Referee's Report on "Beyond 'Horizontal' and 'Vertical': The Welfare Effects of Complex Integration," by Margaret Loudermilk, Gloria Sheu and Charles Taragin

This paper is closely related to a previous paper written by two of the three authors of this paper. I will refer to the previous paper, Sheu and Taragin (2021), as "ST" and to this paper, Loudermilk, Sheu and Taragin (2023), as "LST." I think the simplest way to describe the results of LST is to begin by explaining the results of ST and then to explain how LST generalizes these results.

ST considers the effect of mergers in a model with a pre-merger industry structure where a fixed number of independently owned upstream firms each provide a single product to a fixed number of independently owned downstream firms that in turn sell these products to downstream consumers. Upstream prices are determined by Nash bargaining and downstream firms announce downstream prices. Following a relatively standard assumption in this literature, it is assumed that upstream and downstream prices are set simultaneously. In this framework they analyze and describe the effects of three types of mergers: (i) a merger between two upstream firms; (ii) a merger between two downstream firms; and (iii) a merger between an upstream firm and a downstream firm. I will refer to the first two types of mergers as "pure horizontal" mergers in the sense that all of the merger activity occurs between firms that operate at the same level of the vertical chain and only operate at that one level. I will refer to the third type of merger as a "pure vertical" merger in the sense that the merger occurs between a firm that operates only at the upstream level with a firm that only operates at the downstream level. On a theoretical level, these types of mergers tend to create countervailing effects on both prices and welfare and thus no general statements can be made about the price and welfare effects of any of these types of mergers in all situations. For pure vertical mergers, elimination of double marginalization (EDM) creates downward pressure on downstream prices. However the merger also affects the input prices that the vertically integrated firm negotiates with other non-integrated rivals and at least one of these effects (on the input price that the vertically integrated firm negotiates with unintegrated downstream rivals), often referred to as raising rivals' costs (RRC), can create upward pressure on downstream prices. For a pure horizontal merger at the between two downstream firms, there is of course upward pressure on downstream prices. However, to the extent that the merger improves the merged downstream firm's bargaining power over upstream firms, it may create downward pressure on input prices which will in turn creates downward pressure on downstream prices. The purpose of ST was to present a relatively simple and tractable framework that could be used to model and estimate the effects of these types of mergers and to also qualitatively describe the "net outcomes" on prices and welfare over a broad range of plausible parameter values to try and develop some overall assessments of which of the countervailing effects are likely to dominate the results and what this depends on.

LST generalizes the analysis of ST by considering the situation where some of the firms may already be vertically integrated prior to the merger being considered. This allows them to consider two new questions. The first and major new question they can address is to consider the effects of more complicated types of mergers that are neither purely horizontal or purely vertical.

I will refer to these types of mergers as complex mergers. In particular they can consider the effects of three new types of mergers. These are: (i) mergers between a vertically integrated firm and a non-integrated downstream firm; (ii) mergers between a vertically integrated firm and a non-integrated upstream firm and (iii) mergers between two vertically integrated firms. A second and somewhat less interesting question that they can address regards how the effects of any given merger change as the number of pre-existing already-vertically-integrated rival firms (that do not participate in the merger) changes. LST performs the same sort of exercise in this more complicated environment that ST performs in the more simple environment. Namely, it describes how the simple framework presented in ST needs to be adapted in the more complicated environment, and then attempts to provide some general guidance on the relative magnitude of various countervailing effects with an eye towards providing qualitative guidance on the nature of the net effect.

LST can be viewed as providing four set of results. These are: (i) it explains how the the simple framework of ST can be adapted to deal with complex mergers; (ii) it attempts to provide some general qualitative insights on the nature of the net effect of complex mergers; (iii) it attempts to provide some general qualitative insights on how changing the number of pre-existing vertically integrated rivals changes the effects of a simple or complex merger; and (iv) it applies its framework to analyzing a recent complex merger considered by the DOJ and verifies DOJ's conclusion that the net effect of the merger was that it would be harmful to downstream consumers. I will consider each set of results in turn.

With respect to (i), the paper definitely fully explains how the simple framework of ST can be adapted to deal with complex mergers. The "problem" with this set of results is that I think they are very straightforward. Thus while these results are correct and certainly need to be described in any published paper on this subject, they are not, in an of themselves, sufficiently novel to warrant publication.

With respect to (ii), I think that the paper offers some modest new qualitative insights into describing the overall direction of the net effects that emerge from the countervailing forces at work in complex mergers. It is intuitively clear that a complex vertical merger in some sense involves a combination of a vertical merger and a horizontal merger and we would in general expect the effect of complex merger to be some combination of the effects induced from these two types of mergers. One doesn't need a formal model or simulation to understand this. As I understand it, the point of doing the simulation to try and provide some qualitative results about the direction/nature of the net effect of the various countervailing forces and what this depends on. I think the most significant/interesting result of the paper is that it reports the that over the range of parameters it considers, it appears that in general the horizontal effects of complex mergers (which tend to reduce consumer surplus and result in higher downstream prices) tend to overwhelm the vertical effects (which at least have the possibility of decreasing consumer surplus and resulting in lower downstream prices.) I don't really find this result surprising. After all, if horizontal mergers reduce consumer welfare and vertical mergers can go either way, its not very surprising that mergers that combine elements of both types of mergers tend on average to

be more harmful to consumers that pure vertical mergers. Given that the net effect could go either way, it is still necessary to run the full simulation to determine the net effect, and the result does not provide any guidance on whether or not there are easily observable factors that would tend to imply that regulators could approve a merger at an early stage of the investigation without running a full simulation. Nonetheless, I think this result is somewhat interesting. The authors also report the result that the potentially positive effects of vertical mergers on consumer surplus tend to vanish when the bargaining power of downstream firms is high. ST also report this finding. While I think this finding is surely correct, the basis for this result follows from a very simple intuition that was well understood before ST was ever written. The idea is that as the bargaining power of downstream firms decreases, the amount of double marginalization decreases which means that the potential for a vertical merger to have pro-consumer effects grows smaller. While it may be somewhat interesting to see a simulation verify that this simple intuition is correct, I don't view it a particularly novel or significant result.

With respect to (iii), I think its fair to say that the paper offers no substantial qualitative inights on how the existing number of vertically integrated rivals (that do not participate in the merger) changes the effects of a simple or complex merger.

With respect to (iv), while it is interesting to to see how the various countervailing effects played out in this example, and it provides a nice illustration of how to apply the LST framework for analyzing complex mergers, it is very straightforward.

While I think it is a "close call," on balance I think that a somewhat shorter paper should be published. Analysis of the welfare effects of mergers with vertical elements is still a relatively new area of research. Furthermore I agree with the authors that in the real world many mergers with vertical elements are actually complex mergers that also have horizontal elements and a clear and simple explanation of how the the ST framework can also be adapted to deal with these will be useful for applied economists and graduate students to have access to. I also think that the authors finding that in their simulations of complex mergers, the horizontal effects often overwhelmed the vertical effects is of some interest.

I recommend that the paper be shortened in two ways. First I think that it should report the results for the simulations of complex mergers but should omit the results for the simulations of mergers where the number of pre-existing rivals (that do not participate in the merger) changes. That is, I think the authors should only include simulation results for the case when there are no pre-existing vertically integrated rivals that do not participate in the merger and report that the nature of the results does not change substantially when pre-existing vertically integrated rivals that do not participate in the merger are allowed to exist. In addition to shortening the paper, this will allow the authors to provide a simpler and much less confusing description of the set of examples they consider in their simulations. Second, I think that the material on generalizing the results to the case of increasing marginal costs should be omitted. I think this a somewhat separate issue that deserves separate treatment if substantial enough results can be derived.