

Structural Estimates of Depreciation from Wholesale Auctions of Ford Windstar Vans

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This paper estimates the depreciation of over 20 varieties of Ford Windstar passenger vans, using several hundred thousand observations from a deep collection of wholesale auction transactions. The data permit the estimation of individual vehicle ages apart from differences between resale- and model-years, so that age-, date-, and vintage-effects are all identifiable. Depreciation is modeled in two parts, estimated separately: obsolescence, wherein new model-years depress the resale-values of older cohorts uniformly; and ordinary wear-and-tear, which reduces the resale values of individual vehicles in their aging in a non-uniform manner that is summarized by their different service lives. Obsolescence and inflation are estimated first, in a regression setting of ramified functions of age and miles to hold individual effects constant, allowing varietal and quarterly time dummies to trace each variety's counterfactual "as-if-new" price through time in a way that upholds the useful fiction of a Hicksian aggregate. The as-if-new prices then anchor individual-level resale-price profiles, which are embedded in implicit service-life densities that vary across time and age. Quarterly moments of prices and miles are then matched by adjusting the profiles' wear-and-tear parameters.

As-if-new prices fall fast (over 10 percent a year, on average) --- faster than the observed reductions of actual nearly-new prices, so there is substantial obsolescence. Individual-level service-flows decline in a manner similar to one long assumed by the U.S. Bureau of Labor Statistics, though the service-flows of "better" varieties persist longer. Estimated service-life densities miss too many low-value vehicles to be treated as survivor densities, so the Hulten-Wykoff regression survivor correction is insufficient, but averaging over the conditioning variables age and date yields reasonable unconditional life distributions that cluster close to a 13-year mean.

A tentative National Accounts application is offered.