Ross-Arctos Sports Franchise Index (RASFI)

Methodology

May 2024

Introduction

Ross-Arctos Sports Franchise Index (RASFI) represents the first-ever purely data-driven benchmark of investment performance of North American sports franchise assets. RASFI serves sports industry investors, asset owners, league and team executives, and the wider sports business community as a universal standard for investment performance in the largest North American leagues (the "Big Four"): Major League Baseball (MLB), National Basketball Association (NBA), National Football League (NFL), and National Hockey League (NHL).

Sports franchises are privately held assets that trade in an opaque, illiquid market. Recognition of sports franchises as an alternative asset class, akin to private equity, venture capital, or infrastructure, has brought increased focus from investors and allocators on the drivers of sports franchise valuations. We hope RASFI furthers this understanding.

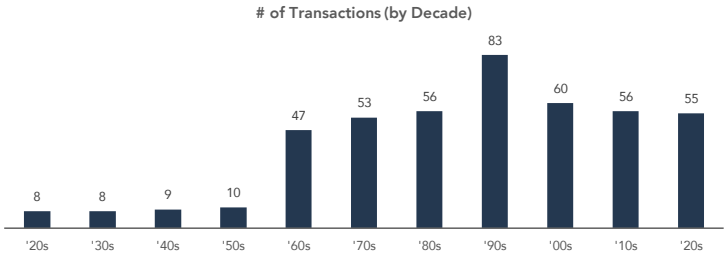
Data[1]

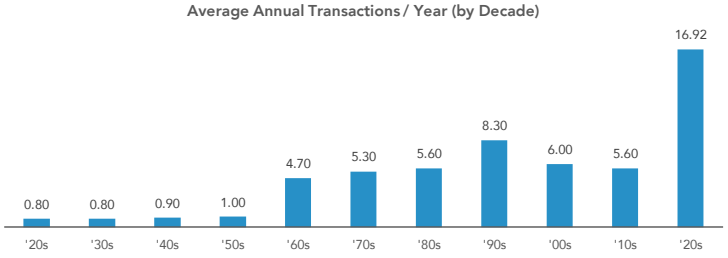
Our full data set comprises over 445 transactions within the Big Four beginning in 1923. Our transaction data set includes all documented full and partial control and non-control transactions, as well as expansion franchises for which expansion fee data is available.

Our main variable of interest is the Franchise Value (Total Enterprise Value)

Figure 1.

Decade	Yrs	Transactions	Annual Average	Average TEV
'20s	10.00	8	0.80	0.01
'30s	10.00	8	0.80	0.02
'40s	10.00	9	0.90	0.51
'50s	10.00	10	1.00	0.78
'60s	10.00	47	4.70	4.88
'70s	10.00	53	5.30	10.27
'80s	10.00	56	5.60	40.12
'90s	10.00	83	8.30	147.77
'00s	10.00	60	6.00	311.06
'10s	10.00	56	5.60	858.70
'20s	3.25	55	16.92	2,194.41
Full Sample	**103.25**	**445**	**4.31**	**455.60**
Research Sample ('60s+)	**63.25**	**410**	**6.48**	**494.46**





Source: Arctos, U. Michigan Ross. As of May 2024.

[1] There can be no assurances that historical trends described herein will continue. Although Arctos and Ross believe that the determinations related to the industry market described herein are reasonable, they are inherently subjective in nature. Other market participants may make different determinations relating to the market based on the same underlying data.

implied by the transaction.[2] Data is predominantly sourced from proprietary transaction data sourced by Arctos, collaboration with sports leagues and public sources including press releases, news articles, and other sources, where transaction information representing Total Enterprise Value or information from which Total Enterprise Value could be readily estimated was available. We believe this data is subject to meaningful and unavoidable noise in the process of reporting; however, as we review, our methodology seeks to explicitly correct for measurement error introduced by the reporting process.

Our research sample excludes the earliest four decades, where information was particularly thin. Transaction rates have been consistent since 1960 (~50-60 per decade) and have grown considerably in the first three years of the 2020s.

Methodology

Our goal is to produce a high frequency (quarterly) estimate of the average Big Four Franchise Value (Total Enterprise Value) using our main sample of 410 transactions. In addition to Franchise Value, we have sparse estimates of prior season franchise revenue and market size (Metropolitan Statistical Area population in millions), with more consistent data availability for revenue beginning in 1980. We use revenue and market size as our main covariates.

We utilize two methodologies, driven by data availability.

State Space Model (1991+). For observations after 1991, where we have consistently available covariate data, we use rolling 30, 40, 50, and 60-trailing window panel regressions using revenue, market size, a non-control dummy, and league as a fixed effect. Given low sample sizes and the time-varying regression horizon, we utilize these four models and take a simple average of the model predictions to improve robustness.

$$\log(V_T) = \gamma_0 + \gamma_1 \log(Rev_T) + \gamma_2 \log(Mkt_T) + (NonControl = 1) + League\ F.E. + \varepsilon_T$$

The average adjusted R^2 across all windows and transactions T is 0.791; average adjusted R^2 across all windows and transactions T over the last ten years is 0.875.

We then define the observed Average Franchise Value in month t AFV_t as the model-predicted Franchise Value of the "average franchise", i.e., using the simple average prior season revenue and estimated market size (MSA population) as inputs, setting $NonControl$ equal to zero, and using the average league fixed effect as our intercept.[3] The result is a sparse monthly time series of imputed AFVs over 388 months beginning in December 1991 (221 missing months).

Our imputed AFV is slightly higher than the observed data (Figure 2). This is driven by skewness in the distribution of revenues and market sizes across franchises in the same league and the time-varying premium earned by control transactions (which is what RASFI aims to measure); a small percentage of our sample

[2] Total Enterprise Value is defined as the total value of all outstanding corporate equity and debt liabilities.

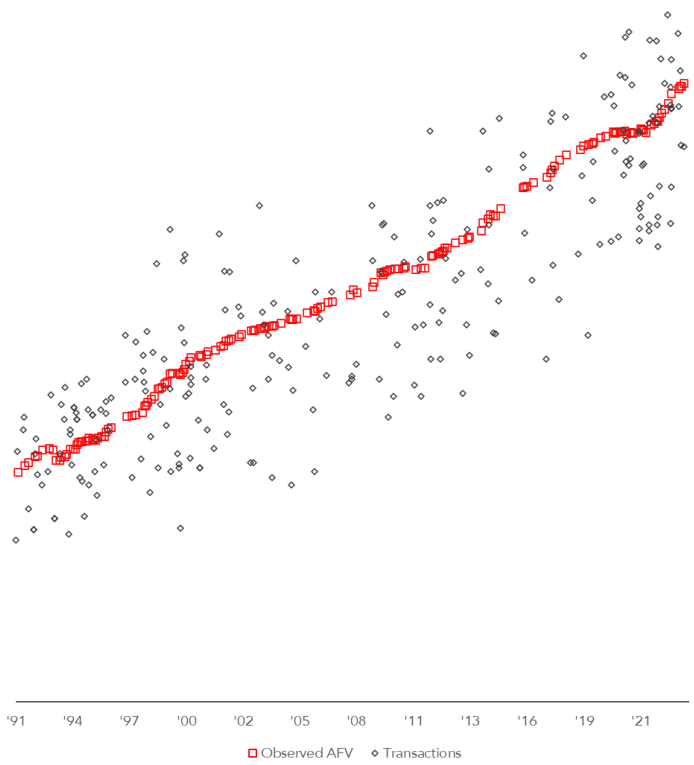
[3] Our data sources are as follows: public sources for estimates of franchise revenue (Forbes, Sportico, public releases of historical financial statements, and internal estimates); U.S. Census Bureau for market size estimates (population) by Metropolitan Statistical Area (MSA).

represents non-control transactions that tend to transact at a discount relative to control transactions (all else equal).

To create a quarterly index, we utilize a linear Gaussian state space model and use a standard Kalman filter to estimate average franchise value as a latent state. Our model is simple and based on the following observations:

1. We believe that best barometer of overall industry health is total revenue (growth), which is itself not particularly correlated with other macroeconomic, financial, or asset price variables.
2. Simple tests of contemporaneous market return in a similar filter model result in factor loadings insignificantly different from zero – i.e., short-term market price movements do not have a significant influence on sports valuations.

Figure 2. Average Franchise Value vs. Actual Data (log scale)



As such, our state space model, which we estimate monthly, is as follows:

$$v_t = v_{t-1} + w_t + \eta_t, \quad \eta_t \sim N(0, \sigma_\eta^2)$$

$$v_t^{obs} = v_t + \varepsilon_t, \quad \varepsilon_t \sim N(0, \sigma_\varepsilon^2)$$

Where $v_t^{obs} = \log\left(AFV_t / AFV_{t_0}\right)$, v_t is our latent state (the RASFI index value in logs), the random walk drift term w_t is estimated as a linear model of monthly (log) revenue growth:

$$w_t = a + b * \log r_t$$

Where $r_t = Rev_t / Rev_{t-1}$. In other words, we model our monthly transaction observations as a noisy signal of underlying (true) average franchise value, which grows according to a random walk whose trend component is a linear function of average franchise revenue growth.

We estimate $v_t \mid a, b, \sigma^{\eta}, \sigma^{\varepsilon}$ using a Kalman filter. We treat a and b as unknown constants and part of the state space vector. We set our initial state value equal to zero, as it represents a cumulative log return. We use an exact uninformative diffuse initialization for the covariance matrix per the method of Koopman and Durbin (2003), and we assume initial parameters $(a_1, b_1, \sigma^2_{\eta,1}, \sigma^2_{\varepsilon,1}) = (0.3, 1.0, 0.01, 0.01)$. As of initial index launch (March 31, 2024), our model suggests a high and significant b of ~1.152 and unexplained return a of ~0.00259 per month, implying 3.2% annual return above that implied by our revenue growth factor.

Figure 3a. v_t over time

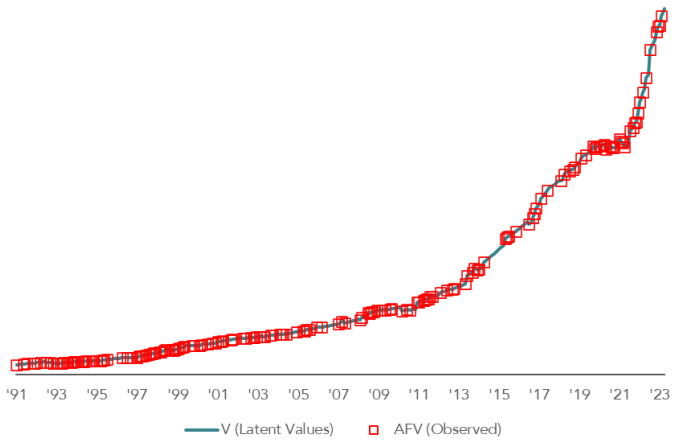
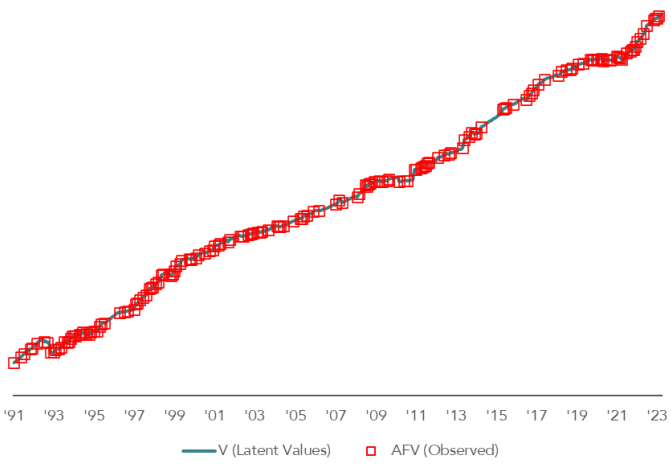


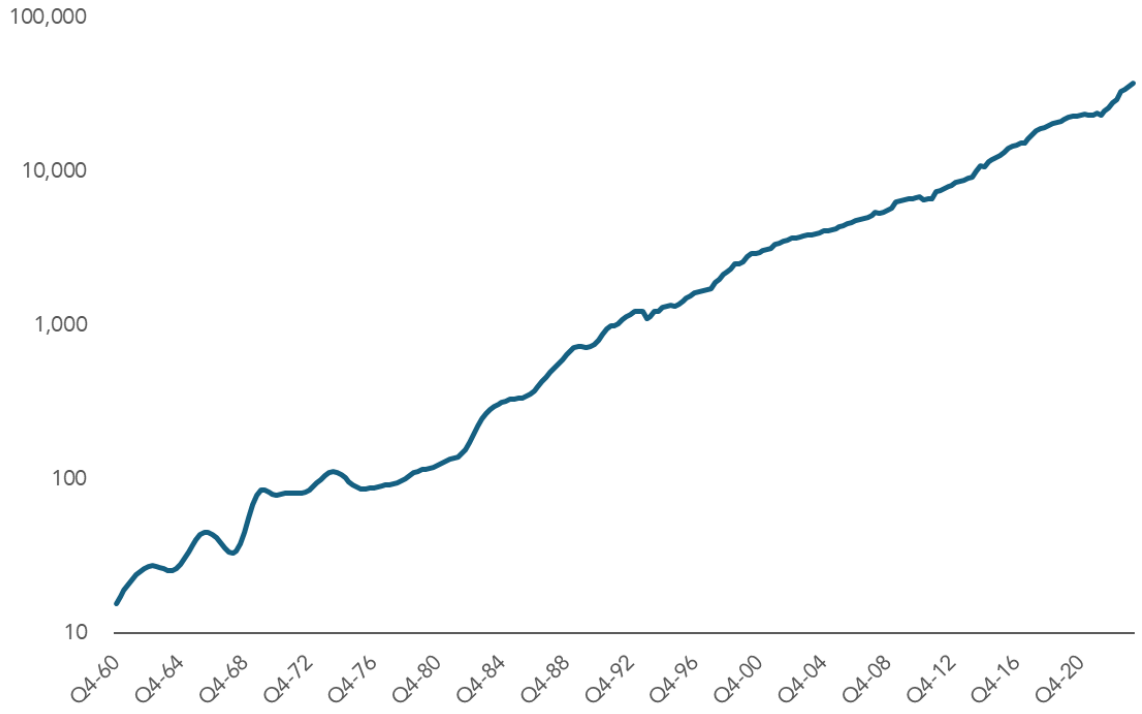
Figure 3b. v_t over time (log scale)



Repeat Sales (Extension back to 1960). We use a Case Shiller method repeat sales model to annually extend the index back to 1960. This extends our index back to December 31, 1960. Our sample includes 277 transaction pairs and ends on December 31, 2023. We then use spline interpolation to create a quarterly result, with the annual coefficients from the initial repeat sales index representing the June 30, YY dates (mid-year). Finally, the resulting index is negatively autocorrelated on an annual basis; hence, we exponentially smooth the result so that serial correlation is zero ($\alpha = 0.6$).

Final Index. The final product is the combination of the Repeat Sales observations to December 31, 1991, followed by the SSM-imputed index, which we track quarterly, starting on December 31, 1991. The December 31, 1991 anchor date value is set to equal 1,000 (Figure 4).

Figure 4. Full RASFI (Dec-91 = 1,000)



Important Considerations

Interpreting movements in RASFI should be done with the following disclaimers in mind:

1. RASFI represents a price return index: it does not capture dividends or net equity issuance / buyback.
2. RASFI is an equally weighted index by construction, with implicit quarterly 'rebalancing'.
3. RASFI is not investible. Our index is an illustrative construction from advanced statistical techniques of the hypothetical performance of the average Big Four franchise.
4. As is common for private asset benchmarks, but unlike most public stock indexes, when RASFI is updated, due to sample updates (incl. backfilled transactions added to the sample), past values of RASFI could change.

References

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