Received: 23 June 2021 | Accepted: 30 May 2022

DOI: 10.1111/ecin.13102

ORIGINAL ARTICLE

Economic Inquiry

The endowment effect and the trading of draft picks in major professional U.S. sports

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Abstract

Several studies have examined the endowment effect. Others have documented the influence of behavioral economics in sports. However, there exists little research on the endowment effect in sports. We study this phenomenon through the trading of draft picks in three major professional sporting organizations: the National Basketball Association, National Football League, and National Hockey League. We find strong evidence of the endowment effect overall and varying degrees of it across leagues. We find that it exists beyond information asymmetries, differences in trading activity, the prior short-term trading relationships of the teams involved and the desire of non-endowed, one-time owners of picks to repurchase those picks.

KEYWORDS
behavioral economics, endowment effect, sports economics

JEL CLASSIFICATION
Z20, D91, Z28

1 | INTRODUCTION

The endowment effect is a well-known and sometimes debated concept in experimental psychology and behavioral economics. Though different definitions exist for it, the endowment effect can be described as an added value that people attach to assets of which they are the original owners. This can manifest in a greater reluctance to sell things that were theirs originally or in a greater desire to repurchase things with which they were endowed but no longer own. In this paper, we test for whether the endowment effect exists for assets that are impersonal, intangible, standardized, and tradable in three major professional U.S. sports - draft picks.

Kahneman and Tversky (1979) document the endowment effect and classify it as a manifestation of loss aversion. Thaler (1980) finds that, in general, a person's valuation of a good increases once that good has become part of his or her endowment, suggesting that ownership itself adds psychological value. Kahneman et al. (1990) conduct several

Abbreviations: GM, General Manager; NBA, National Basketball Association; NFL, National Football League; NHL, National Hockey League.
Managing Editor: Rob Simmons

experiments and conclude that loss aversion and the endowment effect are fundamental aspects of human nature and thus are unlikely to be eliminated by experience.

Since those early studies, however, findings regarding the endowment effect have become more mixed. While Korobkin (2003) accepts the endowment effect and discusses how to apply it to both positive and normative legal theory, several papers find that the endowment effect can be reduced or eliminated with market experience. List (2003) examines sports card and sports memorabilia markets and the market for collector pins at Walt Disney World and concludes that while experience can eliminate the endowment effect, the learning process is prolonged. List (2004) finds that when consumers from the sports card market trade other items (mugs and chocolate bars), those who had been more experienced in the sports card market behave according to neoclassical economic theory. In contrast, inexperienced traders exhibit the tendencies associated with prospect theory. Engelmann and Hollard (2010) find that this difference between the behaviors of experienced and inexperienced traders stems more from the uncertainty of trading than the uncertainty of choice (e.g., product uncertainty) and that changing the rules to significantly increase trading can cure the subjects of the endowment effect.

Some studies examine the endowment effect in the context of people's willingness-to-accept (WTA) being greater than their willingness-to-pay (WTP) for a good. Within this subset of the research, it is disputed whether this WTA-WTP gap indicates proof of the endowment effect. Dupont and Lee (2002) show that such a gap can result from asymmetric information and, in a market where all participants are entirely rational, may result in no trading at all. Plott and Zeiler (2005) show that the inclusion of additional experimental controls can eliminate the gap and thus conclude that its observation does not necessarily constitute evidence of prospect theory or the endowment effect.

More recently, Apicella et al. (2014) find that hunter/gatherers in Northern Tanzania sometimes exhibit the endowment effect and sometimes do not. Specifically, those who are more isolated do not typically demonstrate the effect, whereas those exposed to modern societies do. Last, Tong et al. (2016) show through magnetic resonance imaging that sellers experience loss-aversion and that the neurological indicators of loss-aversion decrease with experience, particularly among younger participants.

There has been some research into behavioral biases in professional sports. For example, Keefer (2015, 2017, 2019) documents instances of the sunk-cost fallacy in the National Football League. Tingling et al. (2019) find the endowment effect to exist around the time of expansion drafts in the National Hockey League. In some cases, behavioral research has reached the front offices of professional sports. Daryl Morey of the NBA's Philadelphia 76ers has embraced the discipline and has even attempted to combat the endowment effect with regard to his team's players by having his scouts apply draft pick values to each of them (Lewis, 2016).

Despite all of these relatively recent developments, we know of no research that explores the possible behavioral biases in the movement of draft picks before those picks are used to select players. This paper examines the endowment effect as defined by an increased likelihood of already-traded picks being sold again or being re-acquired by their original owners. To keep our study as isolated from the "human element" as possible, we avoid the willingness-to-pay versus willingness-to-accept gap (typically measured as the difference between two prices in an experimental setting) owing to the fact that draft pick trades typically include players. These players' values depend upon their contracts, their teams' payrolls, their upcoming free-agent status, and many other factors, making the price paid for a pick challenging to compute. Because our study is empirical and we wish to avoid potentially confounding factors, our definition of the endowment effect focuses on the relative frequency with which endowed and non-endowed draft picks are bought and sold.

2 | DATA AND METHODS

Every year, each of the major professional sports leagues in the United States holds what is known as its "entry draft." During the entry draft the teams select, in inverse order of success from the previous season such that the worst teams get the first picks, amateur players with a view toward signing them to professional contracts. In most of these leagues, teams can trade draft picks (before they are used to select players) at least as freely as they can trade players who are already under contract.

We begin our study by collecting draft pick data from the National Basketball Association (NBA), National Football League (NFL), and National Hockey League (NHL) from www.prosportstransactions.com for the years 1988 through 2017 (we do not include data from Major League Baseball because the MLB did not allow teams to trade their draft picks during that period). Though the number of draft rounds has varied by league and season, for most years of our

TABLE 1 The number of times that draft picks were traded

Panel A:								
	Total (all three leagues)		NBA		NFL		NHL	
# of times traded	Freq.	Of total (%)	Freq.	Of total (%)	Freq.	Of total (%)	Freq.	Of total (%)
0	11,455	68.25	1057	61.17	5343	68.55	5055	69.61
1	3977	23.70	456	26.39	1889	24.24	1632	22.47
2	1110	6.61	154	8.91	471	6.04	485	6.68
3	202	1.20	48	2.78	78	1.00	76	1.05
4	35	0.21	12	0.69	12	0.15	11	0.15
5	5	0.03	1	0.06	1	0.01	3	0.04
2+	*1352*	*8.06*	*215*	*12.44*	*562*	*7.21*	*575*	*7.92*
Total	16,784		1728		7794		7262	

Note: The table shows the number of times that the 16,784 draft picks in our full sample (NBA, NFL and NHL, 1988–2017) were traded. The italicized row provides the number of picks that were traded mutliple times—it is the sum of the four rows immediately above it (for e.g., under Freq. for all three leagues, 1110 + 202 + 35 + 5 = 1352.

sample there have been two rounds of the NBA draft, seven rounds of the NFL draft, and between seven and 12 rounds of the NHL draft. There were between 28 and 32 teams in the NFL during this period, 25–30 teams in the NBA, and 21–31 teams in the NHL. The leagues sometimes award compensatory and supplemental picks to specific teams in addition to the typical allotment of one pick per team per round. Occasionally, the leagues will also force teams to forfeit draft picks because of rule violations or other unusual occurrences.

From the www.prosportstransactions.com website, we download an initial data set of 17,138 draft picks across all three major professional sports leagues for the 30 year period of 1988–2017. We then eliminate from that initial data set all cases where we do not know which team initially owned the pick, the number of the pick is blank, or where the date of any trade is missing or dubious. These checks result in a final sample of 16,784 draft picks, which equals about 98% of our original data set.

Table 1 shows the frequency with which these picks were traded both overall and across the three major professional sports leagues individually. On a per-pick level, the frequency of trading was highest in the NBA, with teams trading nearly 40% of all draft picks at least once at some point. In the NFL and NHL, teams traded a little more than 30% of all draft picks at least once, and picks in those leagues were only about 60% as likely to be traded two or more times as were picks in the NBA. During the period 1988–2017, 671 NBA draft picks, 2451 NFL draft picks, and 2207 NHL draft picks were traded at least once (the relatively low number of NBA picks traded owed to the NBA draft containing by far the fewest picks of the three drafts). Across all three organizations, teams traded 5329 draft picks a total of 6968 times.

3 | IS THERE AN ENDOWMENT EFFECT?

We begin by examining the set of draft picks that traded. We refer to each of these picks as having moved from "Team A" to "Team B" (or A → B for short) during its first trade. We then match these picks to the picks directly above them in the draft, conditional on the matching picks having remained untraded at the time of their match's first trade. We refer to each of these then-untraded matching picks as residing with "Team C" to differentiate it from the owners of the pick directly below it. Occasionally, Team C is the same as Team B (the second owner of the once-traded pick below), and occasionally it is the same as Team A. Still, the vast majority of the time, it is a different team altogether. The basic idea of this pick-matching exercise is to see whether draft picks that have been traded exactly once and thus no longer reside with their original owners are more likely to be traded afterward than are untraded picks that by definition reside with their original owners. This allows for the same amount of time for each pick and its match to potentially trade afterward while equalizing the values of the picks. If the pick directly above the once-traded pick has already traded and thus is not an appropriate match, then we use the pick directly below, as long as it has not traded, instead. Alternatively, we match the sample of then-once-traded picks to the sample of picks directly below them, rather than above them, in the draft order and use the pick above as a backup. For clarity, Table 2 provides an example from the 2009 NHL draft board.

TABLE 2 Example from the National Hockey League's 2009 draft board

Pick	Orig. Team	Trade 1	Team 2	Trade 2	Team 3	Trade 3	Team 4
116	Bruins	January 7, 2007	Wild				
117	Sharks	6/21/2008	Kings	6/27/2009	Thrashers		
118	Hurricanes	July 2, 2009	Lightning	April 3, 2009	Maple Leafs		

Note: Pick #117 in the above figure follows the pattern A → B → C. Once the pick is traded for the first time (on 6/21/2008), we examine any then-untraded picks directly above or below it. In one comparison, we examine the pick above first and then use the pick below as a backup if need be. Here, the pick above had traded nearly a year earlier (on January 7, 2007), so it is not an appropriate match for Pick #117. The pick below had not traded as of 6/21/2008, so we use it as a match instead. In this case, both picks traded after 6/21/2008—Pick #117 to the Thrashers on 6/27/2009 and Pick #118 to the Lightning on April 3, 2009.

We hypothesize that the endowment effect will cause the once-traded picks, whose potential second seller was not the original owner (we refer to these picks as "non-endowed"), to be traded afterward more often than the endowed picks to which we match them. Panel A of Table 3 shows the results. For the three leagues' overall sample, the once-traded picks for which there was an appropriate match got traded 26% of the time afterward, compared to less than 20% for the untraded picks directly above them. The ratio of these two percentages implies that, after the non-endowed picks first traded, they were about one-third likelier to trade again than were the endowed picks. This ratio varies across the three leagues, but is above 25% for each league. In all cases, the results are significant at the 1% level. We also conduct McNemar's test of agreement and obtain very similar results to those reported above. When we match the once-traded picks with untraded picks that are directly below rather than above them in the draft order, we obtain similar results overall, but with a decrease from 36% to 24% for the NHL and an increase from 26% to 34.4% for the NBA.

At this point, we must consider the fact that some teams trade more frequently than do others. Because one of our two groups of draft picks (the A → B group) has already been traded and the other has not, it seems likely that the former belongs to teams that generally trade more often than does the latter. We begin by calculating the number of times the current owner of the once-traded pick ("Team B") sold draft picks as a percentage of the total number of picks sold in the league that season while excluding that pick from the calculation. We then do the same for the endowed owner of the matched pick ("Team C"). As we suspect, the second owners of the once-traded picks for which there are matches sell a higher percentage (4.4%) of draft picks than do the then-untraded picks' original owners (2.8%). To correct for this, we equate the two groups' selling frequency (difference <0.1%) by removing from the sample all pairs where the owner of the once-traded pick sold at least 3.5% more draft picks than the owner of the untraded pick. By doing this, we remove just over one-fourth of the sample, but we also likely prevent the differential frequency of pick-selling from biasing our results.[1]

Panel B of Table 3 reports the results. After we control for the frequency of selling, we find that non-endowed picks for all three leagues combined were 12%–15% more likely to trade again than were their adjacent, endowed counterparts from the same point in time afterward. These results are statistically significant, but we notice some differences when we look at each league individually. Regardless of whether we attempt first to match the once-traded pick with the pick directly below it or above it, the results for the NFL become insignificant. However, the results for the other two leagues remain significant in both a statistical and economic sense. In the NBA, the average once-traded and non-endowed pick is between 24.5% and 29.2% more likely to trade afterward than is its match. In the NHL, the once-traded, non-endowed pick is between 14.8% and 23.6% more likely to trade.

We interpret the results from Table 3 as evidence that the endowment effect strongly influences how teams trade (or choose not to trade) their draft picks overall and within the NBA and NHL specifically. In the next section, we perform further analyses of this behavior and explore different aspects of the endowment effect in more detail.

4 | THE ENDOWMENT EFFECT FROM THE SELLER'S PERSPECTIVE

One interesting thing about studying the endowment effect is that there are two parties to any trade. Therefore, depending upon the specific trade circumstances, the endowment effect could exist for both parties. For example, a general manager (GM) who has purchased a draft pick may feel less attached to that pick than the picks with which the team was originally endowed and subsequently value it less. The GM may thus be more willing to sell that pick in the future. On the other hand, potential buyers of picks may be more willing to purchase picks that were initially theirs

TABLE 3 The overall endowment effect: subsequent trading of once-traded picks versus matching, untraded picks

Panel A: Full sample								
	Total (all leagues)		**NBA**		**NFL**		**NHL**	
	Freq.	***T*-stat**	**Freq.**	***T*-stat**	**Freq.**	***T*-stat**	**Freq.**	***T*-stat**
N: *non* versus *above*	4972		622		2262		2088	
Non-endowed	26.03%		33.28%		23.52%		26.58%	
Above match	19.49%		26.37%		17.55%		19.54%	
Non—Above	6.54%	8.26***	6.91%	2.82***	5.97%	5.23***	7.04%	5.76***
Non/above—1	33.5%		26.2%		34.0%		36.0%	
N: *non* versus *below*	4972		622		2262		2088	
Non-endowed	26.03%		33.28%		23.52%		26.58%	
Below match	19.91%		24.76%		17.20%		21.41%	
Non—Below	6.11%	7.71***	8.52%	3.46***	6.32%	5.63***	5.17%	4.16***
Non/below—1	30.7%		34.4%		36.8%		24.2%	
Panel B: Removes cases where the pick-selling frequency of the owner of the non-endowed pick is at least 3.5% greater than its match								
	Total (all leagues)		**NBA**		**NFL**		**NHL**	
	Freq.	***T*-stat**	**Freq.**	***T*-stat**	**Freq.**	***T*-stat**	**Freq.**	***T*-stat**
N: *non* versus *above*	3636		410		1578		1648	
Non-endowed	24.61%		35.61%		21.23%		25.12%	
Above match	21.42%		27.56%		20.98%		20.33%	
Non—Above	3.19%	3.45***	8.05%	2.64***	0.25%	0.18	4.79%	3.51***
Non/above—1	14.9%		29.2%		1.2%		23.6%	
N: *non* versus *below*	3589		406		1548		1635	
Non-endowed	24.66%		33.74%		21.19%		25.69%	
Below match	21.98%		27.09%		20.22%		22.39%	
Non—Below	2.67%	2.86***	6.65%	2.16**	0.97%	0.71	3.30%	2.36**
Non/below—1	12.2%		24.5%		4.8%		14.8%	

Note: This table shows the frequency with which non-endowed and endowed picks subsequently traded. "Non—Above" is the difference between the two groups. "Non/Above—1" measures how much more likely the non-endowed pick is to trade than its endowed match. *** denotes significance at the 1% level, ** denotes significance at the 5% level.

than picks that were not. In the next two sections of this study, we test the endowment effect from the perspectives of the potential seller and the potential buyer separately by controlling for the other party.

We begin by attempting to isolate examples for which only the seller's endowment effect may drive the trading of draft picks. To do this, we re-examine the matched-sample exercise whose results we reported in Table 3. In that example, we compared the frequency of subsequent trading of a set of non-endowed picks (those A → B picks that had been traded exactly once) to a set of endowed, then-untraded picks of similar value. We obtained results that suggested a strong endowment effect, but that effect could have come from the buyer as well as from the seller. In short, the non-endowed picks could have subsequently traded more often than the endowed picks because the seller was more willing to trade them or because the original owner was more willing to repurchase them. Therefore, we regard the results in Table 3 to indicate the overall endowment effect rather than the effect exerted by one party to the trade to the exclusion of the other.

To study the endowment effect from the seller's perspective alone, we remove any possible endowment effect from the buyer's side by ensuring that all future buyers in both groups are non-endowed. This was already the case for the

matching group, in which all picks were untraded and therefore belonged to their original owners. For the once-traded group, however, we need to adjust our sample. All draft picks in this group had been traded from "Team A" to "Team B". Afterward, there are three possibilities. First, the pick may not trade again. Second, the pick may move to a third team, the full sequence of which we denote A → B → C.[2] Third, the pick may go back to its original owner, which we denote A → B → A. Removing any endowment effect exerted by the buyer requires us to remove cases of the third outcome (A → B → A).

To adjust for the fact that we have now removed one potential buyer (the original owner) from the list of possible trading partners for each owner of a non-endowed pick, we decrease by one the list of possible trading partners for each owner of its matching, endowed pick as well. For the matching pick, we decided to remove from the list of potential buyers the same team that owned the once-traded pick to which we paired it—Team B from the A → B sequence for the adjacent pick. Finally, we remove from each pick's set of potential buyers the matching pick's original owner. This means that for this exercise, Teams A, B, and C are not eligible as potential buyers for both picks. This gives us the same set of potential buyers for both picks from that point onward, which allows us to be even more confident that we have eliminated the buy-side from influencing our results.

Suppose that the endowment effect coming from the seller's side influences trading activity. In that case, we expect the once-traded, non-endowed draft picks to trade more frequently afterward than the then-untraded, endowed picks to which we match them. Panel A of Table 4 reports the results. We find that in all three leagues combined, non-endowed picks do trade 30%–32% more often than their endowed matches. While this result varies across the three leagues individually, in all cases the non-endowed picks are between 21% more likely (NBA with above picks matched to once-traded picks) and almost 40% more likely (NFL with below picks matched to once-traded picks) to trade subsequently than are their endowed matches. All of these results are significant at the 5% level and most are significant at the 1% level.

As before, we next check the relative selling activity of the owners of the matched pairs of draft picks and find that the second owners of the once-traded picks are considerably more active sellers than the first owners of the then-untraded matching picks. Therefore, we again remove all pairs from the sample where the once-traded pick owner sold at least 3.5% more of the total picks sold that season than its match after removing those picks from the calculations. While the results follow the general pattern of Table 3, they (as with the results in Panel A) do attenuate. After removing any potential endowment effect from the buyer and creating the same pool of potential buyers for each pair of picks, we find that the once-traded, non-endowed picks are 9.7%–12.7% more likely to trade again than their matches. In the NBA, non-endowed picks are now 15%–23% more likely to subsequently trade than endowed picks, while in the NHL, non-endowed picks are 13%–18% more likely to trade. The results vary in statistical significance, with the NFL remaining insignificant and the three leagues combined remaining significant.

Last, we perform a robustness check on both the overall endowment effect and the seller-driven endowment effect. In both cases, we make the same team the owner of the untraded pick and the once-traded pick. By ensuring that the same teams holds both picks, we prevent any inter-team differences from influencing our results. This includes not only differences in pick-selling frequency but also in team status and information. In this exercise, we match the once-traded pick (A → B) to either the next or previous untraded pick held by the same team (B) in that draft.[3] For example, in the 2010 NHL draft, the Pittsburgh Penguins acquired Pick #152 from the Toronto Maple Leafs. The Penguins were endowed with Picks #140 and #170 as well. Because neither Pick #140 nor Pick #170 had been traded up to that point and #140 is closer to #152 than is #170, we use Pick #140 as the match. If the Penguins had already traded Pick #140, then we would have used #170 as the match instead. If both picks had already been traded, then we would have thrown the observation out of our sample.

Table 5, Panel A shows the overall endowment effect and compares best to Table 3, Panel B. The result is similar for the three leagues combined as well as for the NBA, stronger for the NFL, and weaker (though still marginally significant) for the NHL. Panel B compares most closely to Panel B of Table 4 and again shows stronger results for the NFL and weaker results for the NHL. The NBA results are also a bit stronger.

Overall, we interpret the results in Panel B of Tables 4 and 5 as evidence that the endowment effect documented earlier is driven partly by the seller, particularly for the full sample of all three leagues. However, the differences between Panels A and B indicate that much of the effect that we find seems to exist independently of the seller. Based on the comparisons of sale frequencies between non-endowed picks and their endowed matches, we estimate that the endowment effect is responsible for, or played a part in, at least 100 pick trades over the period 1988–2017. Roughly 70 of these (the 2% difference between the subsequent sale frequency of the non-endowed picks and their matches

TABLE 4 The seller's side endowment effect: subsequent trading of once-traded picks versus matching, untraded picks

Panel A: Full sample minus teams "A," "B," and "C" as potential buyers for both groups								
	Total (all leagues)		**NBA**		**NFL**		**NHL**	
	Freq.	***T*-stat**	**Freq.**	***T*-stat**	**Freq.**	***T*-stat**	**Freq.**	***T*-stat**
N: *non* versus *above*	4808		597		2220		1991	
Non-endowed	23.81%		30.99%		22.30%		23.36%	
Above match	18.03%		25.63%		16.13%		17.88%	
Non—Above	5.78%	7.37***	5.36%	2.20**	6.17%	5.45***	5.47%	4.53***
Non/above—1	32.1%		20.9%		38.3%		30.6%	
N: *non* versus *below*	4808		597		2220		1991	
Non-endowed	23.81%		30.99%		22.30%		23.36%	
Below match	18.37%		24.46%		15.95%		19.24%	
Non—Below	5.45%	6.90***	6.53%	2.67***	6.35%	5.67***	4.12%	3.32***
Non/below—1	29.7%		26.7%		39.8%		21.4%	
Panel B: Removes cases where the pick-selling frequency of the owner of the non-endowed pick is at least 3.5% greater than its match								
	Total (all leagues)		**NBA**		**NFL**		**NHL**	
	Freq.	***T*-stat**	**Freq.**	***T*-stat**	**Freq.**	***T*-stat**	**Freq.**	***T*-stat**
N: *non* versus *above*	3513		390		1546		1577	
Non-endowed	22.29%		32.82%		19.86%		22.07%	
Above match	19.78%		26.67%		19.21%		18.64%	
Non—Above	2.50%	2.73***	6.15%	2.04**	0.65%	0.47	3.42%	2.54**
Non/above—1	12.7%		23.1%		3.4%		18.4%	
N: *non* versus *below*	3463		386		1516		1561	
Non-endowed	22.24%		30.83%		19.79%		22.49%	
Below match	20.27%		26.68%		19.00%		19.92%	
Non—Below	1.96%	2.10**	4.15%	1.36	0.79%	0.58	2.56%	1.83*
Non/Below—1	9.7%		15.5%		4.2%		12.9%	

Note: This table shows the frequency with which non-endowed and endowed picks subsequently traded. "Non—Above" is the difference between the two groups. "Non/Above—1" measures how much more likely the non-endowed pick is to trade than its endowed match. *** denotes significance at the 1% level, ** denotes significance at the 5% level, and * denotes significance at the 10% level.

multiplied by the roughly 3500 pairs that we study) involve an endowment effect manifesting in the seller and not the buyer of these picks.

5 | THE ENDOWMENT EFFECT FROM THE BUYER'S PERSPECTIVE

Next we attempt to study the endowment effect exerted by buyers, as defined by an excess tendency to reacquire picks that were originally theirs, to the exclusion of any endowment effect exerted by sellers. We begin by examining draft picks that were traded two or more times. By definition, any pick that gets traded once and only once cannot end up with its original owner, but picks that are traded two or more times can. If the endowment effect manifests in how willing major professional sports teams are to buy back their draft picks, then we expect picks traded multiple times to end up with their original owners a disproportionately high percentage of the time. We also expect this percentage to vary with the number of teams in the different leagues over the years.

TABLE 5 The overall and seller's side endowment effect: Each pair of picks has the same potential seller

Panel A: Overall endowment effect; full sample								
	Total (all leagues)		**NBA**		**NFL**		**NHL**	
	Freq.	***T*-stat**	**Freq.**	***T*-stat**	**Freq.**	***T*-stat**	**Freq.**	***T*-stat**
N: *non* versus *match*	3775		469		1646		1660	
Non-endowed	25.85%		36.03%		23.03%		25.78%	
Match	22.81%		28.36%		20.84%		23.19%	
Non—match	3.05%	3.42***	7.68%	2.72***	2.19%	1.71*	2.59%	1.89*
Non/match—1	13.4%		27.1%		10.5%		11.2%	
Panel B: Sellers' side endowment effect; full sample minus "Team A"								
	Total (all leagues)		**NBA**		**NFL**		**NHL**	
	Freq.	***T*-stat**	**Freq.**	***T*-stat**	**Freq.**	***T*-stat**	**Freq.**	***T*-stat**
N: *non* versus *match*	3623		442		1605		1576	
Non-endowed	23.54%		33.26%		21.87%		22.53%	
Match	21.83%		26.92%		20.06%		22.21%	
Non—match	1.71%	1.94*	6.33%	2.22**	1.81%	1.43	0.32%	0.23
Non/match—1	7.8%		23.5%		9.0%		1.4%	

Note: The table shows the frequency with which non-endowed and untraded, endowed match picks subsequently got traded. "Non—Above" is the difference between the two groups. "Non/Above—1" measures how much more likely the non-endowed pick is to trade than is its endowed match. *** denotes significance at the 1% level, ** denotes significance at the 5% level, and * denotes significance at the 10% level.

The results that follow and the explanation in the previous paragraph come with one caveat. It is possible that, owing to the decreasing marginal returns that draft picks may have, a given pick is more valuable to a team that does not have another pick nearby than to a team that does. This may be especially true in the NBA, which has more constraints in the form of smaller rosters and fewer draft rounds than do the NFL and NHL. However, it is also the case that: (a) the examples in this analysis focus on teams that already sold those very picks, (b) the repurchasing team could instead buy any other nearby pick, some of which are owned by teams with multiple picks of about the same value, and (c) an alternative, unreported analysis reveals that relatively frequent second-owners of NFL picks (the Patriots, Eagles, and Cowboys) and NHL picks (the Flyers, Lightning, and Sharks) 100 days from the draft are proportionally almost 25% more likely to then sell those picks than they are to sell their endowed picks. Based on all of this, we find it unlikely that trades caused by decreasing marginal returns are significantly influencing our results.

Table 6, Panel A, shows that 10% of the time, picks traded at least twice ended up residing with their original owners. However, this number varies widely by league, from 5.9% in the NFL to 13.7% in the NHL. We also find, but do not formally report, that these results are consistent between picks traded exactly twice and picks traded three or more times. To test whether these percentages are significantly different from what we would expect them to be absent the endowment effect, we first create a dichotomous variable that equals one if the original owner was the final owner of the pick and zero otherwise. We then define the null hypothesis odds of that pick finishing with its original owner as $1/(N-1)$, where N equals the number of teams in the league that season. We subtract one in the denominator because the team with which the pick ends up cannot be the last team to trade it. For all three leagues, we find that the average difference between the dichotomous variable and the null odds of it taking a value of one is positive, meaning that the original owner ends up with the pick more often than we would expect by chance. Panel A shows that in the NBA, the final owner and the original owner are the same 11% of the time for picks traded at least twice.

By contrast, the original owner represents on average just 3.57% of the teams in the league, meaning that the original team is more than three times as likely (11.16% vs. 3.57%) to be the pick's final owner as another, randomly chosen team in the NBA. In the NFL, the original owner is about 75% more likely to be the final owner, while in the NHL, the original owner is nearly four times as likely to be the final owner. All of these results are highly significant.

Panels B and C show the results for the first 15 years (1988–2002) and the last 15 years (2003–2017) of our sample, respectively. In the early 2000s, major professional sports teams began to invest much more heavily in statistical

TABLE 6 The buyer's side endowment effect: frequency of original owner being final owner versus a randomly chosen team

Panel A: Full sample								
	Total (all leagues)		**NBA**		**NFL**		**NHL**	
	Freq.	***T*-stat**	**Freq.**	***T*-stat**	**Freq.**	***T*-stat**	**Freq.**	***T*-stat**
N	1352		215		562		575	
Original	10.06%		11.16%		5.87%		13.74%	
Predicted: $1/(N-1)$	3.49%		3.57%		3.34%		3.60%	
Orig.—Predicted	6.57%	8.04***	7.59%	3.53***	2.53%	2.55**	10.14%	7.07***
Orig./Predicted—1	188%		213%		76%		281%	
Panel B: 1988–2002								
	Total (all leagues)		**NBA**		**NFL**		**NHL**	
	Freq.	***T*-stat**	**Freq.**	***T*-stat**	**Freq.**	***T*-stat**	**Freq.**	***T*-stat**
N	517		89		206		222	
Original	14.12%		16.85%		7.77%		18.92%	
Predicted: $1/(N-1)$	3.71%		3.74%		3.54%		3.86%	
Orig.—Predicted	10.41%	6.80***	13.12%	3.29***	4.22%	2.26**	15.06%	5.73***
Orig./Predicted—1	280%		351%		119%		390%	
Panel C: 2003–2017								
	Total (all leagues)		**NBA**		**NFL**		**NHL**	
	Freq.	***T*-stat**	**Freq.**	***T*-stat**	**Freq.**	***T*-stat**	**Freq.**	***T*-stat**
N	835		126		356		353	
Original	7.54%		7.14%		4.78%		10.48%	
Predicted: $1/(N-1)$	3.35%		3.45%		3.23%		3.44%	
Orig.—Predicted	4.19%	4.59***	3.69%	1.60	1.55%	1.37	7.04%	4.31***
Orig./Predicted—1	125%		107%		48%		205%	

Note: The table shows the frequency with which picks that were traded multiple times ended up with their original owners. The predicted probability of this occurring (the null hypothesis) assumes that each team is equally likely to be the pick's final owner. *** denotes significance at the 1% level, ** denotes significance at the 5% level.

analysis. This coincided with the popularity of the book *Moneyball* by Michael Lewis. However, many people, especially in baseball, had studied and advocated for Sabermetrics (the analytical study of sports) for some time. Concurrent with this rise in the awareness of Sabermetrics came an increased study of the behavioral biases present in sports.

Panels B and C show an interesting change over time; from 1988 to 2002, the results are all highly significant and perhaps even shocking in their size. The original owner was 3.8 times as likely (14.12% vs. 3.71%) to end up as the pick's final owner than another, randomly selected team for all picks that traded at least twice. In the NBA, the original owner was 4.5 times as likely to end up the final owner, while in the NHL the original owner was nearly five times as likely. From 2003 to 2017, the effect dampens notably, though it remains large. In all three leagues combined, the original owner is 2.25 times as likely to end up the original owner. The effect remains weaker in the NFL than in the other sports, but the original NFL team is still 48% likelier to finish with its original pick (this result is statistically insignificant in a two-tailed test, however). The buyer-driven effect remains extremely strong in the NHL, with the original owner still three times as likely to finish with its pick as a randomly selected team.

As striking as these differences are, they may be driven by the fact that some teams simply trade more often than others. Given that the original owner of the pick has already traded it, this team may, on average, be a more active trader than the typical team in its league. Therefore that team may be more likely, even in the absence of the endowment effect, to re-acquire the pick. To control for this possibility, and by extension team-specific factors like contending/rebuilding status and information asymmetry, we construct an alternative measure of the expected odds of that team ending up with its own originally traded pick—specifically, the number of times that team acquired a pick as

a percentage of the total number of pick trades in the league that season. Each time that we perform this calculation, we eliminate the final trade involving the draft pick that we are examining. When we adjust for the original owner's relative pick-buying activity in this manner, we find in Table 7 that the effect decreases but, for the most part, remains highly significant. In the NBA, the pick is 2.25 times as likely to end up with its original owner (11.16%) as predicted by that team's level of draft pick acquisition activity (4.96%). By contrast, in the NFL the pick is about one-third more likely to end up with the original owner. In the NHL, the pick is 3.7 times as likely to end up with its original owner even after we account for that team's level of pick-buying activity.

As in Table 6, we split our sample into 15-year halves. For the period 1988–2002, we witness a higher degree of reacquisitions, with even the NFL being significant in a one-tailed *t*-test and the average team across all leagues being nearly three times as likely to finish with its pick as predicted by its purchasing activity. From 2003 to 2017, the excess frequency of reacquisitions drops by two-thirds in the NBA and by roughly half in the NFL and NHL. Much of the endowment effect that we document for this period concentrates in the NHL, where teams are almost three times as likely to finish with their picks as predicted by their buying frequency. It remains a striking result that, across all three leagues, draft picks that were traded two or more times are nearly twice as likely to end up being held by their original owner as their level of purchasing activity predicts. Over the 30-year span of our full sample, the different teams' frequencies of pick-buying predict that 57 of the 1352 picks that were traded multiple times would end up with their original owners. Instead, we find that picks traded more than once ended up with their original owners 136 times.[4]

TABLE 7 The buyer's side endowment effect: frequency of original owner being final owner versus propensity to buy picks

Panel A: Full sample								
	Total (all leagues)		**NBA**		**NFL**		**NHL**	
	Freq.	***T*-stat**	**Freq.**	***T*-stat**	**Freq.**	***T*-stat**	**Freq.**	***T*-stat**
N	1352		215		562		575	
Original	10.06%		11.16%		5.87%		13.74%	
Predicted: % Bought	4.19%		4.96%		4.40%		3.69%	
Orig.—Predicted	5.87%	7.07***	6.20%	2.79***	1.47%	1.47	10.05%	6.93***
Orig./Predicted—1	140%		125%		34%		272%	
Panel B: 1988–2002								
	Total (all leagues)		**NBA**		**NFL**		**NHL**	
	Freq.	***T*-stat**	**Freq.**	***T*-stat**	**Freq.**	***T*-stat**	**Freq.**	***T*-stat**
N	517		89		206		222	
Original	14.12%		16.85%		7.77%		18.92%	
Predicted: % Bought	4.74%		5.75%		5.28%		3.83%	
Orig.—Predicted	9.38%	6.00***	11.10%	2.68***	2.48%	1.31	15.08%	5.66***
Orig./Predicted—1	198%		193%		47%		364%	
Panel C: 2003–2017								
	Total (all leagues)		**NBA**		**NFL**		**NHL**	
	Freq.	***T*-stat**	**Freq.**	***T*-stat**	**Freq.**	***T*-stat**	**Freq.**	***T*-stat**
N	835		126		356		353	
Original	7.54%		7.14%		4.78%		10.48%	
Predicted: % Bought	3.85%		4.41%		3.89%		3.60%	
Orig.—Predicted	3.70%	4.00***	2.74%	1.15	0.89%	0.78	6.88%	4.18***
Orig./Predicted—1	96%		62%		23%		191%	

Note: This table shows the frequency with which picks that were traded multiple times ended up with their original owners. The predicted ("null") probability of this is based on the pick-buying frequency of the pick's original owner relative to the league that year. *** denotes significance at the 1% level.

6 | OTHER CONSIDERATIONS

It is commonly believed that the top few picks (especially the top pick or two) in most drafts are far more valuable than the picks immediately below them. There are several unofficial draft pick value charts constructed by sports insiders that indicate this belief. Such charts show an exponential decay in pick values as one moves from the first overall pick through the rest of the draft. Thus there is the possibility that this nonlinearity may in some way skew our results. As a robustness check, we eliminate the first five picks from all drafts and then redo all of the tests up to this point. The results we obtain are nearly identical to those reported thus far, suggesting that our results are not driven nor dampened by the high values of the top picks in a typical draft. Furthermore, given that there is less uncertainty about the players likely to be chosen with the first few picks in a typical draft and thus those picks may be more often traded owing to perceptions of risk (either high or low) regarding career performance, removing them further removes the human element from our study. We also redo Tables 3 and 5 for "early picks" (round 1 in the NBA and rounds 1–3 in the NFL and NHL) and "late picks" (all other rounds) separately. The results are a bit stronger for early picks in the NBA, for later picks in the NFL, and about the same between early and later picks in the NHL.

Another factor in the trading of draft picks could be information asymmetry. For example, a team that is about to improve itself for the current season has the advantage of knowing that its endowed picks in the next draft are likely to worsen that is, decrease in draft position. If other general managers do not know this, then the team may be more likely to trade its own pick than a pick that it had gotten from another team. To eliminate this possibility from affecting our results, we reproduce, but do not report, Table 5 for the subset of cases in which the once-traded pick (A → B) was acquired by Team B after the previous season's trade deadline (once each trading deadline passes, trades are prohibited until a point at which all general managers know the positions of all picks). Therefore, any subsequent selling of picks from that draft occurs without information asymmetry regarding pick position. The unreported results that we find are especially strong; for the NHL and NFL they become significant at the 1% level, although they do disappear for the NBA given that the vast majority of the trades that involve draft picks in that league occur before the previous season's dealine, leaving only 32 out of 469 observations. When we reproduce Panel B, which eliminates the buyers' side in order to test the sellers' side endowment effect, the results mirror those of Panel A and become considerably stronger than the results from Table 5 (with the exception of the NBA).

We then reproduce Panel A from Tables 6 and 7, which examine the buyers' side endowment effect, for those cases in which Team B acquired the once-traded pick after the previous season's trade deadline. The results become much closer to those of the sellers' side; for the NBA they become significant while for the NFL and NHL they remain significant but the coefficients become smaller. We also redo Table 8 and find 14 cases of a pick's path being A → B → C → A versus only four cases of a pick's path being A → B → C → B. This is proportionally similar to the previous result of 20 cases of the former and six cases of the latter. Again, for the sake of brevity we do not include here these alternative versions of Tables 6–8. Collectively, these results suggest that while asymmetric information may play a role in the buying and selling of draft picks prior to the previous season's trade deadline, there appears to be an endowment effect in both for the period after any such asymmetries can exist.

Moreover, we further censor the sample to include only those trades made within 5 days of the draft and find similar results for the buyers' side (Tables 6 and 7) and even stronger results for the sellers' side (Table 5, Panel B). A more

TABLE 8 The buyer's side endowment effect: Picks traded exactly three times—ABCA versus ABCB

	Total (all leagues)		NBA	NFL	NHL
	Freq.	Z-stat	Freq.	Freq.	Freq.
N	26		7	10	9
ABCA	20		5	7	8
ABCB	6		2	3	1
ABCA—ABCB	14	2.75***	3	4	7
ABCA/ABCB—1	233%		150%	133%	700%

Note: The table shows the frequency with which picks traded exactly three times ended up with the original owner and the second owner as the pick's final owner, conditional on all of the first three owners having been different teams. *** denotes significance at the 1% level.

detailed exploration of information asymmetry and of the timing of trades (relative to draft day) provide two interesting avenues for future research.

We also check whether the prior (recent) trading relationships between teams affect our results in Table 6. To do this, we compare the percentages of cases where exactly twice-traded picks and exactly thrice-traded picks finish with their original owners. In the former case, given that Teams A and B have not only traded but have in fact traded that very draft pick, one might expect the establishment of that trading relationship to make it more likely for picks to follow the pattern A → B → A than for them to follow the pattern A → B → C → A after one controls for the difference between the number of twice- and thrice-traded picks. Interestingly, we find no significant difference between the two. Draft picks that trade exactly twice end up with their original owners (A → B → A) 10% of the time, while picks that wind up being traded three times finish with their original owners (A → B → C → A) 9.9% of the time. Thus it does not appear that these trading relationships between teams are driving our results.

Finally, we attempt to compare the endowment effect, defined as the excess desire to own an asset that was originally yours, to the excess desire to own an asset that was yours earlier but not yours *originally*. This is an interesting and to our knowledge new exercise. We examine two groups of picks that traded exactly three times. The first group finished with their original owners while the second group finished with their second owners. We denote the first group A → B → C → A and the second group A → B → C → B. Though this experiment yields only 26 observations, it may be useful. For one thing, all 26 cases by construction have Team B more recently trading with Team C than with Team A. For another, a team that was endowed with a draft pick but does not currently own it has by definition sold but never bought the pick prior to its third trade. By contrast, a team that owned a pick earlier but was not the original nor current owner has by definition both bought *and* sold the pick. These two observations may lead one to believe that the latter group will make up the larger share of the 26 cases.

In Table 8, we report that although our sample for this comparison is very small, we do find that 20 of the 26 observations fall into the A → B → C → A category while just six fall into the A → B → C → B category. We interpret this as further evidence that the endowment effect documented in Table 6 exists and is more potent than any desire that teams may have to re-acquire non-endowed picks that they had bought earlier. This overall result is significant at the 1% level. In each league individually, we find more cases of A → B → C → A than we do of A → B → C → B (five vs. two in the NBA, seven vs. three in the NFL, and eight vs. one in the NHL). Also, given that only six (2.9%) out of the 206 thrice-traded picks ended up with their second owner, we can confidently say that within this small sub-sample of draft picks, we find no evidence that previous owners that were not *original* owners of draft picks have any excess desire to re-acquire them.

7 | CONCLUSIONS

This paper explores whether the endowment effect exists in the trading (and non-trading) of draft picks in the NBA, NFL, and NHL. We believe that it makes six significant contributions to the literature. First, while many studies examine draft picks through the players who are selected with them, ours eliminates the human element by examining draft picks *before* they are used to select players. During this period, draft picks are not only inhuman but also intangible —and often very valuable—assets. To further eliminate the human element, we eliminate the first five picks (which have considerably higher value and are more likely to be associated with players a priori) from all drafts. Second, we eliminate the human element at the managerial level also by controlling for inter-franchise trading relationships. Third, we establish the existence of a statistically and economically significant endowment effect in the NBA and NHL after controlling for the different trading frequencies of the teams involved. Fourth, we examine the endowment effect from the buyers and sellers of draft picks separately by eliminating any possible effect exerted by the other. We find some evidence of an effect on the seller's side (Tables 4 and 5) and strong evidence on the buyer's side (Tables 6–8), suggesting that of the overall endowment effect that we had documented, the majority comes from the buyer of the pick. Fifth, we find that the endowment effect exerted by the buyer's side dampens significantly over time, but remains very large. During the latter sub-period of our sample (2003–2017), the original owner is about twice as likely to end up with the traded pick as we would have expected absent the effect. Sixth, we test the endowment effect (as defined in this paper by an excess desire to reacquire a pick that was yours first) to the desire to reacquire a pick that was yours earlier but not yours originally. We do this by examining the relative frequency of two groups of picks that traded exactly three times—those that followed the pattern A → B → C → A and those of the pattern A → B → C → B. We find that 20 of these cases

follow the pattern A → B → C → A while just six follow the pattern A → B → C → B. In each of the three leagues, there were more cases of the former than of the latter.

We believe that our results strongly support the existence of the endowment effect in the way that teams treat draft picks. Our results are strongest in the NHL but extend substantially to the NBA as well. In other words, Daryl Morey's attempt to combat the endowment effect regarding players by assigning them draft pick values can be extended to include the reverse—fighting the effect regarding picks by assigning them player (or cash) values. The relative rationality of the NFL documented here pertains only to the endowment effect with respect to the trading of draft picks; other studies have found examples of other irrationalities in professional football. We emphasize that while the endowment effect is a type of bias, either party could be rational or irrational in any given trade. The seller could instigate the trade based on either its own endowment bias or its perception of the buyer's bias, and the same goes for the buyer. However, efficiencies in the market for draft picks should make endowed and non-endowed picks equally likely to trade, and yet, in this study, we find that not to be the case.

ACKNOWLEDGMENTS

The authors would like to thank Gerry Hobbs, Lawrence Katz, Rob Simmons, two anonymous referees, and participants at the Eastern Economic Association 2020 conference in Boston, Academy of Business Research 2020 conference online, Southern Economic Association 2020 conference online, Southwestern Finance Association 2022 conference in New Orleans, and Eastern Economic Association 2022 conference in Montego Bay, Jamaica for their helpful comments and suggestions along the way.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are openly available in openICPSR at https://www.openicpsr.org/openicpsr/project/171801/version/V1/view, reference number 171801.

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ENDNOTES

[1] While we choose a 3.5% threshold because it equates the two groups' pick-selling frequencies, we also apply other thresholds as a robustness check. As we expect, relaxing the threshold to less than 3.5% strengthens our results by increasing our sample and making the owners of the non-endowed group generally more likely to sell picks than the owners of the endowed group. Tightening our threshold weakens our results by shrinking our sample and introducing a selling-frequency bias in the opposite direction. These trends continue as we further relax or tighten the threshold.

[2] Earlier in the paper, we used "C" to differentiate the owner of an untraded pick from the owner of a once-traded pick, "A → B". We then compared the two picks to see which was more likely to trade afterward. Here, "C" is the third owner of a twice-traded pick, which we abbreviate "A → B → C".

[3] In an unreported examination, we compare the subset of once-traded (A → B) and untraded (B) picks held by the same team where the two picks are adjacent in the draft. We remove Team A as an eligible buyer to eliminate any endowment effect coming from the buyers' side. This results in a much smaller sample (241 pairs overall with just 30 coming from the NBA and 79 coming from the NFL), and while these teams are 11.3% more likely to re-sell the pick they had acquired than to sell the adjacent pick that was theirs originally, the result is statistically insignificant.

[4] Following a reviewer's suggestion, we also split Tables 3–5 into 15-year halves. Interestingly, the results for an endowment effect exerted by the seller are stronger for the period 2003–2017 than for the earlier period of 1988–2002. Additionally, we split (but do not report here) Tables 6 and 7 into pre- and post-periods that correspond to structural changes regarding payroll and salary restrictions in the leagues rather than into 15-year halves. These splits are 1994–1995 and (alternatively) 1998–1999 for the NBA, 1993–1994 and (alternatively) 2009–2010 for the NFL, and 2004–2005 for the NHL. In all cases, the results that we obtained were similar to the results that we had gotten using the original cutoff of 2002–2003.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

How to cite this article: Hobbs, J. & Singh, V. (2022) The endowment effect and the trading of draft picks in major professional U.S. sports. *Economic Inquiry*, 60(4), 1929–1942. Available from: https://doi.org/10.1111/ecin.13102