The Option Value of Contract Duration: Evidence from the U.S. Timber Market

This paper asks: how contract duration affects buyers willingness-to-pay when contracts have embedded real options? The authors argue that these types of contracts are common across B2B settings and thus their design is of general interest. To answer their research question the use data from oral timber auctions in Oregon. The authors estimate a two-stage dynamic structural model. In the first stage, firms compete in an second-price auction with reserve prices for the right to harvest a tract of lumber within a specific period of time. In the second stage, the winning firm chooses how much lumber to harvest in each period given (a) their previous harvesting choices and (b) the exogenous price of lumber. The authors model allows them to decompose firm tract valuations into the direct value of the lumber, and the option value of *when* to harvest. The key counterfactual of interest asks: if we change the duration of the lumber contract, how do auction prices and harvesting decisions change? The authors find that sellers can manipulate up-front revenue by changing contract duration.

This is an interesting and technical paper. Below are my comments.

(1) I am worried that in its current state the contribution of the paper is not as significant as it could be. I have two notes.
    a. Part of this may be expositional. I want the paper to do more to clearly articulate its contribution above the literature and frame why the research question is important, broadly.
    b. It seems like the more substantive questions here involve the strategic decisions of the seller, for example in setting reserve prices and duration jointly. Similarly, exploring competitive responses to duration, i.e. bidder pool variation – heterogeneity across buyers in option values will drive different patterns of entry (I recognize this is outside the scope of the model now). Even exploring these interactions through comparative statics might be fruitful.

(2) Data cleaning + estimation concerns.
    a. It is not clear to me why the authors exclude auctions with only one bidder. The authors later ignore endogenous entry decisions into auctions, but this is after removing a third of auctions for only having one bidder. Some robustness here would be appreciated.
    b. The authors note that there are contracts of differing lengths but focus only on 3 year contracts for computational reasons. Given they are solving a simple dynamic programming problem, and this variation is clearly counterfactually relevant, I am not sure I understand this exclusion.
    c. I find the authors discussion of estimation and identification wholly insufficient and confusing. Here is my best understanding. The authors implement a mixed estimation strategy in which they solve their model in two steps. (1) First, they solve their dynamic programming problem and estimate its parameters via maximum likelihood, then, given the continuation values from (1), they (2) use Fox et al. 2011 to estimate the distribution of private values in the auction.
        i. The two-stage estimation is non-standard, but given computational complexity, the authors monte-carlo simulation, and their heterogeneity extension I am sympathetic to this strategy. I think the authors could say more about the

implications of this strategy for identification. In particular, what restrictions does this impose on their joint distribution of heterogeneity parameters?

ii. The minimum distance estimation in Fox requires several important decisions regarding support points for the heterogeneity distributions and moments. Can the authors provide more details? What moments are you using for identification [I think this is in there, but its not clearly discussed]? What are your grids and how do your estimates change with respect to this choice?

iii. The discussion at the top of page 21 seems disjoint from the previous page? I am not sure what constraint you are referencing.

iv. Are you including any tract observables in your estimation?

(3) Counterfactuals

a. I would appreciate more details on how you are running the counterfactuals. It seems like the counterfactual you really care about is, holding fixed the expected value of the tract, how does revenue shift as you change contract length? It is unclear to me if that is how the counterfactuals are being run right now.

Minor comments:

- The authors note of a "glitch" in the data. I think the authors need to do more to diagnose the source of this error otherwise it raises questions about data reliability.