The Effects of Vertical Arrangements in a Vertical Supply Chain*

Gloria Sheu†
Federal Reserve Board

Charles Taragin‡
Federal Trade Commission

March 2021

Abstract

We model a two-level supply chain where Nash bargaining occurs upstream and firms compete in a logit setting downstream, either via Bertrand price setting or an auction. The parameters can be calibrated with a discrete set of data on prices, margins, and market shares, facilitating use by antitrust practitioners. We perform numerical simulations to identify cases where modeling the full vertical structure is important and where harm is likely. We also examine the thwarted Anthem/Cigna merger and show how the model weighs the various arguments made by the government and the defendants.

Keywords: bargaining models; merger simulation; vertical markets

JEL classification: L13; L40; L41; L42

*The analysis and conclusions set forth are those of the authors and do not indicate concurrence by other members of the Board research staff, by the Federal Reserve Board of Governors, by the Federal Trade Commission, or by its Commissioners. This article has benefited from conversations with Evan Gee, Nathan Miller, Joseph Podwol, and Nathan Wilson, along with comments from numerous seminar participants at the Federal Communications Commission, the Federal Trade Commission, the U.S. Department of Justice, the International Industrial Organization Conference (April 21, 2018; Indianapolis, IN), and the DC Industrial Organization Day Conference (May 25, 2018; Washington, DC).

†Board of Governors of the Federal Reserve System, gloria.sheu@frb.gov.

‡Federal Trade Commission, ctaragin@ftc.gov

1 Introduction

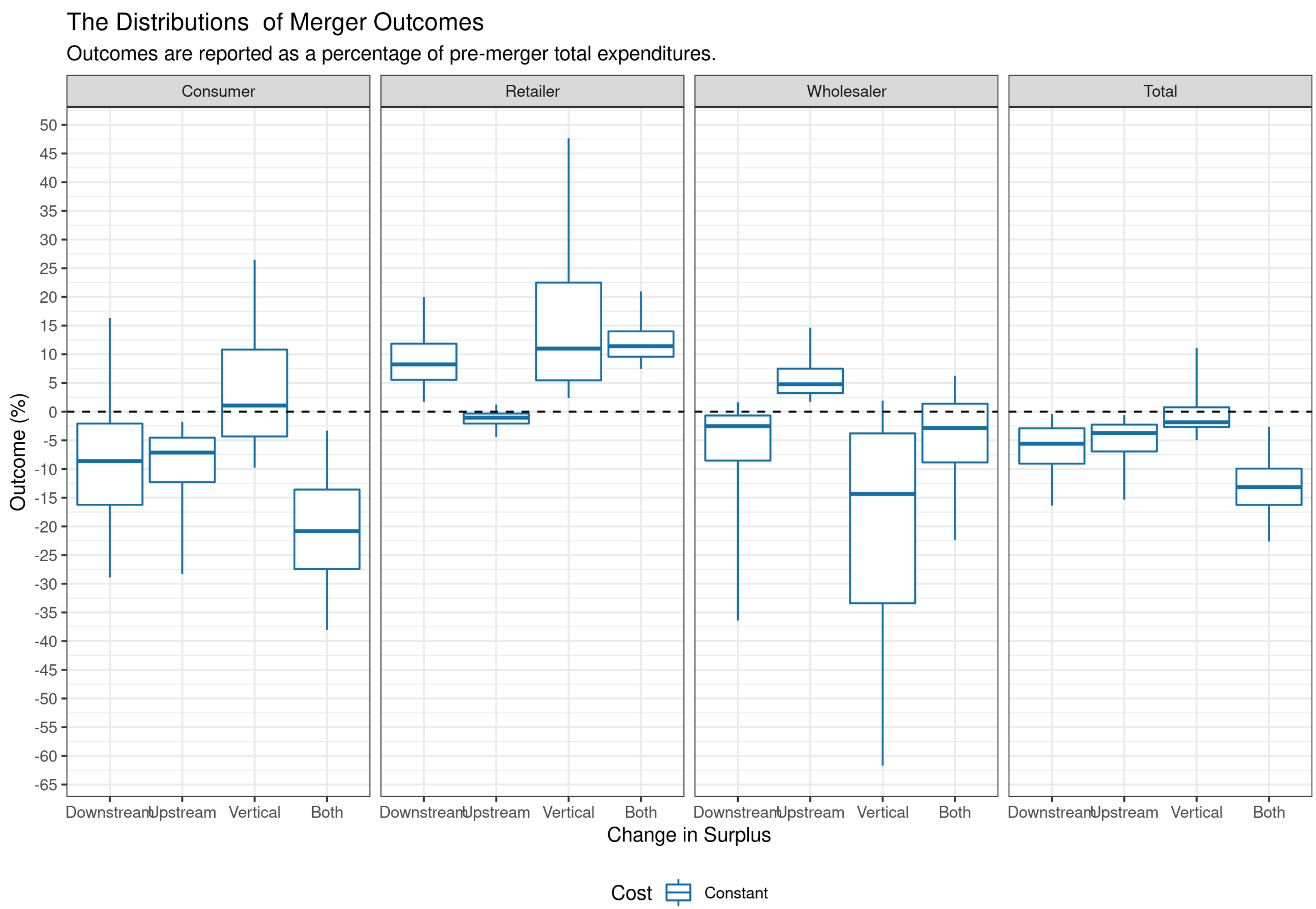

Figure 1 The figure displays box and whisker plots summarizing the extent to which mergers affect consumer, retailer, wholesaler, and total surplus. Each blue box depicts the effects assuming that retailers are playing a Bertrand pricing game. Whiskers depict the 5^{th} and 95^{th} percentiles of a particular outcome, boxes depict the 25^{th} and 75^{th} percentiles, and the solid horizontal line depicts the median.

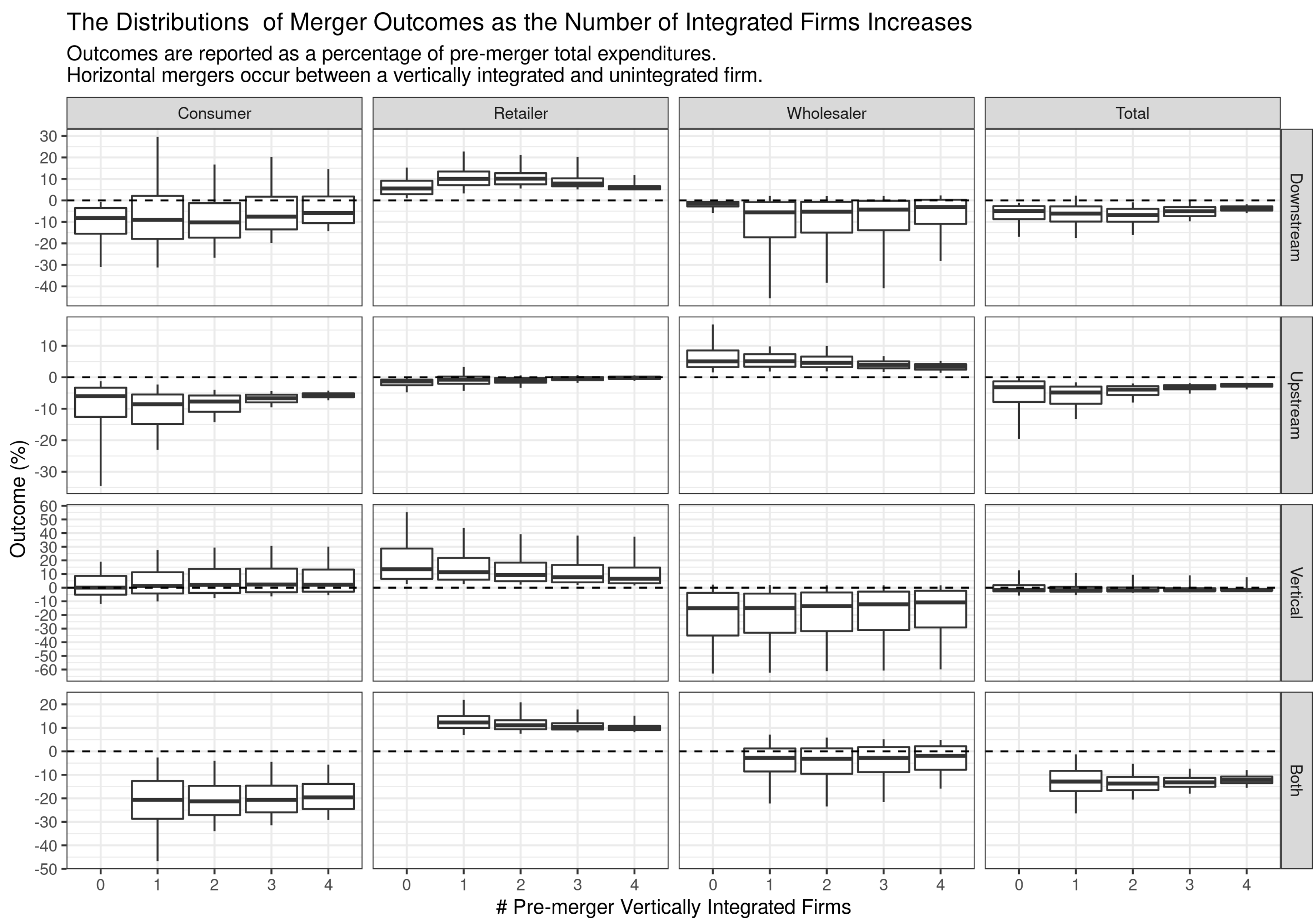

Figure 2 The figure displays box and whisker plots summarizing the extent to which mergers affect consumer, retailer, wholesaler, and total surplus as the number of vertically integrrated firms present in a market change. Each blue box depicts the effects assuming that retailers are playing a Bertrand pricing game. Whiskers depict the 5^{th} and 95^{th} percentiles of a particular outcome, boxes depict the 25^{th} and 75^{th} percentiles, and the solid horizontal line depicts the median.

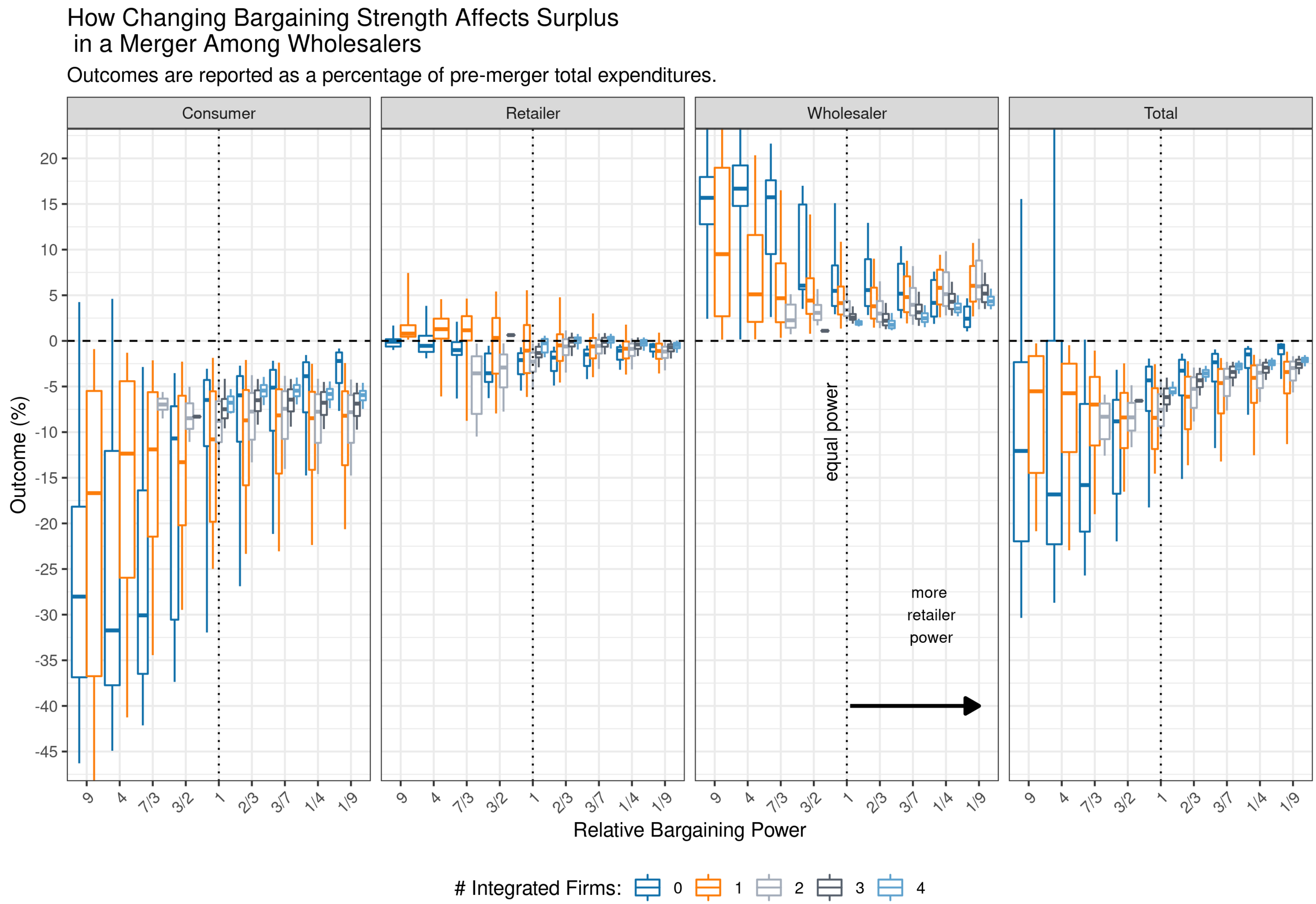

Figure 3 The figure displays box and whisker plots summarizing the extent to which mergers among an integrated and unintegrated wholesaler affect consumer, retailer, wholesaler, and total surplus as the bargaining power of wholesalers relative to retailers changes. Each blue box (on the left in each pair) depicts the effects assuming that retailers are playing a Bertrand pricing game, and each orange box (on the right in each pair) depicts the effects assuming that retailers are playing a second score auction game. Whiskers depict the 5^{th} and 95^{th} percentiles of a particular outcome, boxes depict the 25^{th} and 75^{th} percentiles, and the solid horizontal line depicts the median.

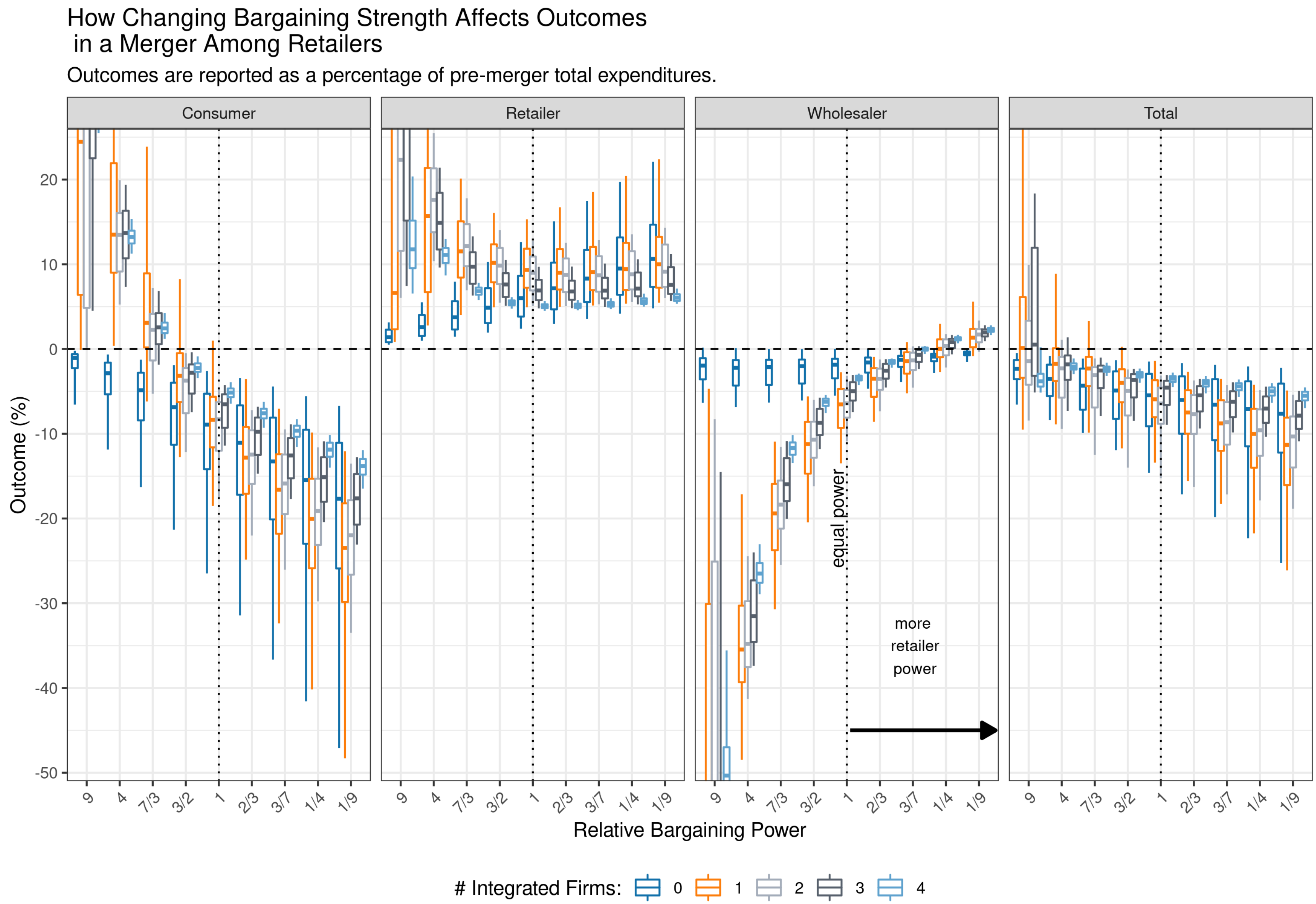

Figure 4 The figure displays box and whisker plots summarizing the extent to which mergers among an integrated and unintegrated retailer affect consumer, retailer, wholesaler, and total surplus as the bargaining power of wholesalers relative to retailers changes. Each blue box (on the left in each pair) depicts the effects assuming that retailers are playing a Bertrand pricing game, and each orange box (on the right in each pair) depicts the effects assuming that retailers are playing a second score auction game. Whiskers depict the 5^{th} and 95^{th} percentiles of a particular outcome, boxes depict the 25^{th} and 75^{th} percentiles, and the solid horizontal line depicts the median.

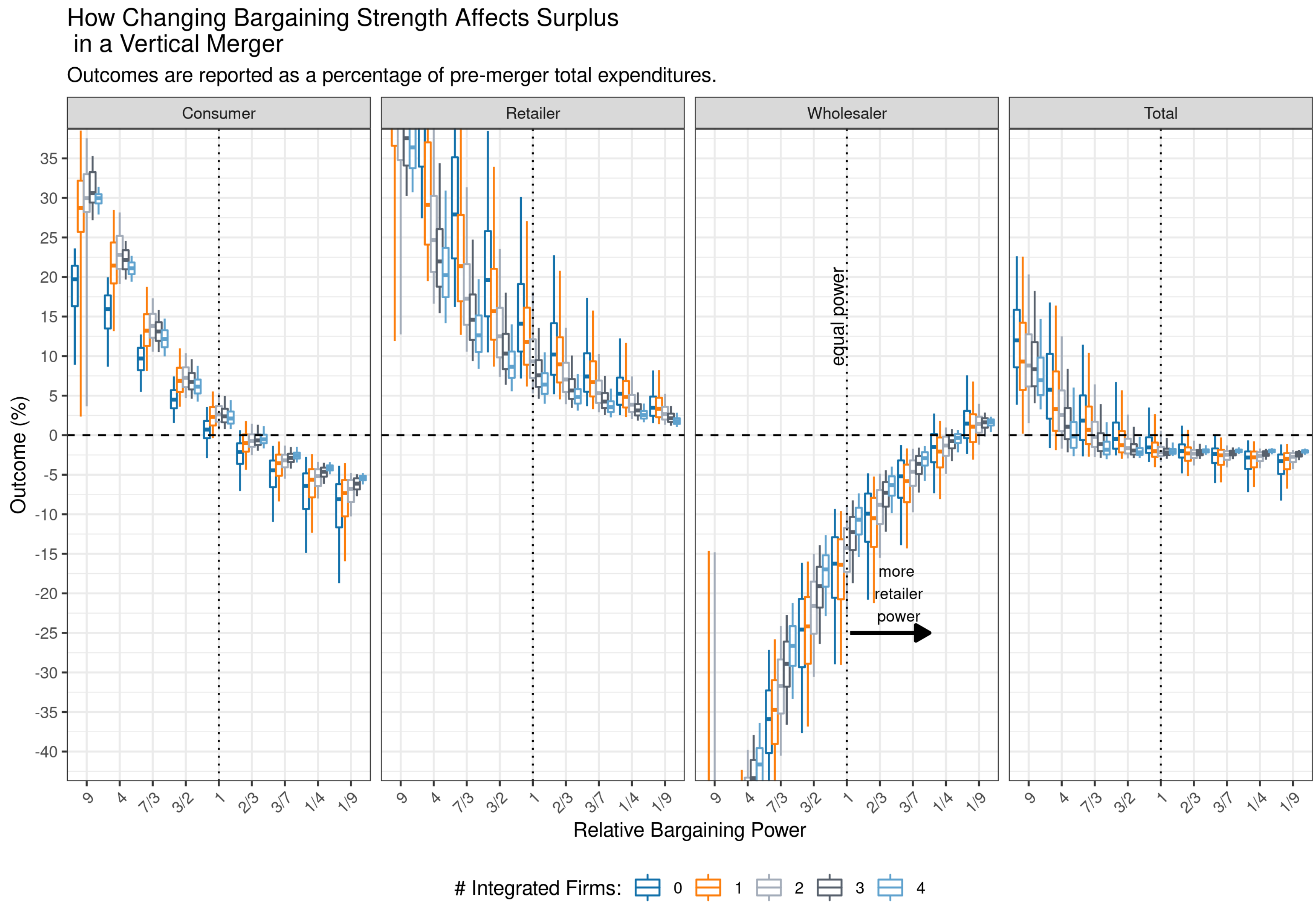

Figure 5 The figure displays box and whisker plots summarizing the extent to which mergers among an unintegrated wholesaler and unintegrated retailer affect consumer, retailer, wholesaler, and total surplus as the bargaining power of wholesalers relative to retailers changes. Each blue box (on the left in each pair) depicts the effects assuming that retailers are playing a Bertrand pricing game, and each orange box (on the right in each pair) depicts the effects assuming that retailers are playing a second score auction game. Whiskers depict the 5^{th} and 95^{th} percentiles of a particular outcome, boxes depict the 25^{th} and 75^{th} percentiles, and the solid horizontal line depicts the median.

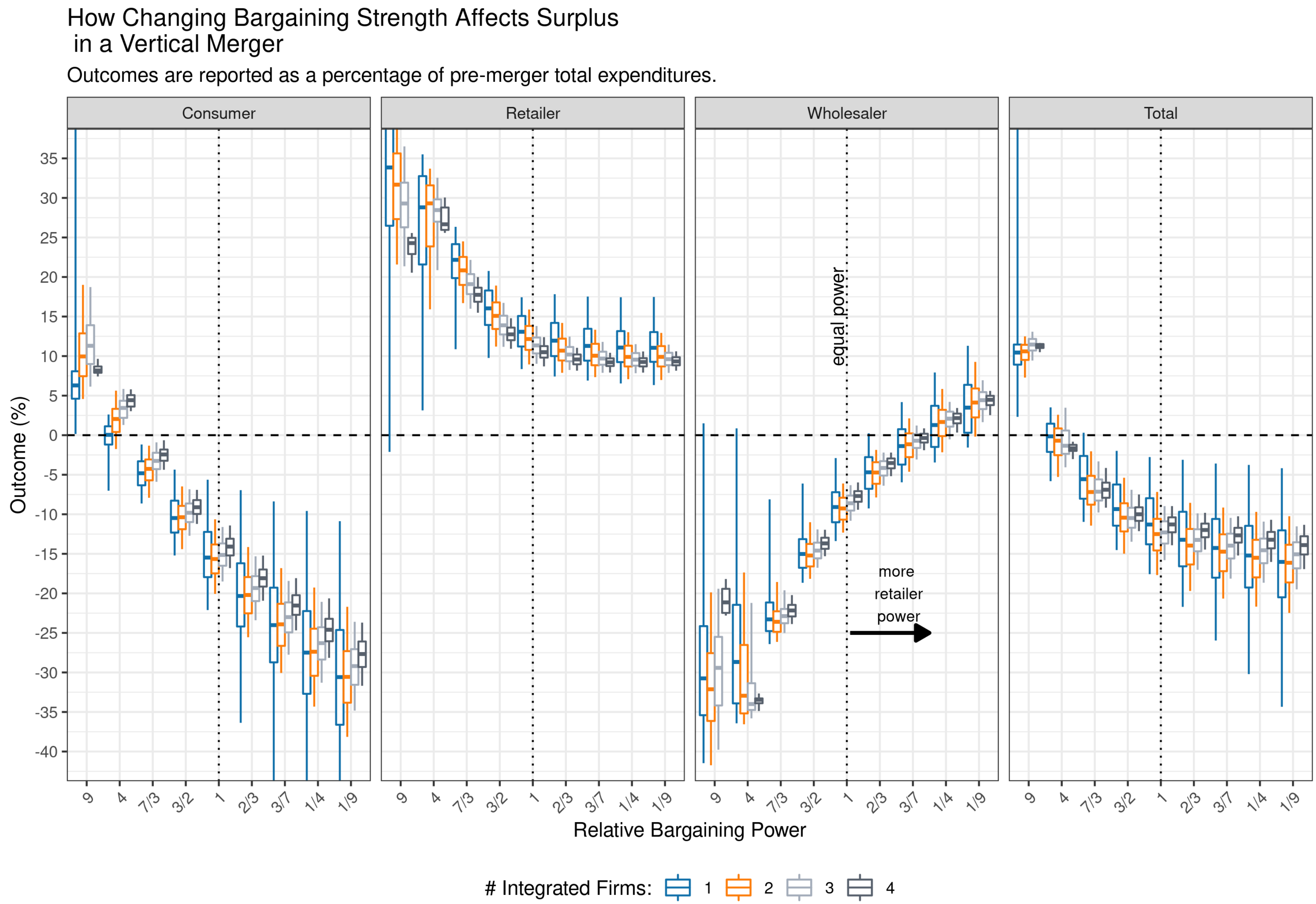

Figure 6 The figure displays box and whisker plots summarizing the extent to which mergers among two integrated wholesalers and retailers affect consumer, retailer, wholesaler, and total surplus as the bargaining power of wholesalers relative to retailers changes. Each blue box (on the left in each pair) depicts the effects assuming that retailers are playing a Bertrand pricing game, and each orange box (on the right in each pair) depicts the effects assuming that retailers are playing a second score auction game. Whiskers depict the 5^{th} and 95^{th} percentiles of a particular outcome, boxes depict the 25^{th} and 75^{th} percentiles, and the solid horizontal line depicts the median.