Online Appendix

for

Who Bears the Risk of Subsidized Sports Venues?

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OA1: Alternative Estimates of Initial Admissions Tax Revenue

The fiscal impact statement reports expected annual admissions tax revenue of $12 million. Because this figure may be influenced by considerations other than fiscal ones, we validate it using two alternative estimates, each of which relies on assumptions favoring the project. Both estimates ($12.3 million and $12.7 million) are close to the reported figure. Because they are deliberately constructed to favor the project, the reported $12 million is itself best interpreted as an upper-end estimate.

Initial Admissions Tax Validation

	Validation 1 Face Value	**Validation 2** Season Tickets
Ticket price ($)	196	117 / 244 / 582 (weighted)
Seating weights (upper / middle / lower)	—	0.5 / 0.4 / 0.1
Capacity (Soldier Field)	61,500	61,500
Home games per year	8.5	8.5
Attendance rate	1.000	0.945
Admissions tax rate	0.12	0.12
Annual revenue ($M)	**12.3**	**12.7**

Notes: Validation 1 is $196 \cdot 61,500 \cdot 8.5 \cdot 0.12 \approx \$12.3$ million.
Validation 2 is $8.5 \cdot (117 \cdot 0.5 + 244 \cdot 0.4 + 582 \cdot 0.1) \cdot 61,500 \cdot 0.945 \cdot 0.12 \approx \$12.7$ million.

These two approaches differ in their inputs. Validation 1 uses average face values from media reports while Validation 2 uses official season ticket prices from Ticketmaster. The weighted Ticketmaster price in Validation 2 is approximately $214, about 9 percent above the $196 value in Validation 1. Validation 1 assumes a sellout, which is unlikely given the Bears' historical attendance of about 94.5%. Validation 2 uses the 94.5% attendance rate, but Ticketmaster prices include a non-taxable markup. Both estimates use the capacity of Soldier Field. A larger proposed stadium would raise capacity, but it could also reduce prices or attendance. We do not adjust for these factors because premium seating strongly influences collections, and its pricing and quantity in a new stadium are unknown.

OA2: Single Simulation Run

The equations below describe the full system and provide a numerical example using the same inputs as in Table 2 of the main paper. Small differences from the Table 2 values reflect rounding. In this example, revenue growth is always drawn from the salary cap distribution, which corresponds to setting τ equal to the length of the financing term (35 years); the alternative specification uses a smaller τ and switches to growing at inflation rate afterward. The only sources of uncertainty are project financing and tax revenue growth (shown in **bold**). $\mathcal{N}(\mu, \sigma)$ denotes the normal distribution, and $T_{df}(\mu, \sigma)$ denotes the Student's t-distribution with df degrees of freedom, mean μ, and scale σ.

Variable Definitions

Variable	Definition
Public Debt	
$\boldsymbol{r_{Loan}}$	Fixed annual coupon rate on the municipal bond, drawn once at origination from a normal distribution
CF_t^-	Debt service paid in year t (coupon, plus the \$1,000 million principal in year 35), in millions of dollars
$\mathbb{1}_{\{t=35\}}$	Indicator equal to 1 in the maturity year ($t = 35$) and 0 otherwise
Tax Revenue	
$\boldsymbol{g_t}$	Growth rate of tax revenue in year t
$g_{Cap,t}$	Growth rate drawn from the historical distribution of NFL salary cap growth (Student's t, 29 degrees of freedom)
$g_{Infl.,t}$	Growth rate drawn from the historical inflation distribution (Student's t, 37 degrees of freedom)
τ	Number of initial years of high (salary cap) growth in the alternative specification
$\mathbb{1}_{\{t\leq\tau\}}$	Indicator equal to 1 during the high-growth period and 0 afterward
CF_t^+	Tax revenue collected in year t, in millions of dollars; $CF_0^+ = 28.25$ is the initial collections estimate
Balance	
$\boldsymbol{r_t}$	One-year Treasury rate in year t
$\boldsymbol{s_t}$	Municipal spread over the Treasury rate in year t, applied only when the balance is negative
$\mathbb{1}_{\{CF_{t-1}^{Net}\leq 0\}}$	Indicator equal to 1 if the previous balance is a liability (or zero) and 0 if it is a surplus
CF_t^{Net}	Cumulative net balance at the end of year t, in millions of dollars (negative values are liabilities)

Public Debt

$$\begin{aligned}
\boldsymbol{r_{Loan}} &\sim \mathcal{N}(\mu = 0.045,\, \sigma = 0.0097) \\
CF_t^- &= -1000 \cdot (\boldsymbol{r_{Loan}} + \mathbb{1}_{\{t=35\}}) \\
CF_{1\ldots34}^- &= -1000 \cdot 0.055 \approx -54.69 \\
CF_{35}^- &= -1000 \cdot (0.055 + 1) \approx -1,054.69
\end{aligned}$$

Tax Revenue

$$\begin{aligned}
\boldsymbol{g_t} &= g_{Infl.,t} + (g_{Cap,t} - g_{Infl.,t})\mathbb{1}_{\{t \leq \tau\}} \\
g_{Cap,t} &\sim T_{29}(\mu = 0.075,\, \sigma = 0.06) \\
g_{Infl.,t} &\sim T_{37}(\mu = 0.028,\, \sigma = 0.015) \\
CF_{t+1}^+ &= CF_t^+ \cdot (1 + \boldsymbol{g_t}) \\
CF_1^+ &= CF_0^+ \cdot (1 + g_0) = 28.25 \cdot (1 + 0.093) = 30.88 \\
CF_2^+ &= CF_1^+ \cdot (1 + g_1) = 30.88 \cdot (1 + 0.053) \approx 32.52 \\
CF_{35}^+ &= CF_{34}^+ \cdot (1 + g_{34}) = 552.11 \cdot (1 + 0.067) \approx 589.16
\end{aligned}$$

Balance

$$\begin{aligned}
\begin{pmatrix} \boldsymbol{r_t} \\ \boldsymbol{s_t} \end{pmatrix} &\sim \mathcal{N}\left(\begin{pmatrix} 0.0344 \\ -0.0124 \end{pmatrix}, \begin{pmatrix} 0.00034 & -0.00015 \\ -0.00015 & 0.00007 \end{pmatrix} \right) \\
CF_t^{Net} &= CF_{t-1}^{Net} \cdot (1 + \boldsymbol{r_t} + \boldsymbol{s_t}\, \mathbb{1}_{\boldsymbol{\{CF_{t-1}^{Net} \leq 0\}}}) + CF_t^+ + CF_t^- \\
CF_1^{Net} &= 0 \cdot (1 + 0.040) + 30.88 - 54.69 \approx -23.81 \\
CF_2^{Net} &= -23.81 \cdot (1 + 0.018) + 32.52 - 54.69 \approx -46.41 \\
CF_{35}^{Net} &= 5,062.23 \cdot (1 + 0.050) + 589.16 - 1,054.69 \approx 4,850.69
\end{aligned}$$

OA3: Robustness of Risk Estimates to Distributional Assumptions

Financing Outcomes and Tax Revenue Growth (Normal Distribution)

This table reports simulated sports venue financing outcomes under several intermediate growth scenarios bounded by historical cap growth (High Growth) and Inflation when growth rates are drawn from normal distributions. Each intermediate scenario assumes a two-stage growth process: annual growth rates are drawn from the historical NFL growth distribution through the year specified in the row label and from the historical inflation distribution for the remainder of 35-year term. The outcome is the balance at the end of the term. Negative values indicate a shortfall (tax revenues were insufficient to fully cover the construction debt and its service), and positive values indicate a surplus. The principal is $1,000 million and is repaid at maturity with the last (35th) annual coupon. Each row reports 100,000 independent simulations. All statistics are reported in millions of dollars.

				Value-at-Risk			Conditional Value-at-Risk		
	Mean	**StDev**	**Median**	**10%**	**5%**	**1%**	**10%**	**5%**	**1%**
Inflation	–957.3	556.5	–982.6	–1,645.5	–1,832.9	–2,191.2	–1,891.1	–2,052.4	–2,369.4
5 Years	–467.8	681.5	–509.0	–1,298.9	–1,516.0	–1,907.5	–1,579.0	–1,759.1	–2,103.2
10 Years	206.0	864.8	157.9	–865.2	–1,119.9	–1,577.2	–1,190.3	–1,397.5	–1,789.8
15 Years	916.2	1,066.0	848.2	–401.5	–708.1	–1,231.0	–786.5	–1,028.4	–1,477.0
20 Years	1,608.6	1,276.4	1,507.0	61.1	–296.7	–932.5	–393.4	–680.6	–1,204.2
25 Years	2,238.3	1,467.5	2,104.8	474.5	74.2	–619.6	–25.4	–342.0	–910.1
30 Years	2,736.7	1,628.3	2,575.5	797.5	363.9	–353.1	259.2	–79.4	–678.0
High Growth	3,021.3	1,709.4	2,851.0	998.9	544.7	–215.3	429.3	71.5	–557.3

Replacing Student's t with normal distributions has no material effect on the results reported in Table 3 of the main manuscript. Means and medians differ by less than $20 million in every scenario. In relative terms, means differ by under 1% in most rows and by at most 4.4% in the 10 Years scenario, where the gap is inflated by a mean being close to zero. Every statistic keeps its sign. With thinner tails, the normal distribution lowers standard deviations by up to 4% and moves Value-at-Risk and Conditional Value-at-Risk slightly closer to zero. The largest change is in the 1% Value-at-Risk for the 30 Years scenario, –$353.1 million compared with –$439.0 million, a gap of $86 million, or about 5% of the scenario's standard deviation.

OA4: Reserve Simulation

A reserve V_0 is set aside at bond issuance and invested in equities. Each month, the reserve is compared with the cost of full coverage, the price of a Treasury portfolio that secures the remaining bond (refers in this section to the bond issued to finance a sports venue) payments. The bond carries principal $P = 1,000$ million, semiannual coupon rate c, and maturity $T = 35$ years (420 months). Once the reserve reaches full coverage, the equity position is liquidated and the Treasury portfolio is held to maturity. We separately consider two Treasury portfolios:

- STRIPS that pay the $1,000 million principal at maturity.
- STRIPS and regular Treasuries. The regular Treasuries pay coupons that match the remaining coupons on the financing bond, and STRIPS cover the rest of the principal.

Data The sample consists of monthly observations from January 1986 through September 2026. Treasury par yields $y_t(k)$ for maturities $k \in \{1, 2, 3, 5, 7, 10, 30\}$ years are monthly averages of daily constant maturity yields from FRED (DGS1, DGS2, ..., DGS30 series). The equity return r_t is the excess market return plus the risk-free rate obtained from the Ken French's Data Library (specifically, monthly FF3 model file).

Bootstrap Yield levels are not resampled, since resampling levels would enable quick jumps. For example, resampling would enable almost immediate switch from the low yields of early 2010s to the high rates of mid-1990s. It is a problem from the reserve construction perspective, since a one-time high yield observation would enable an immediate lock-in (purchase of a Treasury portfolio).

Instead, the simulation resamples monthly changes in par yields, $\Delta y_t(k) = y_t(k) - y_{t-1}(k)$, paired with the equity return of the same month, r_t. We use blocks of 36 consecutive months, which are drawn with replacement. Starting months are uniform over the sample, and a block that runs past the last month wraps around to the first. Pairing preserves the

contemporaneous dependence between equity returns and interest rates, and blocks preserve the within serial dependence. On a simulated path, the reserve and the par curve evolve as:

$$V_m = V_{m-1}\,(1 + r_{s_m}), \qquad \tilde{y}_m(k) = \max\Big\{\tilde{y}_0(k) + \sum_{j=1}^{m} \Delta y_{s_j}(k),\ \underline{y}\Big\}.$$

Here, s_m is the historical month drawn for simulated month m, $\tilde{y}_0(k)$ is the starting curve, and $\underline{y} = 0.01\%$ is a floor that keeps yields positive. To reduce the impact of noise, all values of V_0 share the same 50,000 paths.

Starting curve and coupon We allow for two specifications. In the main specification, every path starts from the Treasury curve on February 23, 2026, and the coupon is $c = 4.5\%$. February 23, 2026 (Indiana SB 27) matches the main calibration, the potential relocation of the Chicago Bears to Indiana. In the random start specification (the results are reported in Online Appendix OA5), each path starts from the curve of a month u drawn uniformly from the sample, $\tilde{y}_0(k) = y_u(k)$, and the coupon is tied to that curve, $c = 0.8\,y_u(30)$. Setting the financing bond coupon at 80% of the 30-year Treasury yield approximates the lower yields on tax-exempt municipal bonds. The random start measures how the reserve would fare had the venue been financed at an arbitrary point in the last four decades.

STRIPS curve Each month, par yields are interpolated linearly to semiannual maturities $t_j = j/2$, $j = 1, \ldots, 60$, with the 1-year yield for $t_1 = 0.5$. Discount factors follow recursively from the condition that a semiannual-coupon bond priced at par is worth one,

$$D_j = \frac{1 - \frac{\tilde{y}(t_j)}{2} \sum_{i<j} D_i}{1 + \frac{\tilde{y}(t_j)}{2}}, \qquad z(n) = 2\left(D_{2n}^{-1/(2n)} - 1\right),$$

where $z(n)$ is the STRIPS yield for $n = 1, \ldots, 30$ years. For a remaining maturity R, $z(R)$ is interpolated linearly between integer maturities, with the 1-year yield for $R \leq 1$ and the 30-year yield for $R \geq 30$.

Cost of full coverage With $R = (420 - m)/12$ years remaining, the portfolio is either:

- A STRIPS with face value P (corresponds to Panel A of Table 4).
- A regular Treasury bought at par with face $F = Pc/\tilde{y}(R)$ that matches the remaining bond coupons, and a STRIPS with face $\max\{P - F, 0\}$ that covers the rest of the principal (corresponds to Panel B of Table 4).

The costs of full coverage are:

$$H_m^A = \frac{P}{(1 + z(R)/2)^{2R}}, \qquad H_m^B = F + \frac{\max\{P - F, 0\}}{(1 + z(R)/2)^{2R}}.$$

In the final month, the costs equal P and $P(1 + c/2)$. The reserve reaches full coverage in month 0 if $V_0 \geq H_0$; otherwise, it reaches full coverage in the first month m with $V_m \geq H_m$. At the February 23, 2026 curve, the 30-year par and STRIPS yields are 4.70% and 5.10%, so $H_0^A = 1{,}000/(1 + 0.051/2)^{70} \approx 172$ and $H_0^B \approx 957 + 43/(1 + 0.051/2)^{70} \approx 965$ million. When $F > P$, the excess principal returned at maturity receives no credit, so H_m^B exceeds the value of the remaining bond payments. This occurs near maturity when short-term yields fall below the coupon. Specifically, the reserve must cover H_m^B, the price of a par bond that the municipality buys to fund the remaining payments. Since this bond matures at face value F, which can exceed the principal P, H_m^B is weakly greater than the present value of the remaining payments. The gap equals the discounted excess principal $F - P$ and shrinks to zero at maturity. This explains the jump in probabilities between months 360 and 420. In other words, the jump is the cost of this implementation, not a numerical artifact, and the construction is conservative because it assigns no value to excess principal.

Output For each V_0, we calculate the median month in which the reserve reaches full coverage, among paths that reach it, and the share of the 50,000 paths that reach full coverage within 60, 120, ..., 420 months.

OA5: Time to Full Coverage under Random Start Dates

Likelihood of Reaching Full Coverage (Random Start Dates)

This table reports simulated outcomes for a reserve initially invested in equities that switches to Treasuries once it can secure $1,000 million at the end of the 35-year term. Each row is based on 50,000 simulations. Each simulation starts on a month drawn at random from January 1986 through September 2026, from the Treasury yield curve observed in that month. The bond coupon is set to 80% of the 30-year Treasury par yield at the start date. Reserve is the initial reserve in millions of dollars. Median is the median month in which the reserve reaches full coverage. The Months columns (60 through 420) report the estimated probability of reaching full coverage within the given number of months. In Panel A, the reserve only covers the principal by switching to STRIPS. In Panel B, it also covers the remaining coupons by switching to a portfolio of regular Treasuries and STRIPS. The rise of probabilities in Panel B at month 420 reflects the drop in the cost of full coverage in the final month, when no excess Treasury principal is required.

		Months						
Reserve	**Median**	**60**	**120**	**180**	**240**	**300**	**360**	**420**
	Panel A: Initial Cost							
25	311	0.039	0.068	0.104	0.172	0.299	0.485	0.662
50	214	0.215	0.291	0.382	0.519	0.677	0.809	0.901
75	124	0.365	0.475	0.589	0.726	0.841	0.918	0.962
100	57	0.500	0.621	0.734	0.842	0.918	0.960	0.983
125	18	0.620	0.734	0.831	0.909	0.956	0.980	0.992
150	3	0.714	0.814	0.892	0.945	0.976	0.990	0.996
175	0	0.787	0.870	0.929	0.966	0.987	0.994	0.998
	Panel B: Initial Cost and Remaining Coupons							
50	358	0.000	0.000	0.004	0.092	0.264	0.424	0.833
100	284	0.000	0.004	0.130	0.355	0.512	0.605	0.953
150	225	0.000	0.062	0.327	0.529	0.638	0.696	0.981
200	183	0.001	0.197	0.487	0.644	0.719	0.756	0.990
250	149	0.016	0.353	0.604	0.721	0.773	0.800	0.995
300	122	0.069	0.493	0.694	0.779	0.817	0.835	0.997
350	99	0.170	0.607	0.761	0.823	0.850	0.864	0.998

Drawing start dates at random from the historical sample shows that the timing of SB 27 favors large reserves and hurts small ones provided only the construction costs are insured (Panel A). At the February 23, 2026 curve, large reserves reach full coverage sooner: a $175 million reserve is fully covered immediately, compared with a probability of 0.787 within 60 months at a random start date. Small reserves fare worse, since many historical curves carry higher yields that lower the cost of full coverage: a $50 million reserve reaches full coverage within 60 months with probability 0.040 at the February 23, 2026 curve, compared with

0.215 at a random start date.

When both the construction costs and coupons are insured (Panel B), probabilities are higher and median months shorter at every reserve amount, as a coupon at 80% of the 30-year yield lowers the cost of covering the remaining coupons relative to the 4.5% coupon in the main specification. By month 420, the probabilities in both panels differ from those in Table 4 by less than 0.06. However, these comparisons should be read with caution. At random start dates, the coupon is fixed at 80% of the 30-year Treasury par yield, while the 4.5% coupon in the main specification is about 96% of the 30-year par yield on February 23, 2026. A higher tax-exemption price premium reduces the cost of covering the remaining coupons, so the higher probabilities in Panel B partly reflect the coupon assumption rather than the start date alone. A more complete approach would simulate municipal and Treasury yields jointly, but such analysis is beyond the scope of this paper.