the analysis of time-series data that, although they may seem to drift randomly, tend to drift in the same manner. Testing for cointegration between commodities has not been reported for paving materials, but has been examined in other industries.

If test results can characterize a long-term price equilibrium between different inputs and each paving material, one could potentially project the price for concrete and asphalt by projecting the inputs as a proxy.

Findings

Three promising findings have resulted from this work. First, it has been shown that for many of these commodities projecting future prices is an effective endeavor and outperforms assuming no price change, as long as adequate historical data are used to create the projection. Second, long-run price equilibriums between major cost inputs and paving materials have been established, and are currently being validated as a reasonable way to project future paving prices to use in an LCCA. Third, and perhaps most importantly, price projections have established the differential price volatility across construction materials by treating projections as probabilistic rather than deterministic.

Impact

Characterizing the price behavior of inputs for concrete and asphalt is a major step towards identifying an appropriate price model in the absence of significant historical data. Current work is validating whether such a price model would have, on average, led a decision-maker to the “better” pavement selection.

More

Research presented by Omar Swei, graduate student in the CSHub, supervised by Randolph Kirchain and Jeremy Gregory.

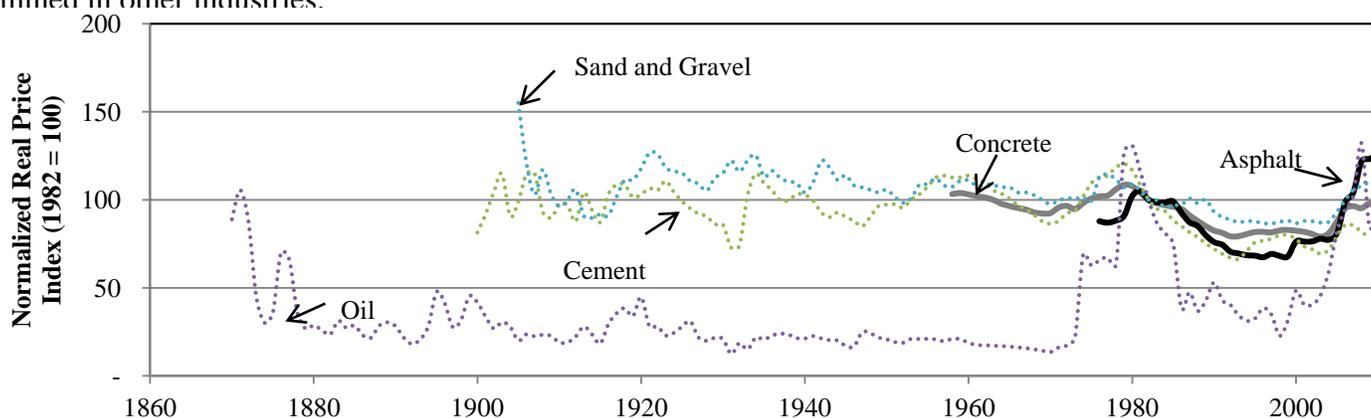


Figure of Historical real-price for Asphalt Paving Mixture (BLS), Ready-Mix Concrete (BLS), Cement (USGS), Sand & Gravel (USGS), and Oil (BP)



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