**Title**
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**Journal**
Milbank Quarterly, 100(2)

**ISSN**
0887-378X

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**Publication Date**
2022-06-01

**DOI**
10.1111/1468-0009.12568

Peer reviewed

THE
MILBANK QUARTERLY
A MULTIDISCIPLINARY JOURNAL OF POPULATION HEALTH AND HEALTH POLICY

*Original Scholarship*

# Do State Bans of Most-Favored-Nation Contract Clauses Restrain Price Growth? Evidence From Hospital Prices

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**Policy Points:**

- Looking for a way to curtail market power abuses in health care and rein in prices, 20 states have restricted most-favored-nation (MFN) clauses in some health care contracts.
- Little is known as to whether restrictions on MFN clauses slow health care price growth.
- Banning MFN clauses between insurers and hospitals in highly concentrated insurer markets seems to improve competition and lead to lower hospital prices.

**Context:** Most-favored-nation (MFN) contract clauses have recently garnered attention from both Congress and state legislatures looking for ways to curtail market power abuses in health care and rein in prices. In health care, a typical MFN contract clause is stipulated by the insurer and requires a health care provider to grant the insurer the lowest (i.e., the most-favored) price among the insurers it contracts with. As of August 2020, 20 states restrict the use of MFN clauses in health care contracts (19 states ban their use in at least some health care contracts), with 8 states prohibiting their use between 2010 and 2016.

**Methods:** Using event study and difference-in-differences research designs, we compared prices for a standardized hospital admission in states that banned

The Milbank Quarterly, Vol. 100, No. 2, 2022 (pp. 589-615)

MFN clauses between 2010 and 2016 with standardized hospital admission prices in states without MFN bans.

**Findings:** Our results show that bans on MFN clauses reduced hospital price growth in metropolitan statistical areas (MSAs) with highly concentrated insurer markets. Specifically, we found that mean hospital prices in MSAs with highly concentrated insurer markets would have been $472 (2.8%) lower in 2016 had the MSAs been in states that banned MFN clauses in 2010. In 2016, the population in our sample that resided in MSAs with highly concentrated insurer markets was just under 75 million (23% of the US population). Hence, banning MFN clauses in all MSAs in our sample with highly concentrated insurer markets in 2010 would have generated savings on hospital expenditures in the range of $2.4 billion per year.

**Conclusions:** Our empirical findings suggest banning MFN clauses between insurers and providers in highly concentrated insurer markets would improve competition and lead to lower prices and expenditures.

**Keywords:** most-favored-nation clauses, state health policy, hospital prices, insurer-provider contracts, health care market concentration.

Decades of consolidation in both health care provider and insurer markets has resulted in highly consolidated health care markets throughout the United States, leading to higher prices for patients and employers.[1-3] In some instances, dominant health insurers have used their market power to demand clauses in contractual agreements that drive up the cost of health care in anticompetitive ways.[4] As a result, antitrust enforcers and policymakers have begun scrutinizing contracting practices between health insurers and providers as one way to promote competition in consolidated markets.[4] Most-favored-nation (MFN) clauses (sometimes called “pricing parity” or “price protection” clauses) were some of the first provisions challenged in court and prohibited by state laws, but the economic impact of these laws remains unknown. This study estimated the effect that laws banning MFN clauses in health insurance contracts have had on hospital prices.

An MFN clause is a contractual agreement between a buyer (health insurer) and seller (health care provider) where the seller agrees to give the contracted buyer the lowest price. If the provider decides later to offer a lower price to another insurer, the price change would trigger the MFN clause and the contracted insurer would have the right to purchase from the provider at the new lower price. In some cases, insurers negotiate MFN-plus arrangements where the provider agrees to charge all other insurers more than they charge the first insurer.

In 2010, the US Department of Justice (DOJ) and the Michigan Attorney General filed suit against Blue Cross Blue Shield of Michigan (BCBS), alleging that BCBS used MFN clauses to exclude competitors by driving up the costs for rival insurers.[5] At the time, BCBS was the dominant health insurer in Michigan, covering more than 60% of state residents with commercial insurance. The insurer had MFN-plus agreements in contracts with 22 hospitals (which included 45% of the tertiary care hospital beds in Michigan) and equal-to-MFN agreements in contracts with 40 smaller community hospitals. In equal-to-MFN agreements, BCBS required the hospital to charge other insurers at least as much as they charge BCBS. In an MFN-plus agreement, BCBS required the hospital to charge other insurers more than BCBS—in this case, the DOJ alleged the requirement was to charge up to 40% more, which greatly increased costs to rival insurers. The DOJ also alleged that BCBS used MFN clauses in contracts to ensure that any hospital that agreed to a lower price with a rival insurer would need to offer the same or better terms to BCBS. As a result, hospitals were unable to agree to lower prices in exchange for incremental volume, and rival insurers trying to construct a narrow network plan were unable to attract hospitals to their networks, thereby securing BCBS's market dominance. Furthermore, the DOJ asserted that BCBS did not use MFN clauses to lower their own costs, but instead offered higher reimbursement rates to hospitals in exchange for the hospitals agreeing to include an MFN clause in the contract—in essence, this arrangement would allow hospitals to "sell" the right to an MFN in exchange for higher provider rates.[6] In the midst of the suit, the Michigan legislature banned the use of MFN clauses by health insurers, health maintenance organizations, health care corporations, and any other entities providing health insurance in their provider contracts, which led the DOJ to drop the lawsuit.

Since that time, MFN clauses have garnered attention from Congress and many state legislatures looking for ways to curtail market power abuses in health care and rein in prices. As of August 2020, 20 states restrict the use of MFN clauses in contracts between health care providers and insurers (including 19 states that ban their use in at least some health care contracts).[4] At the federal level, the sweeping, bipartisan Lower Health Care Costs Act of 2019[7] proposed by Senators Patty

Murray and Lamar Alexander would have prohibited MFN clauses, but that bill failed to pass. Despite this attention to MFN clauses at the policymaking level, this study is the first to provide a comprehensive analysis of the impact legislation banning MFN clauses has on hospital prices. We accomplish this goal by comparing price trends in states that implemented MFN bans between 2010 and 2016 with the price trends of states without MFN bans.

## Conceptual Framework and Prior Literature

The insurer-hospital bargaining model developed in Ho and Lee[8] serves as our framework for thinking about the theoretical impact of a legislative ban on MFN clauses in insurer-provider contracts. To put it simply, a hospital has bargaining leverage when enrollees will switch *insurers* if the hospital is out of the enrollee's current network, whereas an insurer has leverage when enrollees will switch *hospitals* if the hospital is out of their network. As shown by Ho and Lee, a reduction in insurer competition has five effects on hospital prices: an enrollment effect, a premium effect, a hospital cost effect, a price reinforcement effect, and a recapture effect.

The first two effects typically move in opposite directions. For the enrollment effect, if a rival insurer drops out of the market, the remaining insurers are now less likely to lose enrollment by excluding hospitals since consumers have fewer insurer alternatives. As a result, the remaining insurers gain additional leverage in hospital price negotiations, which pushes hospital prices down. However, the fact that there are fewer insurers now makes it likely that the remaining insurers will be able to increase premiums (the premium effect) and will tend to increase negotiated prices, as there is now a larger pie to negotiate over.

Ho and Lee state that the impact of the hospital cost effect will be minimal in their model, so we won't discuss it here. The final two effects—the price reinforcement and recapture effects—are more difficult to sign than the first two effects because they depend not only on changes in demand for all insurers but also on the equilibrium prices paid to all other hospitals. Ultimately, the impact a less-competitive insurance market has on hospital prices is ambiguous and necessitates an empirical study. This ambiguity does not exist for increases in hospital bargaining leverage. As hospital bargaining leverage increases, hospital prices also rise.

MFN clauses have been used in a number of industries and have been discussed at length in the broader literature in antitrust economics.[9-12] Several studies have concluded that MFN contract clauses have the potential to harm consumers.[13-15] Yale economist Fiona Scott Morton nicely summarizes the way in which MFN clauses can affect competition as part of broader discussion of contracts that reference rivals.[6] In an insurer-hospital contract without an MFN clause or other contract terms that reference rivals, she makes the point that all that matters for determining the price that insurer 1 pays hospital A for its services is the terms the two parties set in the contract. If an MFN clause is introduced into the contract, the price insurer 1 pays hospital A now also depends on the prices that insurers 2, 3, and 4 pay hospital A. So, if hospital A wants to agree to a lower price with insurer 2 in exchange for additional volume, it also has to consider the additional price reduction from insurer 1 that is triggered as a result of the MFN clause. This trade-off is not present in contracts that do not reference rivals.

MFN clauses can harm competition in several ways. First, as Cooper has theorized, MFN clauses can result in higher equilibrium prices in a perfect-information model of a price-setting duopoly (two firms) with differentiated products.[14] This increase in equilibrium prices occurs *even though* buyers often request MFN clauses. Why would a buyer ask for something that could lead it to pay higher prices? This paradox is often cited as evidence that MFN clauses must promote competition. However, when market demand is inelastic, as has often been shown to be the case for health insurance,[16] a buyer may not object to a price increase as long as all of its rivals bear the same increase or more. In fact, if a market is dominated by large employers purchasing administrative services–only insurance, price increases for the insurer are directly passed on to employers. The effect of any price increase on insurer profits in this case may be minimal, and insurers do not have to worry if it is later disclosed that they negotiated prices that exceeded those paid by rival insurers. Powerful insurers might even negotiate benefits other than low prices such as stricter claims processing or higher quality targets. Thus, it is hardly surprising that many insurers would welcome MFN clauses. Thinking about the seller's incentives in this scenario makes the anticompetitive potential clear. Consider a hospital that has MFN clauses in a substantial share of its contracts with health insurers. In this scenario, it would be very expensive for the hospital to offer a lower price to one health insurer because doing so would trigger a lower price for a substantial share of the hospital's buyers. Thus, it becomes unlikely the hospital will offer discounts to its customers, and the effect of the MFN clause is to raise equilibrium prices. In addition, insurers may be willing to pay higher prices to hospitals in exchange for an MFN clause because they know all other insurers must pay the higher prices and they can pass on the cost to consumers in the form of higher premiums.

Simple dynamic models also demonstrate how MFN clauses can be anticompetitive. Consider an incumbent insurer and potential entrant insurers. Incumbent insurers typically have advantages over potential entrants because the incumbents have an established brand and consumers generally experience significant switching costs when it comes to health insurance.[17] Under these conditions, entrants need something special to induce consumers to try their insurance product. The obvious way to do this is through offering a lower price. One strategy for the entrant would be to negotiate lower prices from a dominant hospital. However, an MFN clause in the incumbent insurer's contract with that hospital could easily thwart this strategy because any lower prices negotiated by the potential entrant would apply equally to the incumbent, thus immediately eliminating the entrant's input cost advantage.

Despite the aforementioned potential anticompetitive harms of MFN clauses, several potential benefits of MFN clauses in the context of health care have been suggested in the literature. MFN clauses can promote competition if they enable certain types of investments between hospitals and insurers that would not have occurred without the MFN.[6] For instance, an insurer considering whether to invest in improving care coordination for a hospital's patients will be less likely to do so if the insurer thinks the hospital will deploy what it learns from this investment to offer a lower rate to one of the insurer's rivals. An MFN clause would moderate this fear for the insurer. MFN clauses also have the potential to reduce transaction costs.[10] Consider an insurer that has to negotiate with many provider groups. If provider groups are concerned about their competitors getting better rates from the insurer than they are getting, negotiations could become long and drawn out. The insurer can ease the concern by including an MFN provision guaranteeing that the provider groups will not get disadvantageous terms relative to those of their competitors. If adding the MFN provision significantly reduces the time and cost of negotiations, its addition could end up promoting competition.

Given that the effects of MFN clauses could restrict or promote competition, empirical evaluation is necessary to determine which effects dominate in specific contexts.

## Methods

We used event study and difference-in-differences models to test the net impact of MFN clauses by comparing hospital price trends in states that banned MFN clauses between January 1, 2010, and December 31, 2016, with the hospital price trends in states without MFN bans during the same period. If the net effect of MFN clauses is anticompetitive, we would expect to see hospital prices grow at a slower rate in states that banned MFN clauses during our study period as compared with states without MFN bans. If the net effect of MFN clauses is to promote competition, we would expect to see the opposite: hospital price growth would increase in states that banned MFN clauses between 2010 and 2016 relative to hospital price growth in states without bans on MFN clauses. We excluded states with MFN restrictions in place before 2010 from our study; this allowed us to estimate the impact of MFN restrictions because we used only states that did not have bans on MFN clauses during the study period as the control states. We hypothesized that such bans could affect both the level and growth of hospital prices. That is, a ban on MFN clauses could immediately change the level of hospital prices in an area, and it could lead to changes in the growth rate of hospital prices under the assumption that hospitals' power to exercise market power in all future years is changed by the ban. An event study model can estimate this dynamic relationship because difference-in-differences parameters are estimated for each year before and after the event, which, in our case, is a newly enacted ban on MFN clauses. Estimating the effect multiple years after the event is particularly important in our context because hospital-insurer contracts can be renegotiated at varying intervals (e.g., every two or three years) as opposed to annually.

We also tested whether the effect of a ban on MFN clauses varies with the level of health care market concentration. Consider again the example of a hospital that must comply with MFN clauses in a substantial share of its contracts with health insurers. In this scenario, it would be very expensive for the hospital to offer a lower price to one health insurer because doing so would trigger a lower price for a substantial share of the hospital's buyers. Thus, the hospital would be unlikely to offer discounts to its insurers, and the effect of the MFN clause would be higher equilibrium prices. The likelihood that an MFN clause covers a substantial share of a hospital's insurers would presumably be higher in a highly concentrated insurer market; therefore, we hypothesized that the anticompetitive effect of MFN clauses would be stronger in highly concentrated insurer markets. Furthermore, the likelihood is greater in highly concentrated insurer markets that there are dominant insurers with the market power to successfully negotiate an MFN clause with a hospital.

### *Hospital Prices*

The dependent variable in our event study model was the standardized hospital admission price for a metropolitan statistical area (MSA). MSAs are delineated by the US Office of Management and Budget as having one urbanized area and a population of at least 50,000. As of 2010, 263 million people (85% of the population) lived in 384 MSAs across the United States.[18] A standardized hospital admission price (hereafter simply referred to as "hospital price") equals the total amount paid for inpatient services in an MSA divided by the number of standardized admissions in the MSA.[19] The "amount paid" is defined as the amount the health insurer pays plus the out-of-pocket amount paid by the patient, including deductibles, copayments, and coinsurance. A "standardized admission" is defined as an admission of average intensity, with a relative weight equal to 1. Admissions that deviate from the average intensity receive a relative weight that reflects their intensity. We used Medicare Severity Diagnosis Related Group (MS-DRG) relative weights, which assign relative weights based on the clinical characteristics of the inpatient stay and the expected resource requirements.[20] For example, a kidney transplant is more complicated, and requires more clinical resources, than an uncomplicated childbirth. In 2016, a kidney transplant had an MS-DRG relative weight of 3.2—and, therefore, accounted for 3.2 standardized admissions—compared with an uncomplicated childbirth, which had an MS-DRG relative weight of 0.6.

We used 2010-2016 data from the Health Care Cost Institute (HCCI) to calculate MSA-level hospital prices.[21] The HCCI data pool medical claims data from three large US health insurers: Aetna, Humana, and

UnitedHealth. On average, for the 2010-2016 period, the annual HCCI data cover 42 million individuals under the age of 65 years with commercial insurance; these data include observations from every US state and MSA.

### *State Bans on MFN Clauses*

Our independent variable of interest was a state's decision to ban MFN clauses in contracts between health insurers and providers. Given that our hospital price and health care market concentration data span 2010 to 2016, we focused on the eight states that implemented bans on MFN clauses during that time frame. The MSAs in these states serve as the "treated" MSAs in our empirical model. All states that did not have a ban on MFN clauses in place by December 31, 2016 (the end of our study period), serve as the control states in our model. We excluded the 11 states that had MFN clause restrictions in effect prior to the beginning of our study period. Table 1 identifies the specific states in each group.

### *Hospital and Insurer Market Concentration*

We used the Herfindahl-Hirschman Index (HHI) for measures of both hospital and insurer concentration. HHI is used in the Horizontal Merger Guidelines published by the DOJ and the Federal Trade Commission (FTC).[22] The measure is calculated by summing the squared market shares of firms in a market. For example, a market with two firms each with 50% share would have an HHI of 5,000 ($50^2 + 50^2$). The Horizontal Merger Guidelines consider markets with HHIs between 1,500 and 2,500 to be moderately concentrated and markets with HHIs above 2,500 to be highly concentrated.

We used data from the American Hospital Association's Annual Survey Database to calculate hospital HHI.[23] Specifically, we calculated the admission shares of general acute care hospitals for each MSA-year in our sample. Hospitals in the same MSA that were part of the same system were counted as one hospital for the purposes of market share calculations. American Hospital Association data have been used in a number of studies to calculate hospital market concentration.[1,24-26]

Data from the Decision Resources Group's Managed Market Surveyor (formerly HealthLeaders-Interstudy and now owned by Clarivate)[27] were

**Table 1.** States With and Without Statutes Restricting the Use of Most-Favored-Nation (MFN) Clauses, as of August 2020

| Category (No. of States) | Relevance to Study | States (Year Restriction Was Implemented) |
|---|---|---|
| States with MFN clause restrictions implemented during our study period, 2010-2016 (8) | Treated states in our empirical analysis | Connecticut (2011), Georgia (2012), Maine (2012), Massachusetts (2010), Michigan (2013), New Jersey (2014), North Carolina (2013), Ohio (2010)[a] |
| States with MFN clause restrictions implemented before the study period (11) | Excluded as potential control states in our empirical analysis | Alaska (2001), Idaho (1998), Indiana (2007), Kentucky (1998), Maryland (2006), Minnesota (1991), New Hampshire (2001), New York (pre-2007),[b] North Dakota (1999), Rhode Island (2004), Vermont (2009) |
| States without MFN clause restrictions during the study period (32) | Control states in our empirical analysis | All remaining states and the District of Columbia[c] |

Data are from Gudiksen et al. (2020).[4]

[a] Ohio's ban was applied to all providers except hospitals in 2008; it began applying to hospitals in 2010.

[b] New York restricts MFNs by regulation (N.Y. COMP. CODES R. & REGS., tit. 10 §§ 98-1.2 & 98-1.5). The oldest regulations we could locate were from 2007 and those regulations defined an MFN clause as a "material change" to an insurance contract that must be reviewed by the insurance commissioner.

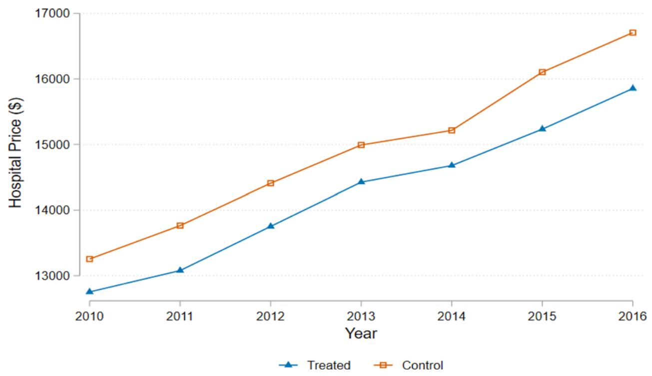
[c] Arkansas restricted MFN clauses in 2019. It serves as a control state in our empirical analysis because its restriction occurred after our study period.

used to calculate insurer HHI. Insurer commercial enrollment shares were used to calculate insurer HHIs for each MSA-year in our sample. The Decision Resources Group's data have been used and discussed in several studies.[1,25,26,28]

## *Statistical Analysis*

We began with an event study research design to estimate the impact of state bans on MFN clauses on hospital prices. An event study design is similar to a difference-in-differences econometric model, but it allows for the estimation of dynamic treatment effects. That is, the treatment's effect in the year it first occurs may differ from the effect it has two to three years down the road. Dynamic treatment effects may be relevant in our context because the impact of a ban on MFN clauses may be small at first if the restriction only applies to new contracts, but the impact could grow over time as contracts signed before the MFN ban went into effect begin to expire. Our model was an MSA-level model where hospital price was the outcome variable, and the 71 MSAs in the eight states that implemented bans during the study period were treated MSAs. The control group of 255 MSAs were located in states that did not have an MFN ban in effect by 2016, the end of our study period. We used an event window of 4 years prior to and 4 years after an MFN ban. We assumed that all observations further than 4 years from the time of the MFN restriction were exactly 4 years away, as the number of treated observations beyond this window is fairly small. We included MSA and year fixed effects to control for time-invariant differences across MSAs and secular trends in hospital prices, respectively. We also included a set of time-varying confounders that may affect the demand of health care services (Medicaid expansion status, uninsured rate, unemployment rate, median household income, insurer market concentration, total population) or the supply of health care services (hospital market concentration, the Medicare Wage Index, and number of physicians per 100,000 residents in the MSA). Changes in either the demand or supply variables would be expected to be associated with changes in hospital prices. When we tested whether the effect of a ban on MFN clauses depends on the level of insurer and hospital concentration in a model, we used a difference-in-differences model in lieu of an event study model. We switched the methodology to gain precision in our estimates and because estimating dynamic

**Figure 1.** Standardized Hospital Admission Price Trends for Treated and Control Metropolitan Statistical Areas (MSAs), 2010-2016




Data are from the Health Care Cost Institute.[21]
Treated MSAs are MSAs in states that passed bans on most-favored-nation (MFN) clauses from 2010 to 2016. Control MSAs are MSAs in states with no restrictions on MFN clauses.

treatment effects is not critical for this additional analysis. More details on our statistical analysis (including the regression equations we estimated) are available in the online Appendix.

## Results

Figure 1 shows the raw trends in hospital prices for admissions in treated and control MSAs from 2010 to 2016. Hospital prices increased considerably in both treated and control MSAs from 2010 to 2016. In the 71 treated MSAs, hospital prices grew by 3.7% per year on average, from $12,752 in 2010 to $15,853 in 2016. In the 255 control MSAs, hospital prices grew by 3.9% per year on average, from $13,765 in 2010 to $16,707 in 2016. The differences in price increases in control MSAs relative to treated MSAs mostly began to appear in 2014. From 2014 to 2016, hospital prices grew by 3.9% on average for treated MSAs as compared with 4.8% on average for control MSAs. The bans on MFN clauses for the treated states occurred at various points during the 2010 to 2016 period, so we would expect the differences in price growth between treated and control MSAs to be largest at the end of the period (i.e., the point in time when all the MFN bans for the treated MSAs were in effect).

Although the lower price growth of the treated group shown in Figure 1 is suggestive of MFN bans reducing the rate of hospital price growth, this analysis did not control for other factors that were changing at the same time. In contrast, the event study model controls for those factors. To compare the characteristics of treated and control MSAs in 2016, Table 2 shows the means of important characteristics. The two groups are similar along a number of dimensions, as indicated by the high $p$-values in the final column. The notable differences occur with respect to hospital and insurer HHI, physicians per 100,000 residents in the MSA, and land area. Additionally, there were substantial regional differences between the locations of treated and controlled MSAs. For example, there were no treated MSAs in the West region (as defined in the US census), but more than 30% of control MSAs were located in that region. All the variables that changed over time in Table 2 (i.e., all variables except land area, percent rural, and census region) are included in our regression analysis as control variables.

Figure 2 shows the results of our event study regression analysis. The horizontal axis shows the year relative to the ban on MFN clauses, and the vertical axis measures the difference in hospital prices between the treated and control group MSAs relative to the difference between the two groups in the year prior to the ban. For example, the estimated coefficient at year relative to MFN clause ban = 0 (i.e., the year the ban went into effect) is −\$195 ($p = 0.337$). This suggests that the price difference between the control and treated group increased between $t = -1$ and $t = 0$, an increase that is not significant. In other words, the MFN ban reduced hospital price growth relative to what it would have been without the ban. As can be seen in Figure 2, the coefficient estimates are more negative as time passes (e.g., at year relative to ban = 2 or 3), suggesting that the effect may increase over time. The reversion of the coefficient estimate in period 4 toward 0 suggests that the effect might be short lived. However, though the average of the five postintervention coefficients (the dashed orange line in Figure 2) suggests an effect

Table 2. Mean Characteristics of Treated and Control MSAs, 2016

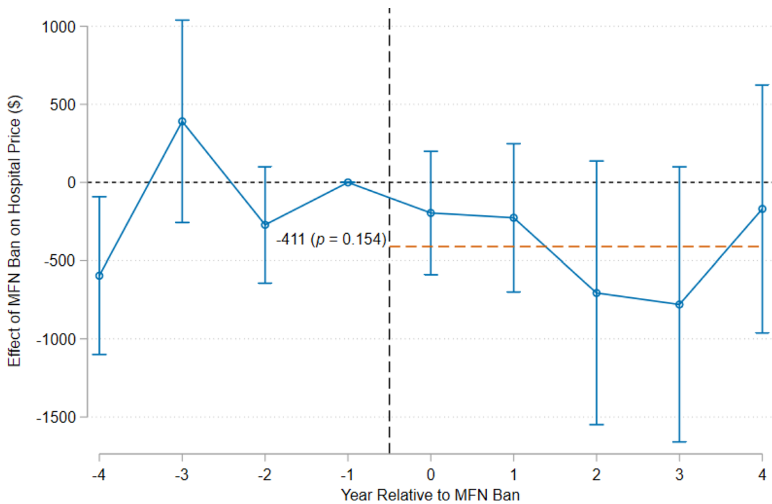
| | Treated (71 MSAs) | Control (255 MSAs) | *P*-Value of Difference in Means |
|---|---|---|---|
| Hospital price ($) | 15,853 | 16,707 | 0.282 |
| Hospital HHI | 6,282 | 5,550 | 0.040 |
| Insurer HHI | 3,096 | 2,829 | 0.072 |
| Medicare Wage Index | 0.958 | 0.958 | 0.992 |
| Medicaid expansion | 0.535 | 0.467 | 0.308 |
| Median household income ($) | 53,757 | 53,503 | 0.854 |
| Uninsured rate (%) | 9.61 | 10.43 | 0.148 |
| Unemployment rate (%) | 5.13 | 5.24 | 0.650 |
| No. of physicians per 100,000 residents | 278.11 | 242.28 | 0.080 |
| MSA population | 909,396 | 691,238 | 0.336 |
| MSA land area (1000s square miles) | 1,533 | 2,804 | <0.01 |
| Percent rural (%)[a] | 35.27 | 33.45 | 0.458 |
| Census region (%) | | | |
| Northeast | 23.9 | 7.0 | <0.01 |
| Midwest | 33.8 | 18.0 | <0.01 |
| South | 42.3 | 44.3 | 0.758 |
| West | 0 | 30.6 | <0.01 |

Abbreviations: HHI, Herfindahl-Hirschman Index; MSA, metropolitan statistical area.

Data are from the Health Care Cost Institute (hospital price),[21] American Hospital Association's Annual Survey Database (hospital HHI),[23] Decision Resources Group's Managed Market Surveyor (formerly HealthLeaders-Interstudy) (insurer HHI),[27] Centers for Medicare and Medicaid Services' Wage Index files (Medicare Wage Index),[29] Kaiser Family Foundation (Medicaid expansion),[30] and the Area Health Resource File (the remaining variables).[31]

[a] Percent rural is defined as the percentage of residents living in rural areas.

**Figure 2.** Effect of Ban on Most-Favored-Nation (MFN) Clauses on Standardized Hospital Admission Prices




Data are from the Health Care Cost Institute,[21] American Hospital Association's Annual Survey Database,[23] Decision Resources Group's Managed Market Surveyor (formerly HealthLeaders-Interstudy),[27] Centers for Medicare and Medicaid Services' Wage Index files,[29] and the Area Health Resource File.[31]

The regression coefficients from which this figure was produced are shown in column 2 of Table A1 in the online Appendix. Standard errors were clustered by state. The $-\$411$ ($p = 0.154$) is the average of the postintervention coefficients (year relative to ban on MFN clauses = 0, …, 4).

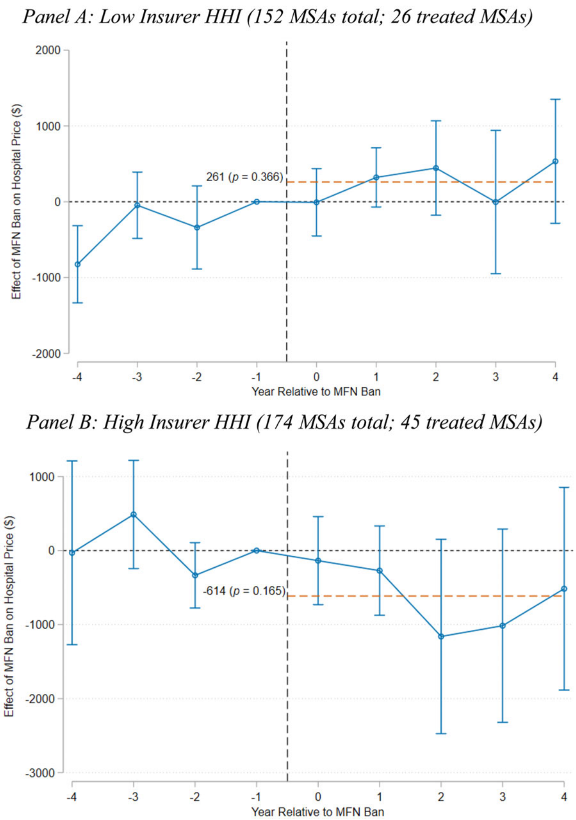
of $-\$411$, the result ($p = 0.154$) does not reach conventional levels of significance.

While the effect shown in Figure 2 is not significant, further analysis of the data by health care market concentration makes it clear that the potential effect seen in Figure 2 is being pulled toward the null (no price change associated with a ban on MFN clauses) by the relatively competitive MSAs. That is, the average effect measured in Figure 2 is a combination of (1) a decrease in hospital prices in treated MSAs relative to control MSAs in highly concentrated insurer markets, and (2) no change in hospital prices in treated MSAs relative to control MSAs in markets that were not highly concentrated. Because the inclusion of the latter category pulls the average effect toward zero, the result shown in Figure 2 is not significant.

We classified MSAs by their hospital and insurer HHI in 2010 as "low" or "high" HHI, using the DOJ/FTC definition for a highly concentrated market as an HHI >2,500. In 2001, 161 of the 326 MSAs in our sample had high insurer HHIs and high hospital HHIs, 123 had low insurer HHIs and high hospital HHIs, 13 had high insurer HHIs and low hospital HHIs, and 29 MSAs had low insurer HHIs and low hospital HHIs. Given sample size constraints stemming from so few MSAs having low hospital HHIs, we split the sample by insurer HHI only in Figure 3. Figure 3 suggests that the potential effect of the MFN ban was being driven by a reduction in price growth in the MSAs with high insurer HHI (see Panel B); very little happened in terms of an effect on price growth in the MSAs with low insurer HHI (see Panel A). Note, however, the average of the five postintervention coefficients in Panel B (−\$614) was not significant ($p = 0.165$).

Figure 3 does not rule out high hospital HHI as the real driver of the effect. As mentioned in the previous paragraph, the MSAs with high insurer market concentration often had high hospital market concentration as well. To observe whether the effect of a ban on MFN clauses depended more on the level of insurer HHI or hospital HHI in an MSA, we returned to our original model and added interaction terms. First, though, we simplified the model by replacing the "event time" variables with a simple "post" variable. That is, instead of estimating coefficients of the effect of the intervention by year relative to the MFN ban, which is helpful for exploring whether the treatment had a differential effect over time, we simply estimated one coefficient for the effect of the treatment. This is the standard difference-in-differences coefficient estimate and is generally close to the estimate of the average of the postintervention coefficients in Figures 2 and 3 (shown by the dashed orange lines). We switched to this difference-in-differences coefficient estimate because the interaction effect of insurer HHI and hospital HHI was of first-order interest here, as opposed to estimating dynamic treatment effects. Details about the regression equation that we estimated to generate Figure 4 are available in the online Appendix.

**Figure 3.** Effect of MFN Clause Restriction on Standardized Hospital Admission Prices by Insurer HHI

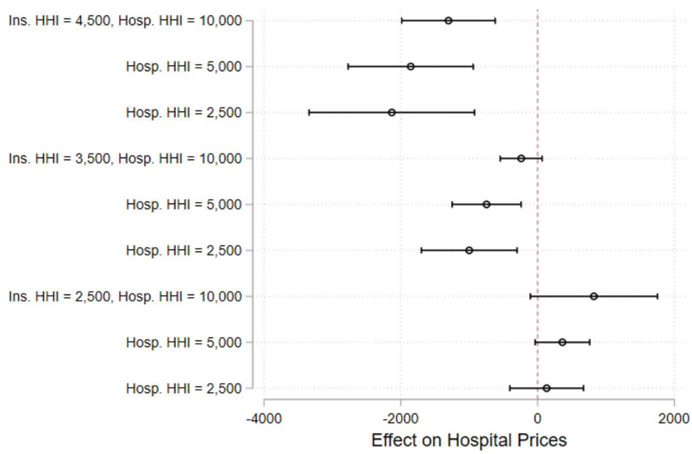



Abbreviations: HHI, Herfindahl-Hirschman Index; MFN, most favored nation; MSA, metropolitan statistical area.

Data are from the Health Care Cost Institute,[21] American Hospital Association's Annual Survey Database,[23] Decision Resources Group's Managed Market Surveyor (formerly HealthLeaders-Interstudy),[27] Centers for Medicare and Medicaid Services Wage Index files,[29] and the Area Health Resource File.[31]

The regression coefficients from which this figure was produced are shown in Table A1, columns 4 (Panel A) and 6 (Panel B), in the online Appendix. Standard errors were clustered by state.

**Figure 4.** Effect of MFN Clause Restriction on Standardized Hospital Admission Prices by Insurer HHI and Hospital HHI




Abbreviations: HHI, Herfindahl-Hirschman Index; Hosp., hospital; Ins., insurer; MFN, most favored nation.

Data are from the Health Care Cost Institute,[21] American Hospital Association's Annual Survey Database,[23] Decision Resources Group's Managed Market Surveyor (formerly HealthLeaders-Interstudy),[27] and the Area Resource File.[31]

The regression coefficients from which this figure was produced are shown in column 2 of Table A2 in the online Appendix. Standard errors were clustered by state.

Figure 4 shows the results of our model with interaction effects. The regression equation that we used to generate Figure 4 contained a triple interaction term. That is, the "post" variable interacted with both insurer HHI and hospital HHI. We analyzed the post variable interaction with both insurer HHI and hospital HHI because we hypothesized that the effect of an MFN ban could differ not only by insurer HHI and hospital HHI separately but also by the ratio of the two. For instance, in an MSA with a dominant insurer (high insurer HHI) and a competitive hospital market (low hospital HHI), it might be easier for an insurer to demand an MFN contract clause than it would be in an MSA with a dominant hospital. Or it could be the case that the effect is strongest when both hospital HHI and insurer HHI are high, which would be the case if dominant hospitals commonly sell the right to an MFN clause to dominant insurers that know they have the market power to pass costs through to consumers in the form of higher premiums.

Figure 4 can be interpreted as follows: First, the figure shows the estimated change in hospital prices of treated MSAs relative to control MSAs on the horizontal axis. Along the vertical axis are combinations of insurer HHI and hospital HHI. For instance, the bottom three points along the vertical axis show the estimated effect of bans on MFN clauses on hospital prices in treated MSAs relative to control MSAs at an insurer HHI of 2,500, and at three different levels of hospital HHI (2,500, 5,000, and 10,000). The next three points along the vertical axis show the estimated effects for the same three levels of hospital HHI but at an insurer HHI of 3,500. The final three points along the vertical axis again show the estimated effects at the three hospital HHI levels but at an insurer HHI of 4,500.

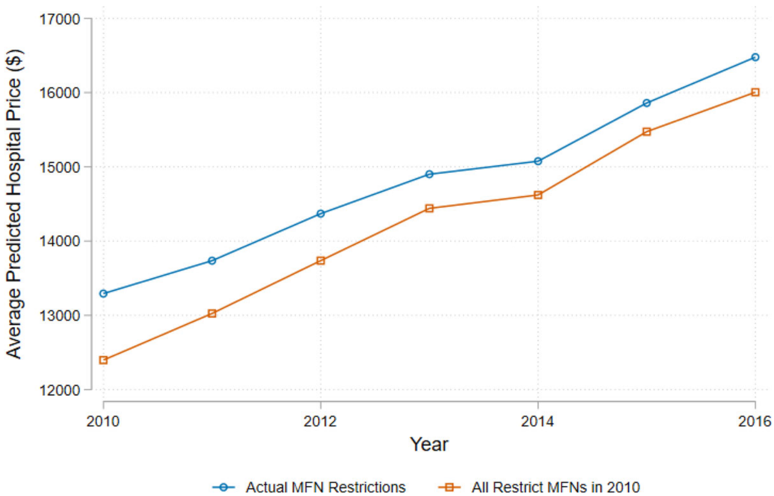
Increasing the level of hospital HHI while holding the level of insurer HHI constant isolates how the level of hospital HHI affected the estimated change in hospital prices. As an example, consider the bottom three points along the vertical axis in Figure 4. The level of insurer HHI is 2,500 for all three points, whereas the level of hospital HHI varies from 2,500 to 5,000 to 10,000. These three points are all positive but not significant. The bigger takeaway is that the estimated effect hardly changes as the hospital HHI increases. The confidence intervals of the three points overlap substantially, which means we cannot conclude that those three estimates are statistically different from each other.

The next exercise was to isolate the effect of insurer HHI. To do this, we held the level of hospital HHI constant while varying the level of insurer HHI. Take the first, fourth, and seventh points in Figure 4 as an example. For each of these points, the level of hospital HHI is 2,500 whereas the level of insurer HHI varies from 2,500 to 3,500 to 4,500. The estimated coefficient at the first point (insurer HHI = 2,500, hospital HHI = 2,500) is \$132 ($p = 0.622$). As insurer HHI increases to 3,500 and 4,500, the respective estimated coefficients decrease to

−\$1,000 ($p = 0.006$) and −\$2,131 ($p = 0.001$). The confidence intervals of the first and seventh points do not overlap, and a Wald test indicates they are statistically different ($p < 0.01$). The overall takeaway from Figure 4 is that bans on MFN clauses reduced prices more (relative to control MSAs) in highly concentrated insurer markets than in markets with low insurer concentration. The level of hospital HHI in the MSA had very little effect on the estimated reduction in price and was not significant.

Figure 5 shows how the estimated regression coefficients from our model were used in two scenarios to calculate predicted prices for a standardized admission to a hospital. In the first scenario, we assumed that the treatment group (the "Actual MFN Restrictions" line in the figure) was only the 45 MSAs in our sample that (1) actually banned MFN clauses between 2010 and 2016, and (2) had highly concentrated insurer markets as of 2010. In the second scenario, we assumed that all of the 174 MSAs with high insurer concentration (in 2010) in our sample restricted MFN clauses in 2010 (the "All Restrict MFNs in 2010" line in the figure). In Figure 5, we plotted the average predicted hospital price for all 174 MSAs (by year) for both scenarios. The goal of this plot is to communicate how much bans of MFN clauses could reduce prices in highly concentrated insurer markets. Clearly, numerous factors other than MFN clauses contribute to hospital price growth, as is evident by the fact that hospital prices grew by just over 29% between 2010 and 2016 in the "All Restrict MFNs in 2010" scenario. However, the gap in hospital prices between the two scenarios suggests that an MFN ban in highly concentrated insurer markets could potentially achieve considerable cost savings. We estimated that hospital prices in 2016 would have been lower by \$472 (or 2.8%) in the 174 MSAs in our sample with highly concentrated insurer markets if MFN clauses had been banned in these MSAs in 2010. The population of these 174 MSAs was just under 75 million in 2016 (23% of the US population). Total hospital expenditures for the privately insured US population were \$373 billion in 2016.[24] If 2016 hospital prices were 2.8% lower for 23% of the privately insured population than they would have been absent the MFN bans, we can conclude that banning the use of MFN clauses in all of the highly concentrated insurer markets in our sample would have created about \$2.4 billion in savings (\$373 billion × 0.028 × 0.23).

**Figure 5.** Predicted Standardized Hospital Admission Prices if All Metropolitan Statistical Areas with High Insurer Concentrations Had Banned MFN Clauses in 2010




Abbreviation: MFN, most favored nation.

Data are from the Health Care Cost Institute,[21] American Hospital Association's Annual Survey Database,[23] Decision Resources Group's Managed Market Surveyor (formerly HealthLeaders-Interstudy),[27] and the Area Resource File.[31]

"Actual MFN Restrictions" indicates a scenario in which "treated" MSAs are defined as (1) being in states that actually banned MFN clauses between 2010 and 2016, and (2) having highly concentrated insurer markets as of 2010. "All Restrict MFNs in 2010" indicates a scenario in which we assume that all 174 MSAs with high insurer concentration (in 2010) in our sample restricted MFN clauses in 2010. The regression coefficients from which this figure was produced are shown in column 2 of Table A2 in the online Appendix. Standard errors were clustered by state.

## Discussion

Our results suggest that the reduction in hospital price growth associated with banning MFN clauses in insurer-hospital contracts is explained by the bans' impact in highly concentrated insurer markets. We did not find a similar impact in highly concentrated hospital markets. As mentioned in the introduction, the DOJ and the Michigan attorney general filed suit against Blue Cross Blue Shield of Michigan (BCBS) in 2010 alleging that BCBS used MFN clauses to exclude competitors by driving up the costs for rival insurers.[5] The DOJ asserted that BCBS did not use MFN clauses to lower their own costs, but instead offered higher rates to hospitals in exchange for an MFN agreement, in essence allowing hospitals to sell the right to an MFN clause in exchange for higher prices. This example is consistent with our empirical findings. Because insurer-provider contracts are not publicly available, it is difficult to know whether insurers in highly concentrated insurer markets are using MFN clauses in general, or that what we observed is solely due to a handful of insurers that have a large influence on health care markets.

It is noteworthy that the hospital prices from HCCI that we used in our analyses do not include BCBS prices. If BCBS were the main (or only) insurer in each market using MFN clauses, that would be enough to drive up prices for the entire market, demonstrating the potential power of MFN clauses. This effect, which is generally referred to as "shadow pricing" in the economics literature, has been observed in different industries. Determining the effect of bans on MFN clauses on BCBS prices specifically, and whether that effect is larger in magnitude than the market-wide effect, is an interesting question but is beyond the scope of this paper.

While our study offers the first empirical evidence about the impact of banning MFN clauses on hospital prices, it is not without limitations. First, the HCCI claims data from which we calculate hospital prices cover only a third of the commercially insured population in the United States. As such, our calculated average hospital price for a standardized admission in each MSA likely differs from the true average price in the MSA, with the difference between the calculated and true average price for a given MSA depending on the market shares of the three HCCI insurers (UnitedHealth, Aetna, Humana) in that MSA.

Second, our analyses do not contain any non-MSA markets. Such markets are often the most highly concentrated in terms of both hospital and insurer market concentration, and we therefore may have underestimated the extent to which MFN bans can effectively reduce price growth.

Third, there is a potential concern of endogeneity with respect to bans on clauses. Do restrictions on MFN clauses lead to changes in price growth, or do changes in price growth lead states to ban MFN clauses? We alleviated this concern somewhat in that we showed that the preintervention price trends were similar in our treated and control MSAs. However, the two MSA groups could differ in ways which we were unable to control for.

Fourth, our estimates would be biased if we failed to account for other law/policy changes across states during our study period that affected hospital prices. Fifth, political opposition may affect whether a ban on MFN clauses is implemented. A state where an insurer that uses MFN clauses has a large market share might find it harder to pass a law to restrict MFN clauses. If the states that might have benefited the most from a ban on MFN clauses were not the states that enacted bans during our study period, our results may have underestimated the benefits of the restrictions on MFN clauses.

## Conclusion

Policymakers across the United States are searching for interventions to address rising health care costs, including passing legislation to restrict the ways that dominant companies can exert market power. Our findings suggest that the anticompetitive harms from MFN clauses likely outweigh the potential competitive benefits, especially in markets with dominant insurers. Hence, in states with a dominant insurer, passing a law banning MFN clauses may help control costs for patients and employers with commercial health insurance plans. Restricting MFN clauses should invigorate more robust negotiations between insurers and hospitals because the negotiated discounts will give insurers a competitive advantage that will not be passed to rival insurers. We refer the reader to the study by Gudiksen and coauthors for detailed recommendations about how states could implement bans on MFN clauses.[4]

This study is the first to empirically show that bans on MFN clauses lead to lower prices in markets with high insurer concentration. Specifically, we estimated that hospital prices would have been lower by $472 (2.8%) in 2016 if bans on MFN clauses had been in place in 2010 in all 174 MSAs in our sample with highly concentrated insurer markets. The 2016 population covered by the highly concentrated insurer markets we studied was about 23% of the total US population. Therefore, we estimated that bans on MFN clauses in the highly concentrated insurer markets in our sample would save about $2.4 billion per year.

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*Funding/Support:* Funding for this study was provided by Arnold Ventures (grant no. 19–02464).

*Conflict of Interest Disclosures:* All authors completed the ICMJE Form for Disclosure of Potential Conflicts of Interest. No conflicts were reported.

*Acknowledgments:* We are grateful to Richard Frank, Anna Sinaiko, Tim Greaney, and Tim Brown for helpful comments on an earlier draft and to Samuel Chang and Alexandra Montague for excellent research assistance. We are also grateful to participants of the UC Hastings and UC Berkeley Workshop on State Merger Review Authority and Addressing Anticompetitive Contract Terms in Insurer/Provider Contracts, held via Zoom on November 13, 2020, for their comments on a draft of this manuscript.

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## Supplementary Material

Additional supporting information may be found in the online version of this article at http://onlinelibrary.wiley.com/journal/10.1111/(ISSN)1468-0009:

**Table A1.** Regression Coefficient Estimates From the Price of a Standardized Hospital Admission in Equation (1)
**Table A2.** Regression Coefficient Estimates From the Price of a Standardized Hospital Admission in Equation (1)—Logged Version
**Table A3.** Regression Coefficient Estimates From the Price of a Standardized Hospital Admission in Equation (2)
**Figure A1.** Standardized Hospital Price Density Plot, 2010-2016
**Figure A2.** Effect of MFN Restriction on Standardized Hospital Admission Prices by Insurer HHI—Sun & Abraham (2021) event study version of Figures 2 & 3