PUBLIC COMMENT

In the matter of: Penn National Gaming, Inc. and Pinnacle Entertainment, Inc.

File No. 181–0011, Docket No. C–4658

Commenter: Roland Eisenhuth

Date: October 31, 2018

The parties are required to divest several properties in the St. Louis, Kansas City, and Cincinnati metropolitan areas "to remedy the anticompetitive effects that otherwise would result from [the] acquisition. . . ." In the 2013 matter of Pinnacle and Ameristar, the merging parties were asked to divest two properties.[1] Then and now, the Federal Trade Commission ("FTC") asserted: "[T]he acquisition would increase Penn's ability and incentive to raise prices post-acquisition, in the form of hold rates, rake rates, and table game rules and odds that are less favorable to customers . . . ."

In this comment, I argue that in the context of the St. Louis and the Kansas City markets:

1. Quantities and prices are not discernible from hold rates in table games. In fact, *ceteris paribus*, increased hold rates necessitate an increase in the quantity exchanged.
2. In St. Louis and Kansas City between 2013 and 2017, changes in market concentration as measured by the Herfindahl-Hirschman index do not result in statistically significant price changes.
3. The Herfindahl-Hirschman index as a measure of market concentration may be inadequate, since the price elasticity of demand may vary across markets for a given degree of market concentration and over time.
4. In St. Louis and Kansas City between 2013 and 2017, changes in market concentration as measured by the Lerner index do not result in statistically significant price changes.
5. The relevant geographic market should include close substitutes (such as electronic gaming devices in Illinois after 2012).

1 Prices and quantities in the casino industry

1.1 Win and hold rates

Gamblers in the U.S. can wager money on table games (such as Roulette, Craps, and Blackjack) and electronic gaming devices (*i.e.*, slot machines). When wagering money on

an electronic gaming device ("EGD"), the total dollar amount wagered is automatically recorded. Hence, juxtaposing EGD revenue and total dollars wagered, a "win percentage" can be obtained according to:

$$\text{win percentage} = \frac{\text{gaming revenue}}{\text{total dollar amount wagered}}. \tag{1}$$

Suppose, for example, that an EGD records \$50 revenue in a given time frame (*e.g.*, one day) and that its electronic records show that a total of \$1,000 was wagered. The average win percentage can be computed using (1): \$50/\$1,000 = 5 percent.

By contrast, accurately accounting for table game win percentages is operationally impossible. In a typical table game, a player will exchange a certain amount of cash for "chips" (*e.g.*, \$100) and play until these funds have either been lost to the casino, or the player chooses to terminate the gambling session for any other reason, whichever comes first.[2] The casino can therefore only account for those fractions of the initially exchanged \$100 that are retained by the casino and the player, respectively.

For an example, suppose that a roulette table records \$100 revenue within a given time frame (*e.g.*, one shift). These \$100 represent the total amount exchanged for chips as "dropped" in the table vault. In American roulette,[3] a player loses an average of 5.3 cents on every dollar wagered. After 200 rounds of play of wagering \$1 each, a player is expected to have lost 200× \$1 × 5.3 percent = \$10.60. When a player who has exchanged \$100 for casino chips at a roulette table leaves after 200 rounds of wagering \$1, this player will cash out \$89.40, and the casino's hold percentage is 10.6 percent and calculated as:

$$\text{hold percentage} = \frac{\text{amount exchanged for chips} - \text{amount of chips cashed out}}{\text{amount exchanged for chips}}. \tag{2}$$

With a downward sloping demand for gaming entertainment, higher win percentages in EGDs may result in lower quantities exchanged between gamblers and casinos. Hold percentages in table games, however, are functions of both the theoretical win percentage of the table game and the total quantity of dollars wagered through repeated wagering. Thus, if the win percentage is considered the price of wagering on EGDs, prices for table games – recorded as hold percentages – are necessarily indiscernible from quantities exchanged. In fact, an increase in the hold rate without any rule changes to a table game necessitates an increase in the quantity transacted.

1.2 Price elasticity of demand

The price elasticity of demand measures the percentage change in quantity demanded when changing the price by one percent. For example, if the current price is \$100 and the current quantity exchanged is 100, a price elasticity of demand of 2 means that when the

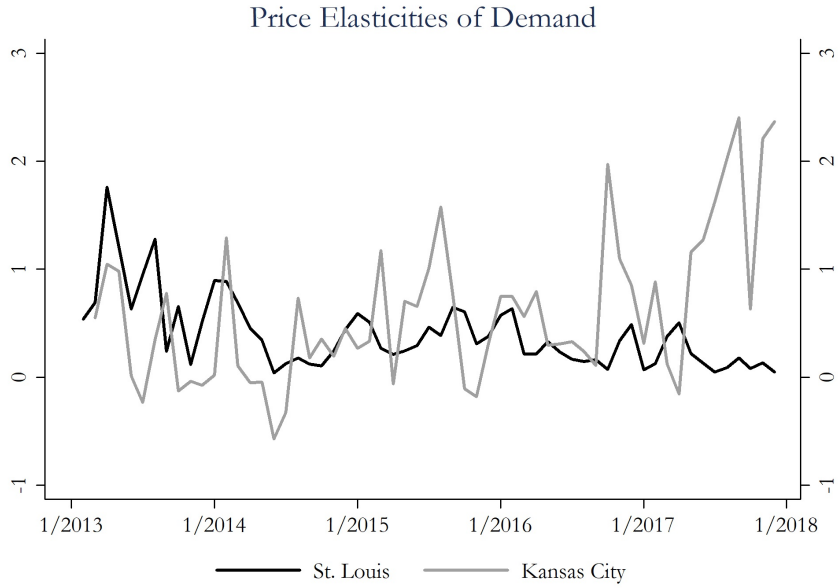

Figure 1: Own calculations.

price increases to $101, quantity will decrease to 98.

Using data from 2012–2017, the estimated price elasticities of demand for EGD gaming in St. Louis and Kansas City are shown in Figure 1.[4] Notably, the price elasticities of demand in Kansas City and St. Louis market are comparable in magnitude. In addition, the elasticity in St. Louis is trending downward while there is an upward trend in Kansas City. Higher elasticities imply that gamblers are more responsive to price changes by adjusting gambling volume.

2 Market concentration

Closely related to the 2013 matter of Pinnacle and Ameristar, the FTC asserts in the present matter that "the acquisition would . . . result in a substantial increase in concentration. . . [and] a highly concentrated market. . . ."

2.1 Herfindahl-Hirschman index

In the 2013 matter of Pinnacle and Ameristar, the FTC calculated and reported pre- and post-merger measures of market concentration. In the horizontal merger guidelines of the FTC and the U.S. Department of Justice, the Herfindahl-Hirschman index ("HHI;" Herfindahl 1950 and Hirschman 1964) is defined as:

$$\text{HHI} = \sum_{\text{competitors}} \text{market shares}^2, \tag{3}$$

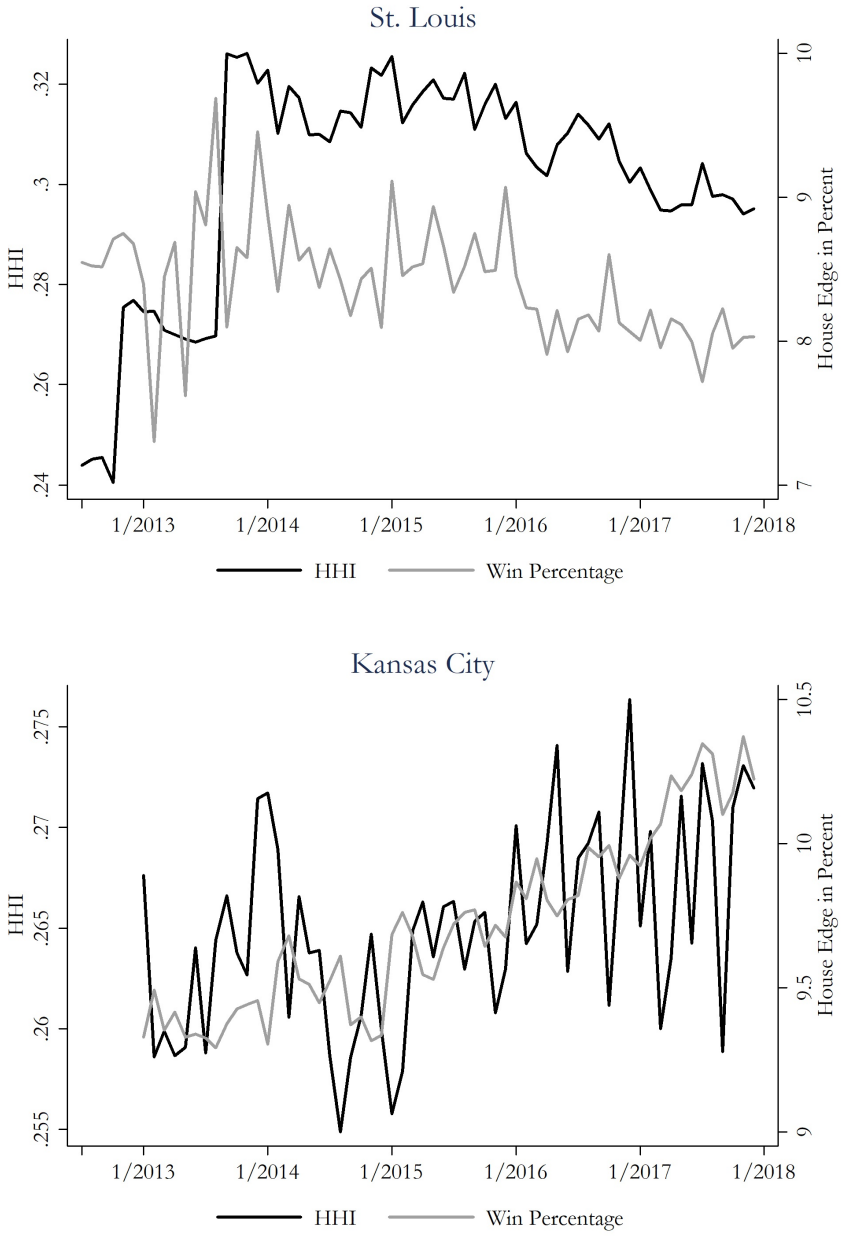

Figure 2: Own calculations.

where, as suggested, market shares are computed using firms' and industry-wide revenues. Figure 2 shows the evolution of the HHI and the average monthly win percentages in St. Louis and Kansas City between 2013 and 2017. While Figure 2 may suggest that there may be a correlation between the HHI and the win percentage, statistical inference confirms that there is not.

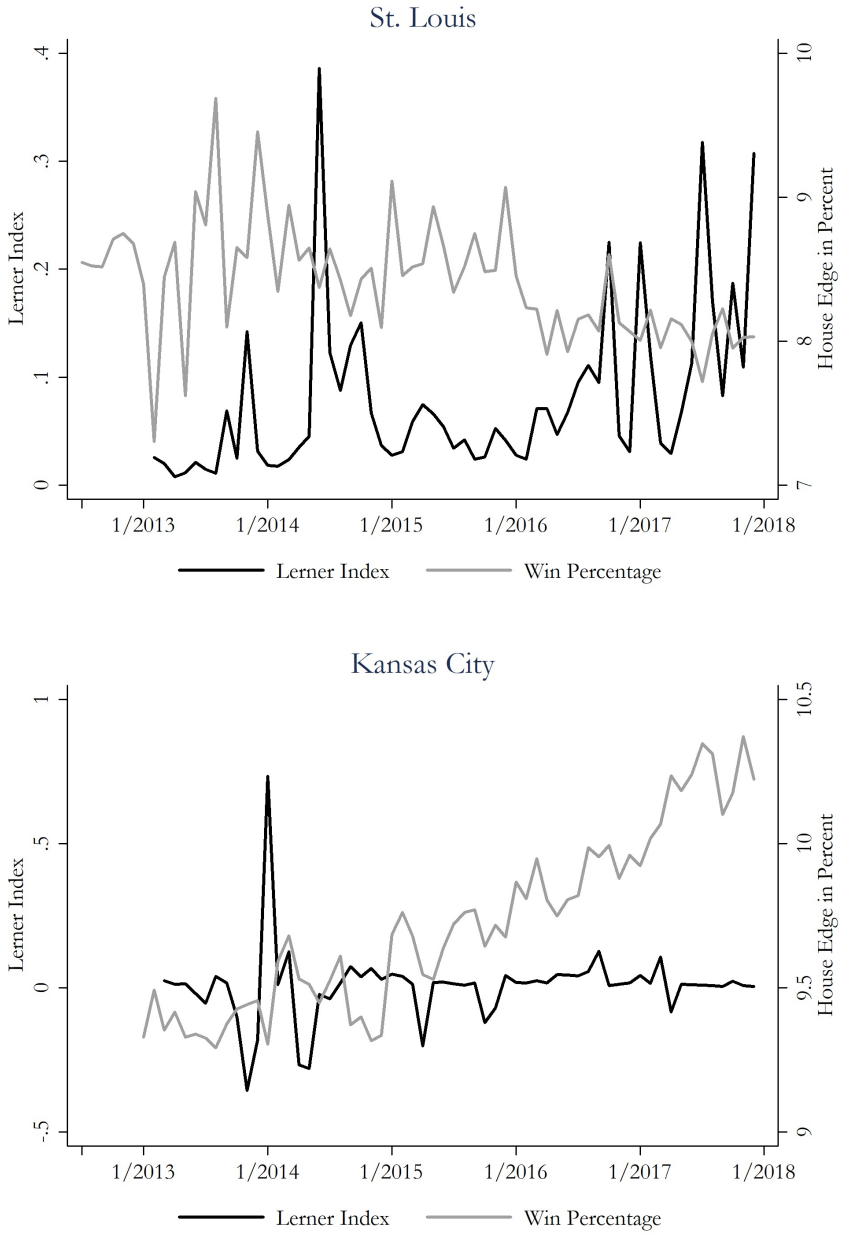

Figure 3: Own calculations.

2.2 The Lerner index

An alternative measure of market concentration, the Lerner index (Lerner 1934), is defined as the percentage per-unit markup over average per-unit cost:

$$\text{Lerner index} = \frac{\text{price} - \text{average per-unit cost}}{\text{price}}, \tag{4}$$

While a debate over which measure of market concentration, the HHI or Lerner index, is more appropriate can be endless, it has – under certain conditions – been shown that the relationship between the HHI, the Lerner index, and the price elasticity of demand obeys (Scherer and Ross 1990, equation 6.3, p. 229):

$$\text{Lerner index} = \frac{\text{HHI}}{\text{price elasticity of demand}}. \tag{5}$$

Figure 3 shows the evolution of the Lerner index in St. Louis and Kansas City between 2013 and 2017. Again, there is no correlation between win market concentration and win percentages.

3 Conclusion

The following economic and empirical insights emerge from the above discussion:

1. Quantities and prices are not discernible from hold rates in table games. In fact, *ceteris paribus*, increased hold rates necessitate an increase in the quantity exchanged.

2. In St. Louis and Kansas City between 2013 and 2017, changes in market concentration as measured by the Herfindahl-Hirschman index do not result in statistically significant price changes.

3. The Herfindahl-Hirschman index as a measure of market concentration may be inadequate, since the price elasticity of demand may vary across markets for a given degree of market concentration and over time.

4. In St. Louis and Kansas City between 2013 and 2017, changes in market concentration as measured by the Lerner index do not result in statistically significant price changes.

5. The relevant geographic market should include close substitutes (such as electronic gaming devices in Illinois after 2012).

Endnotes

[1]See www.ftc.gov/news-events/press-releases/2013/08/ftc-requires-pinnacle-sell-two-casino-properties-condition and www.ftc.gov/sites/default/files/documents/federal_register_notices/pinnacle-entertainment-inc.and-ameristar-casinos-inc.analysis-agreement-containing-consent-orders-aid-public-comment-proposed-consent-agreement/130819pinnaclefrn.pdf.

[2]Since casino tables only exchange chips for cash and not *vice versa*, players commonly arrive at casino tables with chips left over from a previous exchange at another table.

[3]There are two zeroes and 36 non-zero numbers (18 red and 18 black). If a player bets \$1 on red, the chance of winning \$1 is 18/38 and the chance of losing \$1 is 20/38. The player's expected value from the gamble is $18/38 \times \$1 + 20/18 \times (-\$1) \approx -5.3$ percent.

[4]For example, Landers (2008) reports a similar empirical relationship between win percentage and total EGD gambling volume.

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