CAHPR CENTER FOR ADVANCING HEALTH POLICY THROUGH RESEARCH

Hospital Price Effects of Advocate's and Atrium's Recent Cross-Market Transactions

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Purpose

This memo provides transaction-specific evidence for evaluating the price concerns raised by the proposed Atrium-WakeMed combination. It asks whether hospital prices changed after three recent cross-market combinations in the history of what is now Advocate Health: the April 2018 combination of Advocate Health Care and Aurora Health Care; the October 2020 combination of Atrium Health and Wake Forest Baptist Health; and the December 2022 combination of Advocate Aurora Health and Atrium Health.[1] Because Atrium is now part of Advocate Health, all three transactions provide evidence about potential price changes resulting from the combination of Atrium and WakeMed. This memo focuses only on hospital prices; our public comment addresses access, affordability, charity care, and governance concerns separately.[2]

The analysis begins with the observed price trends at the hospitals participating in each transaction. It then compares those trends with prices at other hospitals in the same states. The comparison matters because hospital prices can rise for reasons unrelated to a merger, including economy-wide inflation, labor costs, changes in patient mix, and broader changes in insurer negotiations. The statistical analysis asks whether prices at transaction hospitals changed more than would be expected from the contemporaneous experience of other hospitals. No completed transaction is a perfect comparison for Atrium-WakeMed, but this report points out aspects of it that are similar to the three prior transactions.

Principal Findings

First, we looked at the price impacts of the 2018 combination of Advocate Health Care and Aurora Health Care. Discharge-weighted prices at Advocate-Aurora hospitals increased 26.7% from 2018 to 2024, compared with 18.6% at comparison hospitals in Illinois and Wisconsin. Our regression model estimates that Advocate-Aurora prices increased 7.2% more than the comparison path between 2018 and 2024. That estimate is economically meaningful and statistically suggestive, but it is just outside the conventional 5% significance threshold (95% confidence interval -1.0% to 16.0%; p=.086).

Second, we looked at price changes at the Wake Forest Baptist hospitals, in comparison to price changes at legacy Atrium hospitals and other North Carolina hospitals. For this analysis, we followed Atrium's North Carolina hospitals only, and we observed the legacy Atrium hospitals and the Wake Forest Baptist hospitals separately. We compared both of those groups with the

[1] Advocate Health Care, "Advocate Aurora Health to Become Top-10 Health System" (March 22, 2018); Atrium Health, "Atrium Health and Wake Forest Baptist Health Combine, Create Next-Generation Academic Health System" (October 9, 2020); Atrium Health, "Advocate Aurora Health and Atrium Health Complete Combination" (December 2, 2022).
[2] https://drive.google.com/file/d/1pKkGITwT154TQRn_plKO0RrgquUxxOfz/view.

same group of comparison North Carolina hospitals. From 2020 through 2024, weighted prices increased 24.1% at legacy Atrium hospitals and 28.0% at Wake Forest Baptist hospitals, compared with 20.0% at other North Carolina hospitals.

Third, we looked at how prices have changed at all of the Atrium hospitals, in comparison to other hospitals. In this adjusted regression pooling of the entire 2020–2024 period, we estimate that Atrium prices were 8.9% higher relative to their pre-2020 relationship with comparison hospitals (95% confidence interval -0.4% to 19.1%; p=.061). This is suggestive evidence of a relative increase in prices at Atrium hospitals during the post-2020 period.

The same Atrium analysis does not show a distinct additional acceleration in prices after the 2022 Advocate-Atrium transaction. From 2022 to 2024, Atrium prices increased 11.3%, compared with 12.3% at other North Carolina hospitals. The adjusted relative change is -3.3% (95% confidence interval -11.4% to 5.6%; p=.45). This estimate should not be read as evidence that the transaction lowered prices. It means that, through two full post-transaction years, the data do not identify a separate Atrium price increase associated with the 2022 transaction.

Taken together, the results raise more concern about Advocate-Aurora and the post-2020 Atrium-Wake Forest period than about an additional immediate effect of Advocate-Atrium. Atrium-Wake Forest is the best transaction-level analogue to Atrium-WakeMed because it involves the same North Carolina platform expanding into a distinct but reachable market. Advocate-Aurora provides the strongest longer-run empirical warning from the current parent system.

Data and Methods

Price Measure and Sample

Following Dafny, Ho, and Lee (2019),[3] annual hospital price equals estimated net inpatient revenue from non-Medicare patients divided by non-Medicare inpatient discharges. It is a broad average revenue measure, not the negotiated price paid by a particular insurer for a particular service. Our regressions use log price so estimates are interpretable as percentage changes. The figures below report nominal dollars. Annual movements can reflect negotiated rates, but also changes in payer or service mix, inpatient volume and length of stay, and the accounting inputs used to estimate net inpatient revenue.

We follow Dafny and coauthors' approach to implausible price observations. The sample is limited to non-critical-access general acute-care hospitals paid under Medicare's inpatient prospective payment system, requires positive price components, and excludes observations below the 5th or above the 95th percentile of the national hospital price distribution in each year. We also require essentially complete calendar-year reports and continuous observation throughout the relevant event-study window. For the analyses reported here, that window is

[3] Dafny, Leemore, Kate Ho, and Robin S. Lee. "The price effects of cross-market mergers: theory and evidence from the hospital industry." *The RAND Journal of Economics* 50, no. 2 (2019): 286-325.

2014 through 2024. This annual, symmetric screen removes extreme observations without selecting hospitals according to whether their prices grow slowly or quickly over the full period.[4]

All results reported in this memo weight hospitals by their average non-Medicare discharges. This makes a hospital's influence proportional to the number of patients represented and reduces the influence of small hospitals whose annual averages are often less stable.

Treatment, Controls, and Estimation

The three transactions are analyzed separately rather than combining all Advocate and Atrium hospitals into one treatment group. Each analysis asks what happened to the hospitals participating in that transaction relative to an appropriate contemporaneous comparison group. The results are then considered together because all three transactions form part of the recent expansion history of the organization that would acquire WakeMed.

The 2018 analysis contains 21 Advocate-Aurora hospitals and 119 comparison hospitals in Illinois and Wisconsin observed from 2014 through 2024. The graph follows that fixed group through both the 2018 Advocate-Aurora transaction and its 2022 entry into the larger Advocate Health system.

The Atrium analysis contains 13 North Carolina Atrium hospitals with complete screened data: 10 legacy Atrium hospitals and three Wake Forest Baptist hospitals. It excludes Advocate-Aurora hospitals and Atrium hospitals outside North Carolina. The comparison group consists of 51 other non-critical-access general acute-care hospitals in North Carolina. The graph follows all three groups from 2014 through 2024 and marks both the 2020 Atrium-Wake Forest transaction and the 2022 Advocate-Atrium transaction. Separating the two Atrium components reveals whether a change is concentrated at the Wake Forest targets or shared by the broader Atrium system. The adjusted estimates pool the 13 Atrium hospitals to summarize the price path of the enlarged North Carolina footprint and preserve statistical precision.

The comparison groups are deliberately simple: all other non-critical-access general acute-care hospitals in the relevant states that satisfy the data and reporting requirements. The event-study regressions compare changes within hospitals, remove shocks common to all hospitals in a year, and adjust for case mix, beds, Medicaid share, and for-profit status, following Dafny and coauthors. Standard errors are clustered by hospital. The pre-transaction year is the reference point, so each post-transaction estimate measures how much more or less prices changed at transaction hospitals than at comparison hospitals. For Atrium, the 2020 event study uses 2019 as its reference year; a separate 2022-to-2024 contrast tests whether there is an additional relative change following the Advocate-Atrium transaction.

[4] Methods: Dafny, Ho, and Lee (2019), including the appendix. Data: RAND Hospital Data calendar-year HCRIS file dated May 1, 2026, its accompanying variable documentation, and NASHP hospital cost-report data. RAND defines Medicare HMO as Medicare Advantage and subtracts traditional Medicare discharges when constructing non-Medicare discharges.

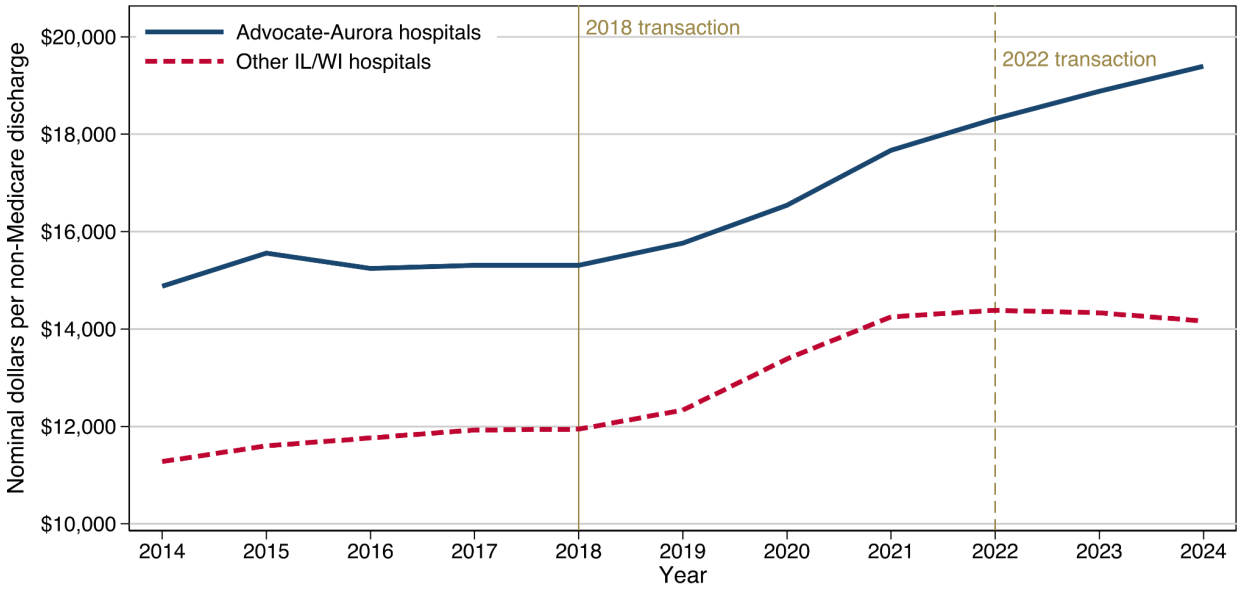
Advocate-Aurora: Prices Rise After 2018 and End Above the Comparison Trend

The most immediate visual fact is that Advocate-Aurora prices begin rising around the 2018 transaction. After remaining nearly flat from 2016 through 2018, weighted prices increase from $15,308 per non-Medicare inpatient discharge in 2018 to $18,320 in 2022 and $19,394 in 2024. That is a 26.7% nominal increase over six years.

The initial takeoff is not unique to Advocate-Aurora. Comparison-hospital prices also accelerate after 2018, rising from $11,944 in 2018 to $14,384 in 2022. Through 2022, the two groups therefore experience similar percentage growth: 19.7% at Advocate-Aurora and 20.4% among comparison hospitals. The graph shows a clear post-2018 price increase at Advocate-Aurora, but the initial timing alone does not establish that the transaction caused it.

The paths diverge after 2022. Advocate-Aurora prices continue rising to $19,394 in 2024, while comparison prices edge down to $14,164. Over the full 2018-2024 period, prices grow 26.7% at Advocate-Aurora and 18.6% among comparison hospitals (Figure 1). The adjusted 2018-to-2024 contrast is 7.2%, with a 95% confidence interval from -1.0% to 16.0% and p=.086.

Figure 1. Nominal price per non-Medicare inpatient discharge, Advocate-Aurora and Illinois-Wisconsin comparison hospitals



Notes: Annual unsmoothed prices after applying the Dafny annual 5th/95th percentile price screen; hospitals are weighted by average non-Medicare discharges. The figure includes 21 Advocate-Aurora hospitals and 119 other non-critical-access general acute-care hospitals in Illinois and Wisconsin. The vertical lines mark the 2018 Advocate-Aurora and 2022 Advocate-Atrium transactions.

Before 2018, the regression does not detect a systematic difference between the two groups' price trends (p=.40). The post-transaction estimates remain close to zero through 2022, then rise to 5.2% in 2023 (p=.14) and 7.0% in 2024 (p=.088). This is best described as suggestive

evidence of a later relative increase, not a conventionally statistically significant finding and not evidence of an immediate 2018 effect.

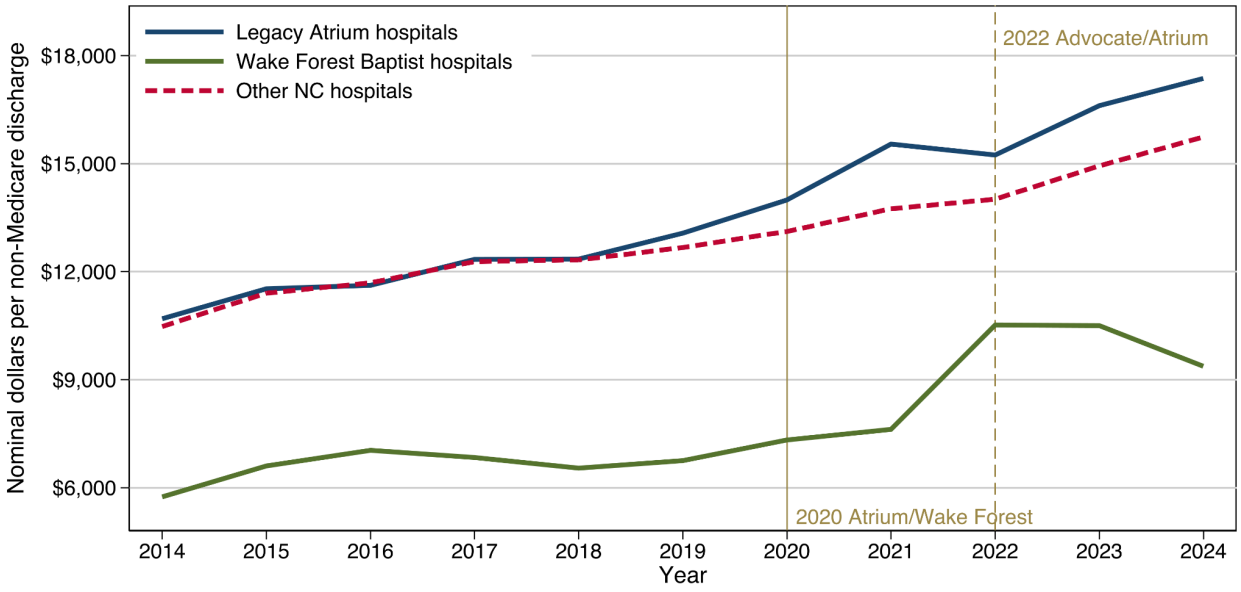
Atrium in North Carolina: Different Paths at Legacy Atrium and Wake Forest Baptist

Legacy Atrium hospitals and the North Carolina comparison hospitals begin at similar price levels and follow similar paths before 2020. In 2014, the weighted average price is $10,699 at legacy Atrium hospitals and $10,479 at comparison hospitals. By 2019, the corresponding prices are $13,073 and $12,674. In the 2020 transaction year, the weighted average price at legacy Atrium hospitals is $13,995 and at the comparison group is $13,119.

Wake Forest Baptist begins at a much lower measured price level: $5,748 in 2014, $6,753 in 2019, and $7,326 in 2020. That level difference is not itself evidence of a transaction effect. The relevant question is whether each group's price path changes around the transaction dates.

After 2020, the legacy Atrium hospitals' price moves above the comparison line. Its price rises to $15,546 in 2021, $15,244 in 2022, $16,616 in 2023, and $17,365 in 2024. From 2020 through 2024, that is a 24.1% increase, compared with 20.0% at other North Carolina hospitals. Wake Forest Baptist follows a different pattern. Its price rises modestly in 2021, jumps from $7,619 in 2021 to $10,525 in 2022, remains near that level in 2023, and falls to $9,378 in 2024. The Wake Forest price is still 28.0% higher in 2024 than in 2020, but the path is considerably less stable than the legacy Atrium path.

Figure 2. Nominal price per non-Medicare inpatient discharge at legacy Atrium, Wake Forest Baptist, and other North Carolina hospitals, 2014–2024



Notes: Price is measured as non-Medicare inpatient net revenue divided by non-Medicare inpatient discharges and is reported in nominal dollars. Annual unsmoothed prices are shown after applying the Dafny et al. annual 5th/95th percentile price screen. Hospitals are weighted by their average non-Medicare inpatient discharges. The figure includes 10 legacy Atrium hospitals, three Wake Forest Baptist hospitals, and 51 other non-critical-access general

acute-care hospitals in North Carolina with complete screened data. “Legacy Atrium” excludes Wake Forest Baptist hospitals. The solid vertical line marks Atrium’s 2020 acquisition of Wake Forest Baptist; the dashed vertical line marks the 2022 Advocate-Atrium transaction.

Pooling the 10 legacy Atrium and three Wake Forest Baptist hospitals in a separate adjusted regression, we estimate that prices were 8.9% higher during 2020–2024 relative to their pre-2020 relationship with comparison hospitals (95% confidence interval -0.4% to 19.1%; p=.061). This provides suggestive, though not conventionally statistically significant, evidence of a relative post-2020 increase.

There is no system-wide additional increase after the 2022 Advocate-Atrium transaction. From 2022 to 2024, prices rise 13.9% at legacy Atrium hospitals and 12.3% at comparison hospitals, while Wake Forest prices fall 10.9% from their unusually high 2022 level. Pooling the Atrium hospitals, prices rise 11.3%, and the adjusted relative estimate is -3.3% and statistically insignificant (95% confidence interval -11.4% to 5.6%; p=.45). The appropriate conclusion is not that the 2022 transaction reduced Atrium prices, but that the available data through 2024 do not identify a common additional Atrium price increase after that transaction.

Interpretation and Implications for Atrium-WakeMed

The three transactions provide a meaningful basis for concern that Atrium-WakeMed could increase prices, particularly at the target (WakeMed) hospitals. Advocate-Aurora hospitals experience a clear nominal price increase after 2018 and end above the Illinois-Wisconsin comparison path. The adjusted estimate is a meaningful 7.2% even if it narrowly misses conventional statistical significance. This pattern is consistent with a positive price effect, particularly a later effect. After 2020, legacy Atrium hospitals rise persistently above the North Carolina comparison path. Wake Forest Baptist's measured price also remains above its pre-2022 level and has grown faster than the comparison path, even after an unusually sharp 2022 peak partly reverses. When pooled, Atrium's North Carolina hospitals show a suggestive average post-2020 relative increase but no additional detectable acceleration after the 2022 Advocate transaction.

The Best Transaction-Level Analogue

Atrium-Wake Forest Baptist is probably the best of the three transaction-level analogues for Atrium-WakeMed. Both involve Atrium expanding within North Carolina into a separate metropolitan hospital market, and both can connect facilities that may be included in the same statewide insurer and employer networks. At the time of the 2020 transaction, the closest major acute-care campuses were approximately 40 road miles apart: Atrium Health Cabarrus in Concord and Wake Forest Baptist's Lexington Medical Center. The principal hubs in Charlotte and Winston-Salem were about 80 miles apart, and a contemporaneous credit analysis described the combined organization as operating in "two distinct markets" in North Carolina.[5]

[5] S&P Global Ratings, "Atrium Health, North Carolina; CP; Joint Criteria; System," November 25, 2020, p. 8. The report states that the combined system operated in two distinct North Carolina markets and that Winston-Salem is approximately 80 miles north of Charlotte.

Atrium's acquisition of Wake Forest Baptist changed how its distance to WakeMed should be measured. Wake Forest Baptist is now part of Atrium, so the relevant edge of the current Atrium system is not Charlotte alone. The closest major inpatient campuses are approximately 80 to 90 road miles apart: Atrium's High Point Medical Center and WakeMed Cary Hospital. The original hubs in Charlotte and Raleigh are roughly 160 to 170 road miles apart. Atrium-WakeMed is therefore more geographically separated at its nearest hospital campuses than Atrium-Wake Forest was in 2020, but both are properly understood as within-state cross-market combinations rather than mergers of direct local hospital substitutes.[6]

Advocate and Aurora operated in neighboring Midwestern states, while Advocate Aurora and Atrium were separated across the Midwest and Southeast. Atrium and WakeMed both operate in North Carolina, creating greater potential overlap among insurers, employers, and system-wide contracting than in the Advocate-Atrium transaction. Advocate-Aurora nevertheless provides the strongest longer-run empirical warning. It is relevant even though Atrium was not yet part of Advocate in 2018 because Advocate is now Atrium's parent system and the proposed WakeMed transaction would further expand that same combined organization. Advocate-Atrium is likely the least informative of the three because the merging organizations were geographically distant and only two full post-transaction years are currently available.

Two Risk Factors Highlighted by the Literature

The broader literature supplies additional context. Lewis and Pflum find that hospitals acquired by out-of-market systems increased prices 17% more than unacquired hospitals.[7] Dafny, Ho, and Lee find increases of roughly 7% to 9% after within-state cross-market mergers.[8] Arnold and coauthors find a 12.9% increase six years after cross-market acquisition, with larger effects when the acquiring system was a serial acquirer.[9] The leading explanation is greater bargaining leverage over insurers and employers that need facilities from the enlarged system in their networks.

The proposed Atrium-WakeMed combination possesses two characteristics that prior research associates with greater price risk. First, it is an in-state cross-market transaction. Dafny, Ho, and Lee find that within-state cross-market mergers increased acquiring-hospital prices by

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[6] Distances compare major acute-care campuses and are approximate road miles. For the 2020 transaction, Atrium Health Cabarrus in Concord to Lexington Medical Center was approximately 39 miles. For the proposed transaction, High Point Medical Center to WakeMed Cary Hospital is approximately 78-87 miles, depending on route and endpoints. Sources: official Atrium Health, Wake Forest Baptist, and WakeMed location pages; Rome2Rio and TravelMath route estimates.

[7] Lewis, Matthew S., and Kevin E. Pflum. "Hospital systems and bargaining power: evidence from out-of-market acquisitions." *The RAND Journal of Economics* 48, no. 3 (2017): 579-610.

[8] Dafny, Leemore, Kate Ho, and Robin S. Lee. "The price effects of cross-market mergers: theory and evidence from the hospital industry." *The RAND Journal of Economics* 50, no. 2 (2019): 286-325.

[9] Arnold, Daniel R., Jaime S. King, Brent D. Fulton, Alexandra D. Montague, Katherine L. Gudiksen, Thomas L. Greaney, and Richard M. Scheffler. "New evidence on the impacts of cross-market hospital mergers on commercial prices and measures of quality." *Health Services Research* 60, no. 1 (2025): e14291.

approximately 7% to 9%, while out-of-state acquisitions did not produce statistically significant increases. Arnold and coauthors later find price effects for both in-state and out-of-state acquisitions, but report that the in-state effects emerged earlier. State boundaries are therefore not a mechanical dividing line, but the evidence identifies within-state expansion as a particularly important concern.

Second, Atrium is now part of a serially expanding corporate system. Arnold and coauthors estimate that acquiring-hospital prices were 12.9% higher six years after a cross-market acquisition. For systems that acquired cross-market hospitals in four or more separate years, the six-year estimate increased to 16.3%, while the pattern for less-frequent acquirers was smaller and less persistent. The current Advocate Health lineage includes the 2018 Advocate-Aurora transaction, the 2020 Atrium-Wake Forest transaction, the 2022 Advocate-Atrium transaction, and the proposed 2026 Atrium-WakeMed transaction. That history places Atrium-WakeMed squarely within the policy concern raised by serial acquisition, even though the exact timing and composition differ from the transactions in the study.

Overall Implication

Atrium-Wake Forest Baptist is the best transaction-level analogue because it most closely matches the acquiring organization, state, and cross-market structure of Atrium-WakeMed. Advocate-Aurora provides the strongest longer-run empirical warning because it has two additional post-transaction years, a larger hospital sample, and the clearest persistent relative increase. Including both is necessary to evaluate the proposed transaction in its current corporate context: one captures Atrium's own North Carolina expansion, while the other captures the longer-run experience of the Advocate system that now includes Atrium. Read together with the literature, these comparisons provide a serious basis for concern: Atrium-WakeMed checks both of the risk boxes emphasized in prior research, combining an in-state cross-market expansion with another acquisition by a serially expanding system.

The evidence does not support a precise forecast, but the short Advocate-Atrium follow-up should not be treated as reassurance; policymakers should consider enforceable price protections if the transaction proceeds. Ongoing transaction-specific monitoring would also be warranted.