



# THE UNIVERSITY OF CHICAGO

Department of Statistics

## MASTER'S THESIS PRESENTATION

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### Explainable ML for a No-Teardown Vehicle Component Cost Estimation: A Top-Down Approach

WEDNESDAY, May 13, 2020, at 3:00 PM  
ZOOM Meeting, 5747 S. Ellis Avenue

#### ABSTRACT

This article introduces a data-driven approach to vehicle cost modeling and component price estimation leveraging a combination of concepts from machine learning, and game theory. This paper shows an alternative to common teardown methodologies and surveying approaches for component and vehicle cost estimation at the price level i.e the Manufacturer Suggested Retail Price (MSRP) level. This novel approach has the advantage to bypass the uncertainties involved in 1. The gathering of teardown data, 2. the need to perform expensive and biased surveying, and 3. the need to perform retail price equivalent (RPE) or Indirect Cost Multipliers (ICM) adjustments to markup direct manufacturing costs to MSRP. As a matter of fact, the result of this novel exercise not only provides more accurate pricing of the technologies at the customer level (including direct and indirect costs), but also shows the large gaps in pricing or marketing strategies between manufacturers, vehicle sizes, classes, market segments, and other criteria. There is also clear synergistic or interactional effect existing in the price of certain technologies when other specifications are present in the same vehicle. Those (unsurprising) results show clear evidence that old methods of manufacturer level component costing, aggregation, and the application of a flat and rigid RPE or ICM adjustment factor should be avoided. The findings are based on an extensive and exhaustive developed database of more than 64,000 vehicles covering MY1990 to MY2020 over hundreds of vehicle specs.