

The Economics of Stadium Subsidies: A Policy Retrospective

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Abstract

This article is intended to inform public policy regarding stadium subsidies, which state and local governments routinely provide to support professional sports teams. We review theoretical and

non-general-fund tax instruments intended to shift funding burdens on local taxpayers serve only to create fiscal illusion, obfuscating the costs borne by local residents.

Section 2 reviews historical trends in venue construction, describing the progression of construction, replacement, and funding since the early-20th century. Section 3 presents common economic arguments for subsidizing sports venues and demonstrates their flaws. Section 4 summarizes empirical research findings that demonstrate the impacts of hosting professional sports teams are too small to justify large subsidies. Section 5 evaluates new development and funding strategies that subsidy advocates have argued may permit public stadium investments to generate positive returns. Section 6 examines reasons for the disconnect between research and policy regarding stadium subsidies. Section 7 concludes the paper with a summary of findings, suggestions for future research, and recommendations for connecting research to policy.

2 Trends in modern stadium construction

2.1 Waves of construction (1909{2019)

As baseball stabilized as a profitable business in the early-20th century, team owners began replacing leased wooden ballparks with their own durable concrete and steel structures. The modern age of stadiums is generally defined by the opening of Shibe Park (Philadelphia Athletics) and Forbes Field (Pittsburgh Pirates) in 1909, both of which remained in operation until 1970. Since that time, professional sports venues have evolved as common fixtures in major metropolitan areas of the US and Canada.¹

Figure 1 records the number of annual openings of venues that served the four major US-based sports leagues: Major League Baseball (MLB), National Basketball Association (NBA), National Football League (NFL), and National Hockey League (NHL). The trend line maps the moving eleven-year average of all venues, centered around the year of observation, which shows intermittent openings through the middle of the century, with two distinct waves of construction peaking in 1970 and 2000. Table 1

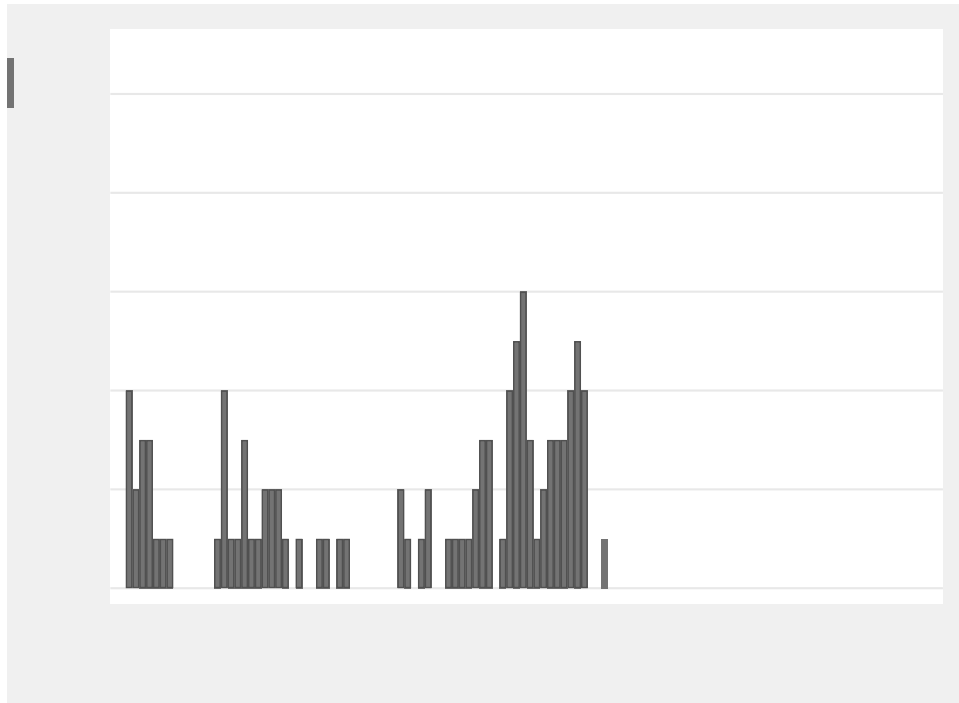


Figure 1: New Stadiums and Arenas, by year (1909-2026)

waves/eras, which we delineate by both timing and construction costs².

The inaugural era of stadium construction was long and gradual, as teams opened their first durable modern stadiums. During this period, construction occurred in bursts before and after World War I, followed by intermittent openings after World War II through the 1950s. Most venues were ballparks that primarily served MLB teams, though multipurpose facilities that hosted professional football, basketball, and hockey teams as regular tenants also opened. Early venues were largely privately financed until the 1930s, when professional sports venues became almost exclusively public ventures through the 1950s (Figure 2).

The second construction era was dominated by team relocations (e.g., Candlestick Park and Dodger Stadium) and league expansions (e.g., Jack Murphy and Shea Stadiums) during the 1960s. Construction continued into the 1970s with the replacement of aging traditional venues with

²Though the terms "stadium" and "arena" are often used as general terms for all sports venues, in the data presentation we differentiate venue types by referring to large and mostly-outdoor venues that host baseball and football as "stadiums" and smaller enclosed venues that host basketball and hockey as "arenas." See Appendix A for a discussion of venue designations and costs, which mostly come from Long (2013). Delineating eras is a subjective endeavor, and venues on the edges of our designations could be classified appropriately as part of adjacent eras. For example, 1950s venues could be considered as the beginning of the second construction wave, but we classify them as part of the earlier era because their costs and basic designs are more similar to preceding facilities than the grandiose superstadiums that followed.

Table 1: Venue Construction Costs, by decade and era

Decade	Wave/Era	Arena Construction Costs				Stadium Construction Costs			
		Arenas Opened	Total (\$)	Public (\$)	Public (%)	Stadiums Opened	Total (\$)	Public (\$)	Public (%)
1900s		1	NR	NR	NR	3	\$30	\$0	0%
1910s		1	NR	NR	NR	10	\$15	\$0	0%
1920s	First	6	\$45	\$0	0%	8	\$14	\$0	0%
1930s		3	\$56	\$39	50%	5	\$30	\$30	100%
1940s		4	\$44	\$28	50%	0	NA	NA	NA
1950s		3	\$62	\$62	100%	5	\$58	\$48	100%
					Median			Median	

new modern "superstadiums" (e.g., Riverfront and Veterans Stadiums), which were often shared by multiple teams to maximize their utilization. These large-scale multipurpose venues, some of which had domes (e.g., Astrodome and Kingdome) were more expensive than their predecessors, and their homogenous spartan architectural designs persisted through the 1980s. Though a shared facility was attractive as a municipal funding project, the circular shape required to accommodate baseball and football was not ideal for spectators of either sport. Football fields included dirt in fields, baseball diamonds had vast expanses of foul territory, and spectators were seated far from the players. Artificial turf introduced for domes was installed in many outdoor venues, as well. Though the "cookie-cutter" stadiums of this era are often viewed with disdain from the present, they were considered architectural feats of their time, which evoked such awe and envy that every city with an ego had to have one" (Boswell 1996). During this period, stadiums remained mostly publicly-funded venues, though private contributions became more common.

Following limited construction during the 1980s, the US began its third construction wave as it entered the 1990s, with openings peaking around 2000. It was during this uptick in venue construction that economists began to study the economic impact of stadiums (Baade and Dye 1988a,b, 1990). Though some new venues of this era served expansion teams and franchise relocations, most structures were replacements for existing facilities, many of which were opened during the second construction wave, even though their predecessors remained structurally sound. The total number of host venues increased as most shared stadiums were replaced with single-tenant facilities, which owners preferred because a dedicated venue provides complete control over operations and offers a spectator environment tailored to suit its sole tenant. For example, Atlanta Fulton-County Stadium was replaced by the Georgia Dome (1992) to host the Atlanta Falcons and Turner Field (1997) to host the Atlanta Braves.

Stadiums of this era were also more extravagant than their predecessors, with fan-centric features and traditional architecture, exemplified by Baltimore Oriole's Camden Yards, which opened as the first retro-style ballpark in 1992. Rather than generate added revenue through expanded bleachers, these venues created new income streams from premium amenities and complementary entertainment options (e.g., luxury suites, private clubs, boutique concessions, and restaurants) that catered to a wealthy cohort of fans. Miami Dolphins owner Joe Robbie demonstrated that revenue from the advanced sales of ten-year leases to luxury "skyboxes" were sufficient to finance

Gillette Stadium (2002) received no direct public funding toward stadium construction, it benefited from \$70 million in infrastructure and sewer improvements from the state (Cassidy 1999).

Long (2005, 2013) finds that official reports often exclude costs on associated expenditures such as land, infrastructure, operations, municipal services, and forgone property taxes which can increase public obligations to 40% of total costs. Long (2005) notes that the cumulative cost of stadium construction, including land, infrastructure, operations, municipal services, and forgone property taxes, is significantly higher than the reported construction cost.

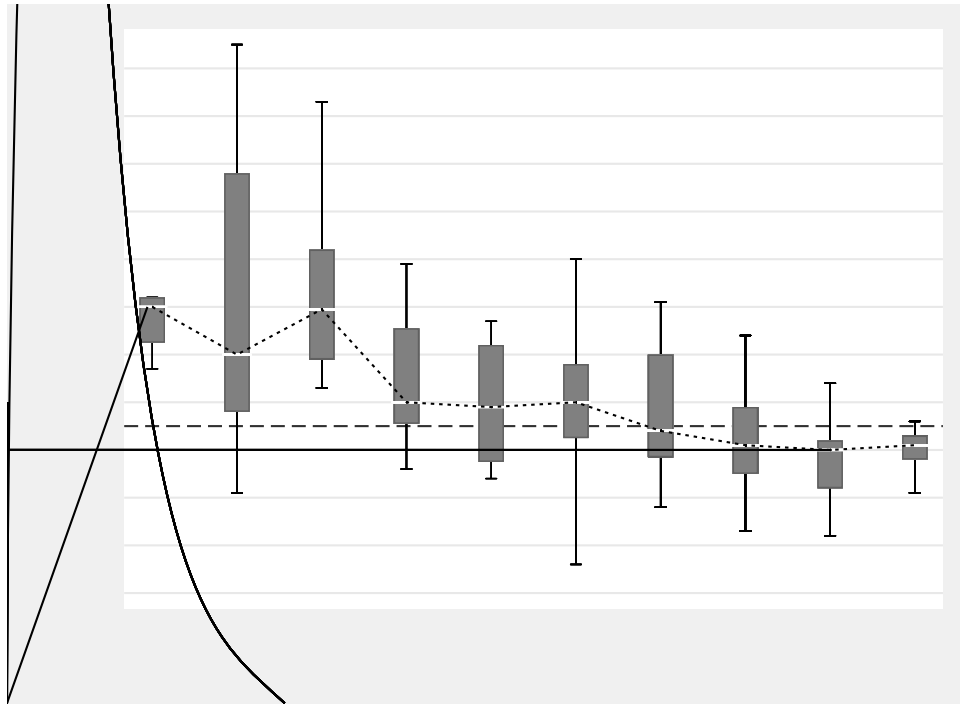


Figure 4: Venue Lifespan, by Decade

*Includes venues open prior to 1997 and venues scheduled to close by 2026.

Table 2: Replaced Venues Opened Since 1990 and Replacements

Original Venue	Hosted Team	Years Hosting			Replacement Venue	Cost (in millions, 2020 dollars)		
		First	Last	Total		Total	Public	Public (%)
Georgia Dome	Atlanta Falcons	1992	2017	26	Mercedes-Benz Stadium	\$1,696	\$742	44%
Alamodome	San Antonio Spurs	1993	2002	10	AT&T Center	\$252	\$212	84%
Globe Life Park	Texas Rangers	1994	2019	26	Globe Life Field	\$1,200	\$500	42%
Edwards Jones Dome	St. Louis Rams	1995	2015	21	SoFi Stadium (Los Angeles)	\$5,500	\$0	0%
Turner Field	Atlanta Braves	1997	2016	20	Truist Park	\$712	\$318	45%
Nissan Stadium	Tennessee Titans	1999	2025	27	TBD ^z	\$2,100	\$1,260	60%
Crypto.com Arena*	L.A. Clippers	1999	2023	25	Intuit Dome ^z	\$1,800	\$0	0%
Gila River Arena	Arizona Coyotes	2003	2022	20	TBD ^y			

*Continues to host L.A. Lakers and Kings. ^yPlaying in temporary facility until replacement determined.
^zFuture venue costs are reported commitments in current dollars.

the novelty effect is consistent with consumer demand for new experiences and facility features that are tailored to recent consumer tastes (Baade and Sanderson 1997; Clapp and Hakes 2005; Coates and Humphreys 2005; Depken 2006; Bradbury 2019). This relationship is congruent with observed stadium lifespans.

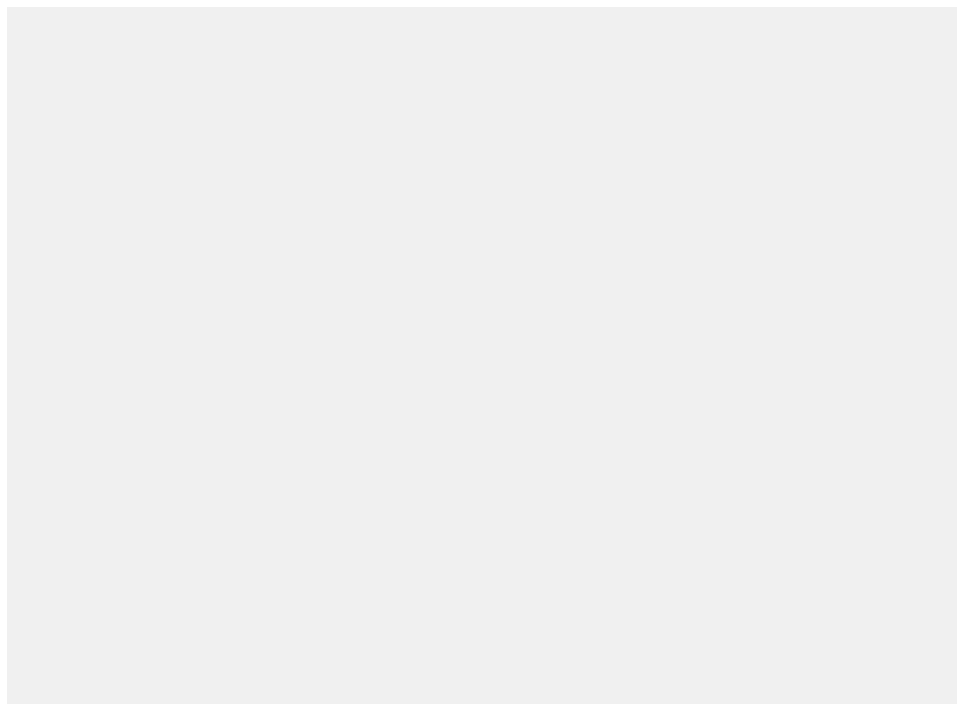


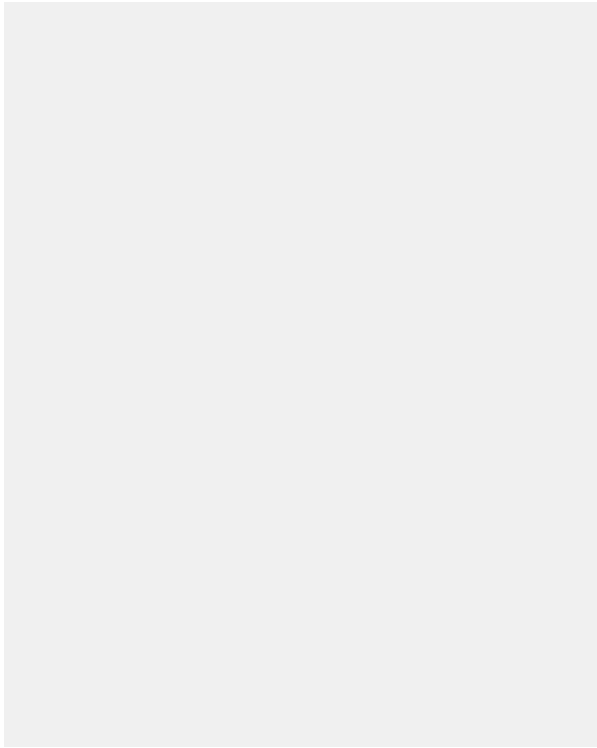
Figure 5: Estimated Relationship Between Stadium Age and Revenue, by league
 Estimates from Bradbury (2019)

The premature replacement of functional stadiums may be further incentivized by the availability of public funding from state and local governments. Subsidies lower the effective price of stadiums, thereby increasing the quantity and quality of new stadiums. Subsidies likely promote what Quirk and Fort (1997) refer to as "gold plating" of stadiums with luxury amenities, which

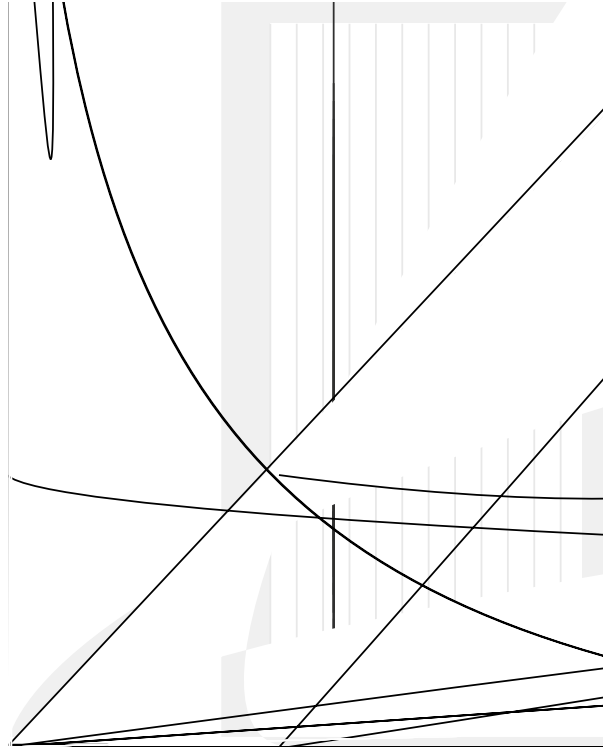
results from team owners designing stadiums without having to bear to the full costs of construction (p. 144). Elasticity estimates by Propher (2017) indicate that every \$1 million in public funds is associated with an average \$37,000 increase in marginal total construction costs (approximately 4% of public contributions during the sample period).

If the pattern of past construction waves that peaked in 1970 and 2000 continues, a 30-year-replacement cycle in stadium construction indicates that another wave of stadium replacement is anticipated to peak in 2030. Figure 6 maps the previous waves along with a projection of future

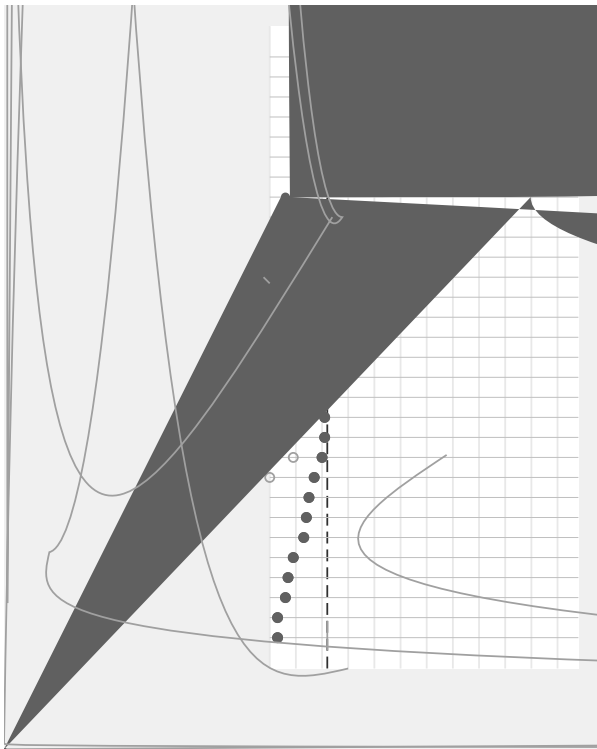
move into replacement venues|Los Angeles Clippers (2024), Buffalo Bills (2026), Tennessee Titans (2026)|and 27 venues will have been renovated within the past 15 years. In total, 32 venues (16 arenas and 16 stadiums) are on track to be at least 30 years old and operated at least 15 years



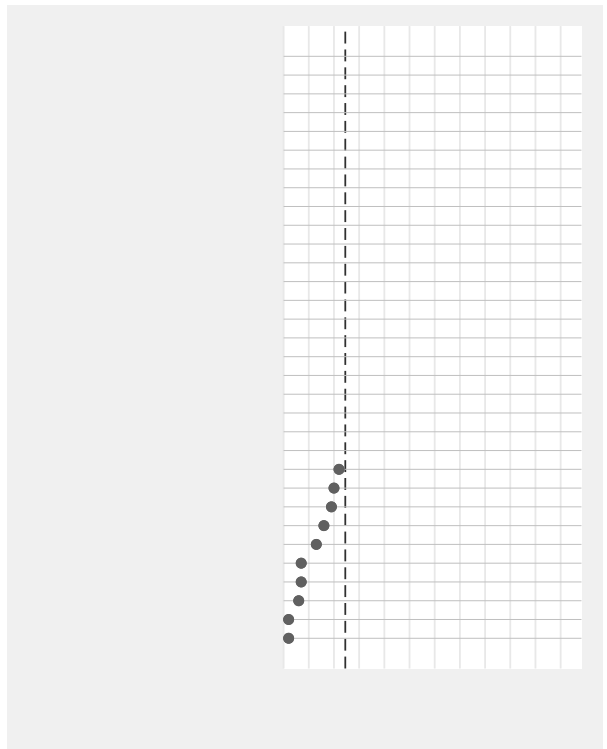
(a) MLB



(b) NBA



(c) NFL



(d) NHL

Figure 7: Ages of Current Major-League Venues in 2023

3 Is there an economic case for stadium subsidies?

The earliest publicly-funded sports venues were erected as public works, funded entirely by governments for the good of the community. Stadiums were built as multipurpose venues to host community events, which came to be used by professional sports teams, such as the Los Angeles Memorial Coliseum (1923) and Chicago's Soldier Field (1924). Stadiums were justified as civic assets, like roads, parks, and other community amenities, and the venues were often christened as war memorials; hence, the prevalence of "Memorial" and "Veterans" among older stadium names.

Beginning in the 1950s, municipalities began to construct venues for the purpose of serving professional sports teams, with the hope of boosting a host city's image and economy. This is exemplified in the history of baseball's oldest existing professional franchise Boston Braves. Milwaukee's County Stadium attracted the team to relocate from Boston in 1953, which the local association of commerce claimed to have generated \$5 million in new business to city, and imparted "a new spirit of civic enthusiasm" and "brought success to civic enterprise far removed from baseball" (Gendzel 1995).

However, the team's stay in Milwaukee would be brief, as similar economic motivations prompted Atlanta Mayor Ivan Allen, Jr. to build Atlanta-Fulton County Stadium in 1965 to poach the franchise from Milwaukee, as well as host the NFL expansion Falcons, the following year. In total, he estimated that the stadium brought the city \$18 million in "new money" annually, but that: "the real value of it all was less tangible. All of the growth indexes in the world couldn't do what major-league sports did in awakening the people of Atlanta and the rest of America to the fact that we really were a major-league city now." (Allen and Hemphill 1971, p. 153). In contrast, Baim (1994

team chose to not renew its favorable 20-year lease of Turner Field to move to the nearby suburb of Cobb County, which provided \$300 million to construct the team's current home Truist Park, based on the claim that the stadium would bring a "scal windfall that would be 'the single greatest economic development project in the modern history of Cobb County'" (Lee 2016).

The economic development rationale for funding stadiums become more prominent in the 1980s as a potential solution to the "urban scissors crisis" of declining municipal budgets from reduced federal grants and falling tax collections (Baade and Dye 1988b). Government officials viewed stadiums as magnets that could attract new commercial activity into cities to replace lost tax revenue.

The main economic argument for stadiums providing economic stimulus is that sports events generate agglomeration economies by attracting spectator spending near host venues, which creates a commercial district that induces complementary businesses to co-locate near the venue (Humphreys and Zhou 2015b). Localized spending ripples out to benefit the wider region through assumed multipliers|where each dollar spent generates more than one dollar of economic activity as it is recirculated within the community|thereby growing employment, income, property values, and tax revenues. The presence of a major-league professional franchise may further benefit a host

than spending in alternate economic sectors, and empirical estimates indicate they may be lower. As Coates and Humphreys (2003) describes, "The ripples of jobs and earnings creation from the sports environment are like those of a tiny pebble tossed into the ocean on the tides, inconsequential in any practical sense" (p. 191).

Even if there is no ex-ante expectation for tangible fiscal returns through development spillovers, subsidies may be justified through public good and quality-of-life externalities from hosting sports teams. Citizens may feel local pride from hosting a major-league professional team more than the explicit consumption value expressed through attending games, purchasing merchandise, or consuming local broadcasts. The presence of a local team may also foster a central business or entertainment district, which area residents may view as an asset even if it does not increase local wealth. If teams provide sufficiently large intangible social benefits, then they may justify corrective subsidies to construct hosting venues.

However, it is also the case that stadium events generate negative externalities from disamenities associated with sports consumption. Games create traffic and congestion that inconvenience local residents, and sporting events are also associated with greater criminal activity. Certain types of non-complementary businesses may be displaced due to game-related traffic that disrupts neighborhood occupants. Environmental and noise pollution are other potential negative externalities from hosting stadium events. These disamenities typically receive much less attention in stadium policy discussions than the assumed positive externalities from economic and social benefits.

4 Empirical evidence

Whatever ambiguity there may have once been regarding the economic case for subsidizing stadiums has been clarified through extensive study, which universally confirms the theoretical expectation of limited economic and social effects. The empirical evidence is unambiguous: stadiums do not confer large positive economic or social benefits on host communities (Bradbury et al. 2023). In this section, we summarize the consensus findings of empirical research.

Humphreys (2011) finds some benefits to earnings among sports-related industries hosting NFL teams. These findings are consistent with the hypothesis that sports consumption reallocates spending among local residents from other local consumption options (e.g., restaurants, bars, movies, etc.) to sports, as opposed to generating new spending. Overall, the strong theoretical expectation that sports do not have strong effects on their host economies because sports spending displaces existing spending is supported by empirical evidence.

4.2 Localized economic development effects

Even though stadiums may not benefit the broader region, it may be possible to justify subsidies on the grounds that they promote localized development benefits (Matheson 2019). By anchoring entertainment, business, or residential districts, sports venues may create an area that benefits the wider community as a nearby amenity. However, there is not strong evidence of large development effects near venues; and even when effects are observed, they are small and limited to specific industries in the immediate vicinity of the facility.

Harger, Humphreys and Ross (2016) examines economic activity before and after the construction of several new stadiums, finding no impact on the number of establishments or general employment. The authors observe a small impact on employment of nearby restaurants and bars that is limited to this sub-sector within one mile of the venues. Stitzel and Rogers (2019) examines sales of sports-related industries (restaurants, entertainment, hotel, and retail) following the relocation of the Oklahoma Thunder to Tulsa, finding increased sales within one mile of the arena; however, while some gains were apparent in restaurants, entertainment sales decreased.

Studies that examine the health of business activity outside venues find localized development effects to be limited. Propheter (2020) and Bradbury (2022b) find no effect of stadiums located in business improvement districts.

4.3 Intangible social benefits

Table 3: CVM-Estimated Mean Non-Use Benefits

Location	League	Non-Use	Construction Costs		Non-Use Value		Study
		Value	Total	Public	Total	Public	
Pittsburgh	NHL	\$33	\$254	\$243	13%	14%	Johnson et al. (2001)
Jacksonville	NFL	\$37	\$171	\$156	21%	23%	Johnson et al. (2007)
Jacksonville*	NBA	\$23	\$216 ^y	\$149 ^y	11%	15%	Johnson et al. (2007)
Portland*	MLB	\$74	\$350 ^z	\$235 ^z	21%	31%	

4.4 Negative externalities

project has been "a net drain" on taxpayers, who were "left to absorb the fiscal fallout" during the financial crisis that followed (p. 670).

Denver's lower downtown (LoDo) resurgence is sometimes credited to the opening of Coors Field; however, the LoDo re-development project pre-dates (1988) the opening of the ballpark (1995) by several years, and the stadium lies on the periphery of district. Most of the restaurants in the area opened prior to the ballpark's arrival and much of the development of the area has occurred away from the ballpark rather than adjacent to it (Delaney and Eckstein 2003b, pp. 114-118).

Prophet (2021) examines property value effects of three sports complexes in Los Angeles,

of hospitality, retail, and residential space to host the relocated Atlanta Braves in 2017. Following its announcement, the Atlanta Braves executive who negotiated a \$300 million subsidy from

public concerns regarding the costs that stadiums place on local taxpayers, elected officials often rely on alternate funding mechanisms that they claim do not burden local residents. For example, Nashville's Mayor defended a proposal to provide \$760 million to fund a new Tennessee Titans stadium by stating, with careful precision: "I will not sell public land, raise the sales tax, or spend your property tax dollars to fund the stadium. Tourists and spending around the stadium will pay for this project, not your family" (Cooper 2022).

The notion that a municipality can collect hundreds of millions in new tax revenue at no cost to jurisdiction residents by exporting costs to visitors and creating new tax revenue streams is dubious. Every jurisdiction operates with a stock of wealth from which taxes may be collected to fund public services. No matter what tax instrument is used to underwrite stadium expenses, the local nature of stadium commerce means that most of the revenue collected will come from local residents and businesses. The incidence of these alternate tax instruments may be difficult for the general public and policymakers to observe, which fosters the perception that public funding does not burden taxpayers. Instead, the alternate tax sources serve to produce a fiscal illusion, which results when the connection between the total and individual share of resources used to fund public services is obscured to hide the true burden to taxpayers (Buchanan 1987).

5.2.1 Venue taxes

Venue taxes for tickets and other in-stadium purchases are use taxes, which are in accord with the benefit principle of taxation that tax burdens should fall on beneficiaries of public expenditures. However, this quality alone does not make stadium funding through venue taxes desirable. Even though venue taxes are paid by stadium attendees, they represent an opportunity cost to local taxpayers. The opportunity cost of stadium spending is other local consumption; thus, stadium spending diverts tax revenue that would have been collected through other local commerce to funding the stadium. This results in less available revenue for other government services funded by general sales taxes, which will necessitate compensating tax increases to recuperate lost tax revenue or reduced services.

In addition, publicly funding a stadium with a use tax is inconsistent with the primary market-failure justification for subsidizing a stadium. If venue attendees can adequately fund the stadium directly through a use tax, then there is no need to collect taxes to subsidize it. Successfully

funding a stadium through use taxes demonstrates that it is feasible for the team tenant to self-fund the construction and operations. Another relevant issue is that many megaevents (e.g., Super Bowl and World Cup), which are touted as future drivers of tax revenue, often require that venue taxes be exempted as a pre-condition for consideration as an event host.

5.2.2 Sin taxes

Excise taxes on items such as alcohol and tobacco ("sin taxes") have been used to fund stadiums in several jurisdictions. For example, following the failure of property tax referendum Cleveland, stadium supporters proposed assessing sin taxes to fund new venues for the Cavaliers and Guardians after focus group research indicated that voters viewed sin taxes more favorably than general sales taxes (Delaney and Eckstein 2003b, p. 70). The sin tax referendum passed with 52% of the vote (Fort 1997, p. 172).

Sin taxes raise revenue efficiently from highly-inelastic goods while not being immediately observable in property tax bills and general sales tax purchases; however, excise taxes are primarily paid by local residents unrelated to stadium events, and tobacco taxes are more heavily borne by the poor. Sin tax revenue also has the opportunity cost of funding other public projects that likely offer higher returns on investment.

5.2.3 Business taxes

Taxes on businesses are another mechanism that has been used to fund stadiums as a means to avoid collecting more general fund taxes. Washington, DC implemented a gross receipts tax on all business that generate more than \$5 million per year to fund the construction of Nationals Park. There is no economic justification for assessing this specific tax to fund a stadium as nearly all taxable revenue collected has no connection to the stadium it funds. The tax serves to distort local

patrons, which funds the upkeep of the stadium and area they are patronizing. For example, the proposed Washington Commanders's stadium in Virginia was to be funded through sales tax revenue generated from a new commercial district surrounding the stadium. Its legislative sponsor stated that because the tax revenue would be collected from a new dedicated revenue stream that it "does not create a penny of debt backed by the Commonwealth" and would not cost the taxpayers "a nickel" (Arzate 2022; Fortier et al. 2022). However, this logic confuses district tax collections as net new revenue to the community.

As explained in Section 5.1, stadium district customers are largely local residents, which means that spending within the district crowds out existing local spending. Therefore, taxes on district spending generate government revenue from reallocated consumption, which reduces jurisdiction tax collections from sales that occurred previously at existing local businesses. For example, diners who patronize a restaurant in the stadium district would otherwise likely have spent their income at a non-district local restaurant, which remits tax revenue to the general fund to support public services. The diversion means the municipality must fund existing services through added taxes or reduced services.

Like general business taxes, stadium district taxes should not be viewed as use taxes paid by stadium customers. Atlanta Braves's Truist Park is partially funded through a new tax on firms within a pre-existing business district that covers approximately seven square miles around the stadium. Though some entities that pay these taxes may experience increased revenue from patrons attending MLB games|though studies in Section 4.2 indicate limited spillovers|most businesses in the district that remit these taxes operated long before the stadium opened and serve non-baseball customers throughout the year. These local firms also compete with new businesses operating within the team-owned development, which their taxes subsidize. In total, the collections fund nearly half the County's stadium contributions, and this revenue could have been used to fund other government priorities.

5.2.5 Visitor taxes

State and local governments often fund stadiums using taxes assessed on hotel stays and car rentals (e.g., Houston funds its major-league venues through 2% hotel and 5% car rental taxes). Visitor assessments are justified as quasi-use taxes, because sports events may attract tourists who stay

in hotels and rent cars. The tax instruments are politically popular funding instruments because they appear to export funding costs onto non-residents. Following the approval of a hotel tax to fund a new Atlanta Falcons stadium, the City's mayor issued a press release stating revenue would come "almost exclusively . . . from visitors and tourists, not residents of the City of Atlanta" (City of Atlanta 2015).

However, it is a well-established principle of economics that statutory responsibility for paying a tax does not determine who bears the cost of the tax: the tax burden derives from price elasticities for the taxed good or service. This lesson of tax incidence is so widely-understood by economists that it is included as a key part of the introductory microeconomics course curriculum; thus, it is unfortunate that elected officials responsible for fiscal policy appear to be unaware of, or ignore, this important public finance concept.

In the case of a hotels, taxing guests raises the effective price of room stays, which deters marginal guests. Hotel owners respond by lowering pre-tax prices to compensate for the tax, which reduces their revenue. The tax burden experienced by guests (through higher prices) and hotel owners (through lower revenue) is determined by demand and supply elasticities, with the least price-sensitive party bearing the larger share. Relative demand and supply elasticities for hotel stays differs by location and have not been precisely estimated; however, it is unlikely that hotel demand is perfectly inelastic, which is necessary for the full tax burden to be exported to visitors. Hotels have a fixed supply of rooms that generate revenue only when occupied; therefore, the supply of rooms is likely sufficiently inelastic to incentivize hotel owners to lower pre-tax prices to retain guests. Collins and Stephenson (2018) finds decreased occupancy and net prices in response to an imposed hotel tax in Georgia to conclude that the tax burden was not fully exported to consumers and imposed significant burdens on hotel operators.

In addition, it is incorrect to view hotel and car rental taxes as being assessed on stadium patrons. Most stadium spectators are residents who do not stay in hotels, and most hotel and car rental customers do not attend stadium events. Also, local businesses often rent rooms and cars for out-of-town employees and clients who travel to the city for necessary business, and low-income residents often live in extended stay hotels that are subject to hotel taxes. Many local businesses and residents rent cars for their own use, for personal trips or when experiencing car trouble, who contribute to taxes that fund stadiums.

A related argument for taxing visitors is that new venues are likely to be chosen to host megaevents such as the NFL Super Bowl or NCAA Final Four, which will contribute to tax funding of the stadium. In addition to evidence from economic studies that indicate that megaevents do not yield substantial economic impacts (Baade and Matheson 2016; Scandizzo and Pierleoni 2018), large revenue gains from an influx of hotel guests from megaevents are not expected. Event visitors may fill some otherwise-vacant hotel rooms, but they also displace would-be guests, which results in the net gain in room rentals being considerably less than total rooms rented during the event. Megaevents may produce limited temporary boosts in hotel tax collections, but the revenue gains are small in comparison to hundreds of millions of dollars provided in venue subsidies. Heller and Stephenson (2021) estimates that the 2017 Super Bowl in Houston increased incremental hotel revenue by \$44 million. That means its 2% hotel occupancy tax assessed to fund Super Bowl host NRG Stadium translated to roughly \$880,000 in tax revenue, which represents less than 0.3% of the \$310 million in public funds used to construct the venue in 2002.

Economic studies have estimated weak relationships between venue-hosted events and hotel outcomes and generated tax revenue. Depken and Stephenson (2018) finds occupancy effects of sports events to be "modest at best" and that incremental tax receipts typically are insufficient to cover construction costs of sports venues. Another relevant factor is that visitors are not distributed evenly across hotels in the area, even though hotel taxes are often assessed over a broad jurisdiction. Chikish, Humphreys, Lui and Nowak (2019) finds that though hotels close to Crypto.com Arena in Los Angeles received a small positive impact from arena events, hotels further away were harmed; in total, the net effect was a reduction in hotel revenue. Overall, there is not a strong case to expect tourist-driven revenue from hotel taxes to justify stadium subsidies.

5.2.6 Reallocating existing revenue

Governments have also used existing funds and revenue streams to finance stadiums, claiming that the venue was funded without tax increases. After allocating \$565 million of casino revenues from the Seneca Nation of Indians to fund the Buffalo Bills new stadium, New York Governor Kathy Hochul stated that the allocation of the revenue meant, "the direct hit to taxpayers is significantly less" (Zremski 2022). Though no new taxes were assessed to generate this revenue, the state could have reduced other assessments or funded other public projects with higher returns. When

government funds are used to fund public projects, it represents an opportunity cost to taxpayers and is not windfall revenue.

6 Explaining the disconnect between research and policy

That governments continue to subsidize stadiums contrary to the unambiguous research consensus raises a paradox: Why do policymakers continue to devote tax dollars to fund sports venues in opposition to expert policy guidance? We consider several explanations below.

6.1 Market power of monopoly sports leagues

Sport teams possess significant market power that derives from sports leagues operating as natural monopoly cartels, which have withstood antitrust challenges (Neale 1964; Surdam 2015). Strong consumer preferences for local sports teams and the restriction of competitive alternatives provides owners the opportunity to extract substantial subsidies from residents with relocation threats. The anti-competitive environment creates incentives for rent extraction, which are formalized by Humphreys and Zhou (2015a).

Relocation threats were an effective tactic that teams used during the 1980s and 1990s, following the departures of the Oakland Raiders to Los Angeles (1982) and Baltimore Colts to Indianapolis (1984). It became common for team owners to receive subsidies by publicly exploring alternative markets without having to move. For example, the Chicago White Sox received \$157 million in public assistance to replace Comiskey Park after threatening to leave the city (Smith 1986). The threats were so successful that MLB awarded an expansion team to St. Petersburg, Florida in 1998 to forestall antitrust lawsuits over League relocation restrictions, which the White Sox and other franchises had exploited to extract subsidies (Topkin 1995).

Though relocation fears offer some motivation for localities to grant subsidies, other threats have proved ineffective. After openly considering relocation to other markets, the San Francisco Giants constructed Oracle Park (2000) almost entirely on its own, receiving only \$15 million in public funds. After not hosting an NFL team for 20 years, Los Angeles attracted both the Chargers and Rams, who constructed their own privately-funded multi-billion-dollar shared SoFi Stadium (2020). Tampa Bay Rays have been threatening relocation almost since the franchise was founded,

but the team continues to play in Tropicana Field to small crowds.

The recent paucity and ineffectiveness of relocation threats at extracting subsidies may be because they are no longer perceived as credible, especially when relocation targets involve smaller markets and speculative proposals. Major-league teams wish to locate teams in the most profitable markets, which is where most teams are currently located. Thus, relocation threats may be undermined by the precedent of leagues expanding to replace teams that departed from

negotiating, trying to pit everybody against each other, but we're not going to get into a bidding war over them. And we're not going to be proposing \$1.2 billion to build them the stadium. If Virginia wants to do that, and they want to go to Virginia, I would say, "Good luck." (DePuyt 2022).

As we discuss in Section 6.3, community relationships play an important role in fostering public support for subsidies. Relocation threats may be a counter-productive strategy for promoting subsidies, because they strain important social bonds with voters who feel spurned by a local team they have long supported.⁶ Thus, market power alone is not sufficient to explain the continued prevalence of stadium subsidies.

6.2 Political bargaining asymmetry

By their nature, stadiums have a concentrated interest group of supporters. Team owners, proprietors of complementary businesses (e.g., concessions and hospitality operators), and sports fans benefit from subsidies collected from a tax base dispersed widely across the polity. A team owner receiving several hundred million dollars in subsidies ought to be willing to expend considerably more resources to lobby local representatives and voters than individual taxpayers who bears a small share of the public cost. For example, a \$500 million subsidy spread out over 30 years in a city with one million households results in an annual cost of \$17 dollars per household. It is often not cost-effective to organize a political coalition to combat proposed subsidies, because the organization costs are greater than their tax burden from the stadium, resulting in rational acceptance of subsidies.

Political bargaining asymmetry offers an intuitively appealing explanation for stadium subsidies, because it conforms to well-known political-economy models of concentrated benefits and dispersed costs (Olson 1965; Peltzman 1976; Becker 1983). Though bargaining asymmetry favors team owners, and stadium boosters do outspend opponents in referendum campaigns, the subsidy allocation process does not operate as a lobbying contest in practice.

As part of their extensive case study of stadium campaigns, sociologists Kevin Delaney and

⁶For example, Delaney and Eckstein (2003b) report the reasoning provided by a downtown stadium advocate in Philadelphia as to why the team avoided using relocation threats to promote subsidies: "If [the team owners] stand on a street corner and threaten to move the teams from Philadelphia, the people of Philadelphia will say 'Fuck you, move the teams. Move.' Whether they mean it or not" (pp. 179-180).

Rick Eckstein (2003) document that team owners played little to no role in advocating for public funding, even though they would be the chief beneficiaries. Instead, subsidy advocacy is typically spearheaded by a "local growth coalition" of area influencers. They observed that rather than evaluating the policy desirability of subsidies with objective vetting of cost-benefit estimates where

decision-making participants, from which they observed influential elites in shepherding subsidies through the political process in all cities. Local growth coalition advocacy offers an attractive explanation for stadium subsidies because it accurately describes how stadium policy is determined in practice.

Drawing from Molotch (1976)'s growth machine theory of local economic development policy, Delaney and Eckstein (2007) describes local growth coalitions as "institutional and ideological alliances between and among headquartered local corporations, local government, and the local mainstream media" which "articulate and influence social policies intended to stimulate economic growth within certain prescribed parameters." These parameters "favor large, visible projects that will attract new corporations to the city, and real estate policies that increase exchange value" (pp. 334-335).

What makes local growth coalitions distinct from traditional lobbying, where advocacy and opposition groups compete to influence policymakers, is that the coalition establishes itself as an informal community institution whose approval is valued by elected officials. Though a local growth coalition may lobby on-behalf of team owners, its influence differs from traditional political lobbying in that the coalition is a bellwether constituency that shapes the policymaking environment. Its membership is typically not partisan and claims to promote a neutral pro-community agenda. Coalitions may tout fiscally conservative principles, such as low taxes, but they may also advocate on behalf of special bond issues and tax increases that support schools and infrastructure projects. Rather than out-lobbying the opposition, a powerful local growth coalition inhibits opposition arguments from consideration. Even a well-organized opposition group will have difficulty in defeating proposals that the local growth coalitions supports, because politicians who go against the coalition risk losing the backing of an important constituency in other matters.

Local growth coalitions are organized chiefly by local business leaders, but they often include influential community members, such as politicians, community organizers, and media members. In particular, business leaders may view sports as directly beneficial to their personal financial interests, because it signals that the city is a desirable place to live and work to highly sought-after executives, whom they want to recruit and retain. They view a local sports franchise as an asset that attracts talented young professionals, who are likely consumers of sports events and stadium amenities (Delaney and Eckstein 2007). Opulent modern venues that emerged in

the 1990s also provide a comfortable environment for casual business networking, as Baade (1996b) describes, "Business once promoted and conducted in boardrooms and restaurants now is facilitated in skyboxes and stadium clubs." Coalition members also benefit from unique perks that teams can provide, such as special access to exclusive events, celebrity athletes and spectators, and luxury amenities. Thus, coalition members benefit directly through their sports consumption, which is subsidised by tax contributions from the general public.

Coalition members are influential among politicians and exploit support networks (e.g., chambers of commerce, executive groups, and community booster organizations) to mobilize and promote favorable policies. The success of local growth coalitions at garnering subsidies derives from members' prominence in the community, who appear detached from the team owner receiving significant subsidies. Delaney and Eckstein (2003b) observes "non-sports corporations can more easily obfuscate their vested interests in new stadiums and portray their advocacy as being in the best interest of the entire community" (p. 3).

Perl, Howlett and Ramesh (2018) explains that common core beliefs, even mistaken beliefs, are the glue that bind local advocacy coalitions together.

These beliefs at the center of each coalition include both normative values about the way the world should be, and axiomatic understandings of how policy can and does function in support of such a worldview. These principles motivate policy actors to cooperate with likeminded counterparts in formulating policy options that advance their preferred outcomes, and to learn from both advocacy and research efforts about how to expand the likelihood of those outcomes over time.... The [advocacy coalition framework] presumes that coalition members will maintain their core beliefs, even in the face of evidence that might call these beliefs into question. ... The durability of core beliefs that draw coalition members together suggests their resilience in the face of alternative facts and misinformation. Indeed, a stream of disruptive information could work to reinforce solidarity within established coalitions as their members are motivated to redouble their efforts to organize and advocate for preferred policy options in the face of perceived efforts to challenge or intimidate the policy subsystem(pp. 591{592).

difficult for policy debates over the desirability of public stadium investments to occur. Delaney and Eckstein (2007) observes: "municipalities are not neutral referees in these stadium initiatives but are clearly predisposed toward building publicly financed stadiums. . . . this has become the default policy" (p. 334, emphasis original). Therefore, stadium subsidy critics (including economists who have studied the economic impacts of sports events and venues extensively) are in a position where they must "un-convince" influential insiders who are not amenable to reviewing contrary evidence that indicates a stadium proposal is undesirable. "From a growth coalition perspective, opponents of publicly financed stadiums must fight city hall, whereas proponents of publicly financed stadiums are already aligned with city hall" (p. 335{336).

The importance of local growth coalitions in stadium campaigns offers a compelling explanation as to why governments continue to subsidize stadiums contrary to the advice of economic experts. It also suggests that it is coalition members, not just elected representatives, who need convincing that stadiums are not worthwhile public investments.

6.4 Commissioned economic impact reports

An important component in all stadium advocacy campaigns is a commissioned economic impact report that forecasts the proposed stadium's strong financial prospects. Rather than providing objective evaluation of an economic development project, like peer-reviewed studies published in academic outlets, this "promotional literature" consists of commissioned "studies" by for-hire consultants that are intended of to persuade the public, community leaders, and policymakers that using tax dollars to fund a stadium is a good public investment (Coates and Humphreys 2008). These advocacy reports are typically conducted by professional consulting firms but moonlighting academic economists with established reputations have also accepted commissions to produce independent reports on behalf of teams, supportive community organizations, and local governments (deMause 2018). It is also common for universities to support affiliated centers that offer economic consulting services, which are willing to attach the university's academic reputation to superficial economic impact reports that tout large economic benefits to paying clients and government entities. Stadium boosters likely commission private economic impact reports because voters view public funding of stadiums more favorably when they are framed as economic development catalysts (Connolly and Touchton 2020). Commissioned studies are promoted to the community, media, local

growth coalition members, and elected representatives as proof of a stadium's economic favorable prospects.

Economists who have scrutinized commissioned reports have found them to be deeply flawed, regularly committing basic errors, such as overestimating benefits and underestimating costs, confusing gross and new spending, using unrealistic multipliers that inflated growth expectations, and relying on unrealistic assumptions about future economic development (Crompton 1995; Hudson 2001; Wassmer et al. 2016). Commissioned analyses differ considerably from established methods employed in academic studies, which estimate economic effects through retrospective analysis of observed outcomes. Consultant reports favor speculative projections of future impacts, often employing commercial input-output computer models not used in academic economics research, declaring the calculations to be validated by the software packages they employ. Rarely are the methods and assumptions explained sufficiently to defend the estimates as credible, nor do study authors explore why forecasts of positive benefits differ from consensus academic findings of objective research.

Even though the biases and flaws of commissioned studies are obvious, they appear to be effective at neutralizing the economics consensus to promote the positive public perception of stadium proposals. Team owners and booster coalitions often insist that a commissioned study of their specific project is superior to past academic research, which they assert to be outdated or inapplicable because of novel features of the proposed project. For example, a report commissioned by Truist Park boosters (Center for Economic Development Research 2018) argued that though "historically, publicly financed stadiums do not pay for themselves . . . the Atlanta Braves changed the stadium-financing paradigm" with its mixed-used development to forecast a positive fiscal return—a claim that has not held up to scrutiny (Bradbury 2022c).

The novelty argument is likely effective because all new stadiums have unique qualities. Though it is unlikely that any novel features of a proposed stadium would provide an improvement that could overcome the well-documented economic failures of stadiums, the commissioned report provides sufficient comfort to individuals predisposed to support a new stadium. Delaney and Eckstein (2003a) surmises that the esoteric nature of quantitative economic and financial analyses promotes their fallacious credibility: "The economic issues are complex enough so that it doesn't take much to obfuscate matters a little more and send relatively well-informed citizens running for

cover" (p. 202). Advocacy reports are also produced for a layman audience as public relations documents, with general summaries that highlight the favorable estimates and press releases using graphics and quotable passages for press coverage.

Advocacy reports also benefit from a short decision-making time frame. Stadium proposals are often presented and approved within a matter of weeks or months, with urgency imposed by arbitrary deadlines and vague relocation speculation. Policymakers and community members may thus accept a commissioned report's favorable findings as expedient confirmation of their policy preference to fund a new stadium.

In an effort to counteract the misinformation in commissioned studies, Wassmer et al. (2016) provides a set of questions (Table 4) for quickly evaluating the credibility of economic impact studies. Encouraging policymakers and media members to use this rubric to identify common flaws of commissioned reports may lessen their influence.

Table 4: Evaluative Questions for Commissioned Economic Impact Studies

Evaluative Questions	
1. Does the study adjust for the inappropriateness of counting nonlocal casuals, nonlocal time switchers, and local residents who would have spent regardless?	11. Does the study use an income multiplier and report its value (of any type)?
2. Does the study adjust for the possibility of redistributed labor?	12. Is the logic of the chosen multiplier clearly stated and reasonably defended?
3. Does the study adjust for the possibility of import substitution?	13. Does the study incorporate future economic development into its impact estimates?
4. Does the study adjust for the possibility of crowding out?	14. Are assumptions about the probability of development and magnitude of investment explicit?
5. Does the study adjust expenditure and employment estimates for novelty effects?	15. Does the study discuss shifting economic activity within a jurisdiction as a benefit?
6. Does the study discuss specific assumptions?	

6.5 Media coverage

The above-mentioned factors that favor the adoption of stadium subsidies may be muted or intensified by media reporting. Delaney and Eckstein (2008) observes that local media coverage plays an influential role in shaping the public perception of stadium proposals. Critical media coverage can impede a stadium project, when the local growth coalition is weak, but uncritical media often become "the primary institutional booster" (p. 72).

Recent research has discovered an important role for misinformation and "fake news" in affecting policy. Nyhan (2020) reports that public misperceptions often derive from prominent politicians, pundits, groups, and media outlets, noting that elites often play a key role in popularizing fallacious information. The willful ignorance embraced by local growth coalition members undermines the assumed rationality of objective policy evaluation to promote actions based on misleading evidence that is subject to manipulation (Perl et al. 2018). Deliberately and unintentionally, media coverage may exacerbate public and policymaker misunderstanding of the returns to public stadium investments, which promotes bad policy.

We discuss three types of biased media coverage we have observed that may contribute to the perception that subsidizing stadiums is reasonable or desirable policy.

6.5.1 Uncritical reporting: Just the facts

The most basic form of uncritical media coverage is limiting reporting to basic facts regarding a proposed stadium deal without including context regarding potential policy implications. Reporting may include relevant financial figures and logistics regarding political hurdles for approval and schedules for stadium construction with little policy commentary. In some cases, economic impact estimates from advocacy reports may be repeated without external validation of credibility, and press release statements from stadium boosters are quoted in stories without critical assessment.

For example, coverage of a proposed Tennessee Titans stadium ~~The Tennessee~~ described the stadium as "a centerpiece for Nashville's imagined future" in its headline, and provided only positive commentary from the team's president and Nashville's mayor, who brokered the deal (Mazza 2022). The article describes the \$760 million of local government funding covering the cost of the new domed stadium as "a fraction of the cost [of the \$2.1 billion total] . . . using revenue bonds

to be repaid with future tax proceeds from the project," repeating a booster talking point that \nancing strategy that doesn't require any taxpayer investment." While the statements about tax revenue collection mechanism are technically true, it is not correct that the public funding does not require any taxpayer investment, because the revenue bond funds would come mostly from existing local commerce reallocated to a new dedicated tax district (see Section 5.2.4). Thus, the reporter passes along intentionally misleading statements without checking the dubious assertions of biased sources, which may in uence readers who assume that the claims were evaluated for credibility.

Uncritical reporting of stadium advocate claims may be inadvertent and derive from the intermittent nature of stadium construction. Given the typical 30-year lifespan of modern stadiums, most local markets will face policy questions regarding stadium replacement and refurbishments only a few times over the typical career of reporter, unlike school board budgets and debates over municipal services, which are regular topics for local news coverage. Local media outlets do not have reporters dedicated to covering stadiums, which necessitates allocating assignments to other news beats. When stadium proposals arise, local news reporting comes from journalists who cover a range of subjects (e.g., local government, business, and sports), which results in coverage from reporters who may lack familiarity and interest in the economics of stadiums. Media members may be ignorant of the economic consensus and thus be more apt to accept non-credible estimates from commissioned reports, press release statements, and booster talking points intended for quotation in news stories. In addition, reporters may seek and receive assistance from local growth coalition members who have served as sources on other local stories.

Reporters may defend their reporting as objective, because they are merely the conduit for information relayed from other sources without judgement. However, the result is that a favorable policy consequences become a public focal point for context. That a new stadium could have a \$100 million impact on the local economy, because a commissioned report declared it to be a possibility, may be interpreted as a reasonably likely or moderately optimistic outcome, when the most credible benchmark expectation based on the most credible research is \$0.

6.5.2 False balance or \bothsidesism"

without conveying that the overwhelming expert consensus rejects arguments for stadium subsidies. Media outlets typically report news-worthy but dubious claims from non-experts with caution. For example, most credible media outlets do not nakedly report motivated contrarian claims regarding global warming, vaccination risks, and election fraud without explicit caveats that such claims are unsupported by evidence and contrary to the opinions held by most subject experts. It has been our experience, that skeptical questioning and fact-checking of non-credible stadium claims is less common.

False balance is particularly harmful in spreading misinformation regarding the economic impacts of stadiums due to the prevalence of advocacy reports. Pitting privately-commissioned studies against academic research creates the illusion of equal credibility, and sometimes stories are framed to present the economic consensus as the exceptional skeptical voice. For example, a Tennessee story on a poll showing voters opposed to a new Tennessee Titans stadium described sports stadiums as having, "a mixed history of delivering on economic promises," when the evidence is overwhelming that stadiums fail to deliver on economic promises (Friedman 2022). This language suggests that it is reasonably plausible to expect a positive economic impact from the stadium proposal under consideration, when consensus economics evidence indicates that it is not.

6.5.3 Editorial sycophants

Local growth coalitions often include media members, who actively use their position to influence the community's perception of a proposed stadium project. Media members may personally benefit from anticipated networking opportunities and see sports as a product that draws readers and viewers, which supports their advertising business. This relationship results in what Delaney and Eckstein (2007) describes as "ideological convergence" with the local growth coalition, which results in intentionally biased news coverage that is supportive of stadium subsidies:

This convergence revolves around the "proper" vision of local economic growth and the role new stadiums play in that vision. ...Editors and reporters ... seem predisposed to believe in the wonders of stadium-centered economic development. The practice of uncritically reproducing press releases from stadium advocates and covering the "dog and pony" shows, such as ground-breaking ceremonies, help produce this bias and disseminate

how they can deal with the growth, especially, of willful ignorance and obliviousness

Table 5: Current Venues Constructed without Public Funding Since 1990

Venue	Teams	Year Opened	Total Cost(\$)
UBS Arena	New York Islanders	2021	\$1,056
SoFi Stadium	Los Angeles Chargers & Rams	2020	\$5,500
Chase Center	Golden State Warriors	2019	\$1,414
T-Mobile Arena	Las Vegas Golden Knights	2016	\$405
MetLife Stadium	New York Giants & Jets	2010	\$1,868
Gillette Stadium	New England Patriots	2002	\$468
Nationwide Arena	Columbus Blue Jackets	2000	\$225
Crypto.com Arena	LA Lakers & Clippers & Kings	1999	\$488
Scotiabank Arena	Toronto Raptors & Maple Leafs	1999	\$369
FTX Arena	Miami Heat	1999	\$330
Ball Arena	Denver Nuggets & Colorado Avalanche	1999	\$279
Capital One Arena	Washington Wizards & Capitals	1997	\$322
FedEx Field	Washington Commanders	1997	\$290
Bank of America Stadium	Carolina Panthers	1996	\$309
Bell Centre	Montreal Canadiens	1996	\$356
Wells Fargo Center	Philadelphia 76ers & Flyers	1996	\$307
Canadian Tire Centre	Ottawa Senators	1996	\$224
Moda Center	Portland Trail Blazers	1995	\$388
Rogers Arena	Vancouver Grizzlies & Canucks	1995	\$218
TD Garden	Boston Celtics & Bruins	1995	\$245
United Center	Chicago Bulls & Blackhawks	1994	\$315
Enterprise Center	St. Louis Blues	1994	\$298
Vivint Arena	Utah Jazz	1991	\$179

Construction costs in millions of real 2020 dollars. Does not include costs of maintenance, operations, and tax abatements that these facilities may receive.

contradict published research should be vetted through peer review to verify their credibility.

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A Appendix: Historical Database of Stadiums and Arenas

Data on stadium construction and funding was compiled by the authors from several sources. Most 1909{2010 financial information is from (Long 2013, Table 2.1), which provides a consistent source of valuation over the sample that has been closely vetted by an expert for consistency. Benson (1989), Gershman (1993), and Lowry (1986) provide additional information. Post-2010 and a few missing observations were collected by the authors from various media sources. Publicly-reported costs often differ across sources; thus, we reviewed multiple sources and report data that we find to be most credible. Reporting standards are not identical over time or across publications; however, though imperfect, the data are sufficiently reliable to offer useful guidance on trends in venue construction, duration, and costs. Sources that informed the determination of costs, openings, and hosting for individual venues will be made available in data file in a public repository upon publication.

Renovations are difficult to track over time, because they are not consistently documented and reported across facilities and media sources. Most venues receive periodic renovations as part of their regular life (e.g., reconfiguring seats and luxury boxes, upgrading video boards, replacing depreciated capital), which typically range from hundreds of thousands of to tens of millions of dollars. We do not track these minor refurbishments, even though they may be described as "major" in public reports. For venues currently hosting major-league teams, we record the most recent and planned substantial renovations that contribute significant capital construction that is intended to prolong the facility's lifespan for 15 years or longer. Typical substantial renovations have reported costs of more than approximately \$50 million for arenas and \$100 million for stadiums. We document the timing of renovations in Table 7, but we do not report funding contributions in a table. Renovations may be completed over time; therefore, the date of last renovation is the first year following the reported completion of the renovations. Renovations data reported in Figure 7 were gathered from media reports.

In a few cases we record substantial reconstruction of an existing facility as new venues, because it resulted in the effective replacement of an existing facility that would otherwise not be up to major-league standards. We believe it is appropriate to view these projects as new venues even though they incorporated some features of their predecessors. The exceptions below are

denoted with asterisks in Table A1, and we do not report their funding data, which are not directly comparable to new venue construction costs and often unreported.

- Sportsman's Park (St. Louis, 1909) and League Park (Cleveland, 1910) replaced small wooden-framed stadiums with larger concrete and steel structures similar to the new durable stadiums erected during the era. The stadiums would host baseball for 58 and 37 years, respectively.
- The original Mile High Stadium in Denver opened as a small 15,000 seat minor-league baseball stadium in 1948. It was gradually reconfigured to host football during the 1960s. 1968 marks its beginning as a major-league stadium, when a second deck was added to expand its capacity to 50,000 spectators, which was a condition for the American Football League's Broncos being included in the rival league's merger with the NFL.
- Climate Pledge Arena is a rebuilding of Key Arena, which had been deemed not acceptable to host the Seattle Sonics, which departed Seattle in 2008. Its \$1.15 billion renovation gutted the facility to reconstruct it to be equivalent to other contemporary NHL arenas in order to host the expansion Seattle Kraken in 2021. Both arenas are listed in the table separately, as new and defunct arenas.

Some extensive renovations that we do not count as new venues include refurbishments of Soldier Field (2003) and Yankee Stadium (1976). Even though the renovations were expensive and substantial, and some sources do classify them as new venues, we conclude that the changes did not alter the character of the stadiums enough to rise to the level of being effective replacements.

We do not include the Baker Bowl (Philadelphia Phillies, 1895{1938) in our sample, which was the first non-wooden stadium. Though it was constructed with fire-resistant steel and brick and used cantilever architecture, the stadium is generally not considered to be a modern era stadium. It experienced several partial collapses during its history and did not inspire imitation (Benson 1989, pp. 297{302).

Table A1 includes venues that hosted franchises in present day major leagues. Teams and venues often pre-date league founding for non-MLB teams. Stadiums that hosted only teams of now-defunct rival major leagues (e.g., Federal League, American Basketball Association, World

Hockey Association, All American Football Conference) are not included; however, some of these stadiums are included because they later hosted existing major-league franchises (e.g., Wrigley Field).

Venue characteristics: General description of the venue and its hosting responsibilities.

Venue: Venues that currently host major-league teams are listed by their current name.

Venues that no longer host teams are listed by the name most commonly-associated with the facility during its hosting period. Venues that served as temporary or occasional hosts are not included.

In general, arenas are smaller and less expensive than stadiums, typically hosting less than 35,000 spectators and are always enclosed. Stadiums are larger facilities capable of hosting crowds of 40,000 to 100,000 spectators. Stadiums are mostly outdoor facilities, though they sometimes feature permanent domes or retractable roofs. We classify venues as either an arena or a stadium according to the type of professional team it hosted, where arenas hosted only NBA and/or NHL teams, and stadiums primarily hosted MLB and/or NFL teams.

Teams: Team names of major-league clubs that considered the facility its principal home venue. Teams are listed by their most common name during the hosting period, and some defunct franchises of present-day major leagues are listed for older venues. Many venues hosted multiple teams, which are listed.

Operation: Records the duration of the venue's hosting period.

Year Open: The first season that the venue opened as capable of hosting a major-league sports team. In some cases, eventual hosts did not host a major-league team for several years (e.g., Tropicana Field opened in 1990, but it did not host the Tampa Bay Rays until 1998); however, the opening year reflects the depreciation of the facility over time to quantify longevity.

Last Year: The last season in which the venue served as a regular host for a major-league team. Many stadiums remain open as public entertainment venues or host minor-league

and college sports teams after they were deemed obsolete for hosting major-league franchises.

Lifespan: Facility lifespan is calculated from the venue's date of opening through the last year the facility served as an intended long-term host for a major-league team, or 2023 if the stadium continues to host a major-league team. Venues that served as temporary hosts for major-league teams are not included, even if they once served as permanent homes for major-league teams. For example, though Washington Nationals played three seasons in Robert F. Kennedy Stadium from 2005{2007 while waiting for its new stadium to be constructed, 1996 is the year it last served as the regular host for the city's NFL team.

Costs: Costs reflect publicly reported capital costs on building, land, and infrastructure for constructing new sports stadiums and arenas that served as the primary regular hosting venue for a major-league team. It does not include maintenance and operations expenditures. All costs are reported in current dollars in the year the venue opened and in real 2020 dollars. While previous researchers have reported real dollars using producer and construction indexes, we use the Consumer Price Index (CPI) to deflate cost to reflect the opportunity cost of consumption. The CPI has the added advantage of being recorded using objective methods since 1913, which covers most of the sample. Pre-1913 costs are deflated using the 1913 CPI and post-2020 costs are deflated using the 2021 CPI. Costs are left blank when no credible reports are available.

Total Cost: Total funding devoted to new facility construction.

Public Cost: The sum of government contributions to new facility construction costs. It does not include additional contributions of public land and supporting infrastructure, because these costs are often reported differently across jurisdictions. Though we do not include these contributions, it is important to acknowledge that they can be substantial (Long 2013).

Public Share: Public costs as a percentage of total costs reflects the relative share between public and private entities in funding venue construction.

Table A1: Venues Hosting Major US Sports League Teams (1909{2026})

Venue	Teams	Operation			Funding (in millions)				Share
		Year Open	Last Year	Lifespan (years ^y)	Total (current)	Public (current)	Total (2020)	Public (2020)	Public (%)
Boston Arena	Boston Celtics & Bruins	1909	1955	47					
Forbes Field	Pittsburgh Pirates & Steelers	1909	1970	62	\$2	\$0	\$52	\$0	0%
Shibe Park	Philadelphia Athletics & Eagles	1909	1970	62	\$0.30	\$0	\$8	\$0	0%
Sportsman's Park*	St. Louis Browns & Cardinals (MLB & NFL)	1909	1966	58					
Comiskey Park	Chicago White Sox & Cardinals (NFL)	1910	1990	81	\$0.70	\$0	\$20	\$0	0%
League Park*	Cleveland Indians	1910	1946	37					
Griffith Stadium	Washington Senators & Redskins	1911	1960	50					
Mutual Street Arena	Toronto Maple Leafs	1911	1931	21					
Polo Grounds	New York Giants (MLB & NFL) & Yankees & Jets	1911	1957	47					
Crosley Field	Cincinnati Reds	1912	1970	59	\$0.22	\$0	\$6	\$0	0%
Fenway Park	Boston Red Sox	1912		112	\$0.65	\$0	\$17	\$0	0%
Topps Stadium	Detroit Area	1912	1970						0%

Venue	Teams	Year Last Open Year	Lifespan (years ²)	Total (current)	Public (current)	Total (2020)	Public (2020)	Public (%)
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Venue	Teams	Year Open	Last Year	Lifespan (years ²)	Total (current)	Public (current)	Total (2020)	Public (2020)	Public (%)
Memorial Auditorium	Bu alo Braves & Sabres	1940	1996	57	\$3	\$3	\$55	\$55	100%
Cow Palace	San Francisco Warriors	1941	1971	31					
Cincinnati Gardens	Cincinnati Royals	1949	1972	24	\$3	\$0	\$33	\$0	0%
Colisee de Quebec	Quebec Nordiques	1949	1995	47					
Milwaukee Arena	Milwaukee Hawks	1950	1988	39					
War Memorial Coliseum	Fort Wayne Pistons	1952	1957	6					
Memorial Stadium	Baltimore Orioles & Colts	1953	1991	39	\$6	\$6	\$58	\$58	100%
Milwaukee County Stadium	Milwaukee Braves & Green Bay Packers	1953	2000	48	\$5	\$5	\$48	\$48	100%
Metropolitan Stadium	Minnesota Twins & Vikings	1956	1981	26	\$9	\$9	\$86	\$86	100%
Lambeau Field	Green Bay Packers	1957		67	\$1	\$1	\$9	\$9	100%
Sun Devil Stadium	Arizona Cardinals	1958	2005	48	\$12	\$0	\$108	\$0	0%
Los Angeles Memorial Sports Arena	Los Angeles Lakers & Clippers	1959	1999	41	\$7	\$7	\$62	\$62	100%
Candlestick Park	San Francisco Giants & 49ers	1960	2013	54	\$11	\$11	\$96	\$96	100%
Veterans Memorial Coliseum	Portland Trail Blazers	1960	1995	36	\$8	\$8	\$70	\$70	100%
Civic Arena	Pittsburgh Penguins	1961	2010	50	\$22	\$22	\$191	\$191	100%
Cobo Arena	Detroit Pistons	1961	1978	18					
RFK Stadium	Washington Senators & Redskins	1961	1996	36	\$22	\$22	\$191	\$191	100%
Baltimore Civic Center	Baltimore Bullets	1962	1973	12					
Dodger Stadium	Los Angeles Dodgers	1962		62	\$27	\$7	\$231	\$60	26%
Key Arena	Seattle Sonics	1962	2008	47					
Shea Stadium	New York Mets & Jets	1964	2008	45	\$24	\$24	\$200	\$200	100%

(continued)

Venue	Teams	Year Open	Last Year	Lifespan (years ²)	Total (current)	Public (current)	Total (2020)	Public (2020)	Public (%)
Arizona Veterans Memorial Coliseum	Phoenix Suns	1965	1992	28					
Arlington Stadium	Texas Rangers	1965	1993	29	\$2	\$2	\$16	\$16	100%
Astrodome	Houston Astros & Oilers	1965	1999	35	\$38	\$38	\$312	\$312	100%
Atlanta-Fulton County Stadium	Atlanta Braves & Falcons	1965	1996	32	\$19	\$19	\$156	\$156	100%
Angel Stadium	Los Angeles Angels & Rams	1966		58	\$25	\$24	\$200	\$192	96%
Busch Memorial Stadium	St. Louis Cardinals (MLB & NFL)	1966	2005	40	\$26	\$6	\$208	\$48	23%
Oakland Arena	Golden State Warriors & California Golden Seals	1966	2019	54	\$26	\$26	\$208	\$208	100%
RingCentral Coliseum	Oakland Athletics	1966		58	\$30	\$30	\$240	\$240	100%
San Diego Sports Arena	San Diego Rockets	1966	1984	19	\$7	\$7	\$56	\$56	100%
Great West Forum	Los Angeles Lakers & Kings	1967	1999	33	\$16	\$0	\$124	\$0	0%
Jack Murphy Stadium	San Diego Padres & Chargers	1967	2016	50	\$28	\$28	\$217	\$217	100%
Metropolitan Sports Center	Minnesota North Stars	1967	1993	27	\$6	\$6	\$47	\$47	100%
Pacific Coliseum	Vancouver Canucks	1967	1995	29	\$6	\$5	\$47	\$39	83%
Tampa Stadium	Tampa Bay Buccaneers	1967	1997	31	\$5	\$5	\$39	\$39	100%
The Spectrum	Philadelphia 76ers & Flyers	1967	1996	30	\$12	\$0	\$93	\$0	0%
HemisFair Arena	San Antonio Spurs	1968	1993	26					
Madison Square Gardens	New York Knicks & Rangers	1968		56	\$133	\$0	\$990	\$0	0%
Mile High Stadium*	Denver Broncos	1968	2000	33					
Salt Palace	Utah Jazz	1969	1991	23	\$17	\$0	\$120	\$0	0%
Riverfront Stadium	Cincinnati Reds & Bengals	1970	2002	33	\$56	\$56	\$374	\$374	100%

(continued)

Venue	Teams	Year Open	Last Year	Lifespan (years ²)	Total (current)	Public (current)	Total (2020)	Public (2020)	Public (%)
Three Rivers Stadium	Pittsburgh Pirates & Steelers	1970	2000	31	\$55	\$55	\$367	\$367	100%
Foxboro Stadium	New England Patriots	1971	2002	32	\$7	\$0	\$45	\$0	0%
Texas Stadium	Dallas Cowboys	1971	2008	38	\$35	\$30	\$224	\$192	86%
Veterans Stadium	Philadelphia Phillies & Eagles	1971	2003	33	\$48	\$48	\$307	\$307	100%
GEHA Field at Arrowhead Stadium	Kansas City Chiefs	1972		52	\$33	\$28	\$204	\$173	85%
Nassau Veterans Memorial Coliseum	New York Islanders	1972	2021	50	\$31	\$31	\$192	\$192	100%
The Omni	Atlanta Hawks & Flames	1972	1997	26	\$17	\$17	\$105	\$105	100%
Capital Center	Washington Wizards & Capitals	1973	1997	25	\$18	\$0	\$105	\$0	0%
Highmark Stadium	Bu alo Bills	1973	2025	53	\$22	\$22	\$128	\$128	100%
Kau man Stadium	Kansas City Royals	1973		51	\$37	\$28	\$216	\$163	76%
Kemper Arena	Kansas City Kings	1974	1985	12	\$22	\$22	\$116	\$116	100%
Market Square Arena	Indiana Pacers	1974	1999	26	\$16	\$16	\$84	\$84	100%

Venue	Teams	Year Open	Last Year	Lifespan (years ²)	Total (current)	Public (current)	Total (2020)	Public (2020)	Public (%)
Kingdome	Seattle Mariners & Seahawks & SuperSonics	1976	1999	24	\$67	\$67	\$305	\$305	100%
Olympic Stadium	Montreal Expos	1976	2004	29	\$539	\$270	\$2,452	\$1,229	50%
Joe Louis Arena	Detroit Red Wings	1979	2017	39	\$57	\$57	\$203	\$203	100%
Reunion Arena	Dallas Mavericks	1980	2001	22	\$27	\$27	\$85	\$85	100%
Brendan Byrne Arena	New Jersey Nets & Devils	1981	2010	30	\$85	\$85	\$242	\$242	100%
The Metrodome	Minnesota Twins, & Vikings & Timberwolves	1982	2013	32	\$71	\$64	\$190	\$172	90%
Hoosier Dome	Indianapolis Colts	1983	2007	25	\$77	\$47	\$200	\$122	61%
Scotiabank Saddledome	Calgary Flames	1983		41	\$100	\$100	\$260	\$260	100%
Hard Rock Stadium	Miami Dolphins & Florida Marlins	1987		37	\$115	\$0	\$262	\$0	0%
ARCO Arena	Sacramento Kings	1988	2016	29	\$40	\$0	\$88	\$0	0%
Bradley Center	Milwaukee Bucks	1988	2018	31	\$84	\$0	\$184	\$0	0%
Charlotte Coliseum	Charlotte Hornets	1988	2002	15	\$58	\$58	\$127	\$127	100%
Miami Arena	Miami Heat & Florida Panthers	1988	1999	12	\$53	\$53	\$116	\$116	100%
The Palace of Auburn Hills	Detroit Pistons	1988	2017	30	\$70	\$0	\$153	\$0	0%
Orlando Arena	Orlando Magic	1989	2010	22	\$110	\$110	\$230	\$230	100%
Rogers Centre	Toronto Blue Jays	1989		35	\$413	\$194	\$863	\$405	47%
Target Center	Minnesota Timberwolves	1990		34	\$104	\$55	\$206	\$109	53%
Tropicana Field	Tampa Bay Rays	1990		34	\$162	\$148	\$321	\$293	91%
Guaranteed Rate Field	Chicago White Sox	1991		33	\$187	\$157	\$355	\$298	84%
Vivint Arena	Utah Jazz	1991		33	\$94	\$0	\$179	\$0	0%
Footprint Center	Phoenix Suns	1992		32	\$83	\$28	\$153	\$52	34%

(continued)

Venue	Teams	Year Open	Last Year	Lifespan (years ¹)	Total (current)	Public (current)	Total (2020)	Public (2020)	Public (%)
Georgia Dome	Atlanta Falcons	1992	2017	26	\$200	\$200	\$368	\$368	100%
Oriole Park at Camden Yards	Baltimore Orioles	1992		32	\$106	\$97	\$195	\$178	92%
Alamodome	San Antonio Spurs	1993	2002	10	\$175	\$147	\$313	\$263	84%
Honda Center	Anaheim Ducks	1993		31	\$123	\$123	\$220	\$220	100%
SAP Center	San Jose Sharks	1993		31	\$163	\$133	\$292	\$238	82%
Enterprise Center	St. Louis Blues	1994		30	\$170	\$0	\$298	\$0	0%
Globe Life Park	Texas Rangers	1994	2019	26	\$147	\$135	\$257	\$236	92%
Progressive Field	Cleveland Guardians	1994		30	\$176	\$84	\$308	\$147	48%
Rocket Mortgage FieldHouse	Cleveland Cavaliers	1994		30	\$152	\$124	\$266	\$217	82%
United Center	Chicago Bulls & Blackhawks	1994		30	\$180	\$0	\$315	\$0	0%
Coors Field	Colorado Rockies	1995		29	\$197	\$144	\$335	\$245	73%
Edwards Jones Dome	St. Louis Rams	1995	2015	21	\$300	\$300	\$510	\$510	100%
Moda Center	Portland Trail Blazers	1995		29	\$228	\$0	\$388	\$0	0%
Rogers Arena	Vancouver Grizzlies & Canucks	1995		29	\$128	\$0	\$218	\$0	0%
TD Garden	Boston Celtics & Bruins	1995		29	\$144	\$0	\$245	\$0	0%
TIAA Bank Field	Jacksonville Jaguars	1995		29	\$145	\$132	\$247	\$224	91%
Amalie Arena	Tampa Bay Lightning	1996		28	\$139	\$96	\$229	\$158	69%
Bank of America Stadium	Carolina Panthers	1996		28	\$187	\$0	\$309	\$0	0%
Bell Centre	Montreal Canadiens	1996		28	\$216	\$0	\$356	\$0	0%
Bridgestone Arena	Nashville Predators	1996		28	\$144	\$144	\$238	\$238	100%
Canadian Tire Centre	Ottawa Senators	1996		28	\$136	\$0	\$224	\$0	0%

(continued)

Venue	Teams	Year Open	Last Year	Lifespan (years)	Total (current)	Public (current)	Total (2020)	Public (2020)	Public (%)
KeyBank Center	Buffalo Sabres	1996		28	\$128	\$56	\$211	\$92	44%
Wells Fargo Center	Philadelphia 76ers & Flyers	1996		28	\$186	\$0	\$307	\$0	0%
Capital One Arena	Washington Wizards & Capitals	1997		27	\$200	\$0	\$322	\$0	0%
FedEx Field	Washington Commanders	1997		27	\$180	\$0	\$290	\$0	0%
Turner Field	Atlanta Braves	1997	2016	20	\$235	\$0	\$378	\$0	0%
Chase Field	Arizona Diamondbacks	1998		26	\$354	\$253	\$563	\$402	71%
FLA Live Arena	Florida Panthers	1998		26	\$185	\$157	\$294	\$250	85%
M&T Bank Stadium	Tennessee Titans	2016		5	\$150	\$150	\$150	\$150	100%

Venue	Teams	Year Open	Last Year	Lifespan (years ²)	Total (current)	Public (current)	Total (2020)	Public (2020)	Public (%)
Minute Maid Park	Houston Astros	2000		24	\$265	\$180	\$398	\$270	68%
Nationwide Arena	Columbus Blue Jackets	2000		24	\$150	\$0	\$225	\$0	0%
Oracle Park	San Francisco Giants	2000		24	\$324	\$15	\$486	\$23	5%
Paul Brown Stadium	Cincinnati Bengals	2000		24	\$450	\$404	\$675	\$606	90%
Xcel Energy Center	Minnesota Wild	2000		24	\$130	\$95	\$195	\$143	73%
American Airlines Center	Dallas Mavericks & Stars	2001		23	\$390	\$125	\$569	\$183	32%
American Family Field	Milwaukee Brewers	2001		23	\$392	\$290	\$572	\$423	74%
Empower Field at Mile High	Denver Broncos	2001		23	\$400	\$289	\$584	\$422	72%
Heinz Field	Pittsburgh Steelers	2001		23	\$261	\$199	\$381	\$291	76%
PNC Park	Pittsburgh Pirates	2001		23	\$271	\$196	\$396	\$286	72%
AT&T Center	San Antonio Spurs	2002		22	\$175	\$147	\$252	\$212	84%
Ford Field	Detroit Lions	2002		22	\$430	\$264	\$619	\$380	61%
Gillette Stadium	New England Patriots	2002		22	\$325	\$0	\$468	\$0	0%
Lumen Field	Seattle Seahawks	2002		22	\$360	\$230	\$518	\$331	64%
NRG Stadium	Houston Texans	2002		22	\$425	\$310	\$612	\$446	73%
Paycom Center	Oklahoma City Thunder	2002		22	\$89	\$89	\$128	\$128	100%
Gila River Arena	Arizona Coyotes	2003	2022	20	\$220	\$180	\$310	\$254	82%
Great American Ballpark	Cincinnati Reds	2003		21	\$280	\$250	\$395	\$353	89%
Lincoln Financial Field	Philadelphia Eagles	2003		21	\$360	\$202	\$508	\$285	56%
Toyota Center	Houston Rockets	2003		21	\$175	\$175	\$247	\$247	100%
Canada Life Centre	Winnipeg Jets	2004		20	\$108	\$33	\$148	\$45	30%

(continued)

Venue	Teams	Year Last Open	Lifespan (years ^y)	Total (current)	Public (current)	Total (2020)	Public (2020)	Public (%)
U.S. Bank Stadium	Minnesota Vikings	2016	8	\$1,061	\$498	\$1,146	\$538	47%
Little Caesars Arena	Detroit Pistons & Red Wings	2017	7	\$863	\$324	\$915	\$343	38%
Mercedes-Benz Stadium	Atlanta Falcons	2017	7	\$1,600	\$700	\$1,696	\$742	44%
Truist Park	Atlanta Braves	2017	7	\$672	\$300	\$712	\$318	45%
Fiserv Forum	Milwaukee Bucks	2018	6	\$524	\$250	\$540	\$258	48%
Chase Center	Golden State Warriors	2019	5	\$1,400	\$0	\$1,414	\$0	0%
Allegiant Stadium	Las Vegas Raiders	2020	4	\$1,970	\$750	\$1,970	\$750	38%
Globe Life Field	Texas Rangers	2020	4	\$1,200	\$500	\$1,200	\$500	42%
SoFi Stadium	Los Angeles Chargers & Rams	2020	4	\$5,500	\$0	\$5,500	\$0	0%
Climate Pledge Arena*	Seattle Kraken	2021	3					
UBS Arena	New York Islanders	2021	3	\$1,100	\$0	\$1,056	\$0	0%
Intuit Dome	Los Angeles Clippers	2024		\$1,800	\$0	\$1,728	\$0	0%
New Bills Stadium	Bu alo Bills	2026		\$1,400	\$850	\$1,344	\$816	61%
New Titans Stadium	Tennessee Titans	2026		\$2,100	\$1,260	\$2,016	\$1,210	60%

^y Lifespan as of 2023 for current host venues.

*Significant refurbishment of existing facility that represents an effective replacement.

Current major-league venues in bold .

Planned venues pending final approval in italics.