

Effect of Volatile Market Conditions on Highway Construction Costs

Minsoo Baek and Baabak Ashuri, Ph.D.

Georgia Institute of Technology

Atlanta, Georgia

Price volatility in highway construction costs imposes significant burden on transportation agencies in pricing construction costs and completing projects within budget. The major cause of the price volatility is the dynamic environments of construction market and economic conditions. In such dynamic environments, the transportation agencies should include the high level of uncertainty in respect to the material prices, the wage level, equipment prices, interest rates, competitiveness in bidding, etc. The uncertainty often leads to inaccurate cost estimates, inefficient resource allocations, cost overruns, and poor project quality.

The main objective of this study is to explain the variation in the submitted unit price bids for asphalt line items to understand impacts of external factors such as construction market and economic conditions. To achieve this main objective, the sub objectives of this research are to: (1) identify and group potential factors which are related to project specific, construction market, and economic conditions; (2) analyze the relationship between the submitted unit price bids and the potential factors; and (3) develop regression model using critical factors influencing the unit price bids for asphalt line items. Multiple linear regression analysis is carried out to develop a model for explaining the variation in the submitted unit price bids for asphalt line items by using the several explanatory variables associated with construction material, labor, and oil markets. Since the major objectives of this study are to determine a wide variety of relationships between the unit price bids and to compare the relative impacts of explanatory variables in the best model, the multiple linear regression can be an ideal approach for this study.

The results of this study indicate that the Georgia asphalt cement price index, the quantity of the line items, the number of bidders, the gross domestic product (GDP), and the total bid price are the most significant factors for explaining the variation in the submitted unit price bids by construction contractors. The Georgia asphalt cement price index, the GDP, and the total bid price have the positive relationship with the submitted unit price bids, while the quantity of the line item and the number of bidders show the negative relationship with the submitted unit price bids for asphalt line items. These findings contribute to understanding of the external factors affecting construction costs. Taking into consideration the influential factors, the transportation can develop more accurate cost estimates and effective budget control strategies. In addition, since this study analyzes the unit bid prices for an asphalt line items used in resurfacing and widening projects, the findings can be used for developing cost estimates for asphalt paving projects such as resurfacing and widening projects.

Keywords: Bid Prices, Price Volatility, Highway Construction, Market Conditions, Cost Management