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REVISITING THE FIRST TEN YEARS: ASSESSING THE CASE FOR GOVERNMENT INVOLVEMENT IN THE CONSTRUCTION OF WELLINGTON'S WESTPAC STADIUM

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REVISITING THE FIRST TEN YEARS: ASSESSING THE CASE FOR GOVERNMENT INVOLVEMENT IN THE CONSTRUCTION OF WELLINGTON'S WESTPAC STADIUM

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Abstract

The consensus in the scholarly literature that has examined the impact of sports facilities on local economies is that there is an absence of realised tangible economic impacts. This paper examines the case of the Westpac Stadium in Wellington, New Zealand, where a new facility was built to replace the aging Athletic Park. Local government investment in the new facility was justified on the grounds of forthcoming economic benefits associated with both construction and stadium operations. Two reports were commissioned by the Wellington Regional Stadium Trust in 2004 and 2010 to assess the economic impact of the stadium on the Wellington region. Ex-post econometric models of aggregate employment between 1989 and 2009 are developed to examine the impact of the Westpac Stadium on the Wellington regional economy during the construction and post-construction periods. Results fail to detect the presence of realised economic impacts as detailed in the 2004 and 2010 reports. Intangible consumption benefits from stadium attendance are also quantified in the form of consumer surplus. An adjusted estimate of consumer surplus benefits from the replacement facility is hypothesised and the results of which were found to be insufficient to cover the cost of the public expenditure on the Stadium. These findings are consistent with the majority of the academic literature that replacement facilities cannot be expected to generate tangible economic impacts above and beyond those impacts associated with their predecessors. They are also consistent with much of the scholarly literature that has demonstrated the inability of intangible benefits associated with facilities to meet the costs of public subsidies expended towards their construction.

Keywords: Economic impact; cost-benefit analysis; sports facilities; employment; consumer surplus, public good benefits.

JEL Classification: L83, R58.

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1. INTRODUCTION

The Westpac Stadium in Wellington, New Zealand, opened to much fanfare in January, 2000. Affectionately known as the Cake Tin due to its distinctively shaped exterior, it was the first major replacement facility in New Zealand to be built at a different location to its predecessor.[2] It was jointly funded by the private and public sector, with local and regional government together contributing one third of construction costs. Five years after the facility began operation, a commissioned report was released that indicated that the ex-post economic impacts of the Stadium during the first five years of its operation were more than double what was originally forecast at the outset of stadium construction (Arcus, Sanderson, and Goodchild, 2004). A second report was conducted by Norman and Sanderson (2010) in which the annual economic impacts for each of the first ten years of the Stadium's operations were found to be approximately one and a half times greater than the projected figures in 1996.

This paper seeks to address the potential conflict between the commissioned reports of Arcus, et al., (2004) and Norman and Sanderson (2010) and the vast majority of ex-post studies in the scholarly literature to date that have found little or no evidence of positive realised impacts of professional sports teams, events, or stadium construction on key economic variables (Baade and Dye, 1990; Coates, 2007; Coates and Humphreys, 1999; Richardson, 2012a, 2012c; Siegfried and Zimbalist, 2000, 2006). This analysis seeks to examine whether the experience of the Westpac Stadium on the Wellington region is consistent with the literature and justified local government involvement in its construction. The NZ$122 million Stadium received local and regional government funding of NZ$40 million, and this funding was justified on the grounds that the facility would generate economic benefits (including job creation) for the wider region.

There are two empirical hypotheses to be tested in this analysis: firstly, that the construction phase of the Westpac Stadium was associated with an increase in overall employment in the Wellington region, and secondly, that the first ten years of the Stadium's operation was associated with an increase in overall employment in the region. A simplified cost-benefit analysis is then utilised to evaluate the appropriateness of the stadium investment from the perspective of local government. The intangible consumer surplus benefits associated with event attendance are estimated, and the present discounted values of these benefits are then compared to the public contribution towards stadium construction.

This paper contributes towards the scholarly literature in three ways. Firstly, the identification of the catalysts for change, including the motivation behind facility development, provides the context within which a facility can be evaluated. If the motivation for facility construction was economically oriented, that is, the project was expected to create jobs and boost incomes, the project should be evaluated in that light. Secondly, the assessment of realised economic impacts during the facility and event stages of facility development can thus provide grounds for the consideration of tangible economic impacts as a central part of the justification for

[2] The Westpac Stadium is a "cookie-cutter", a term given to circular-shaped multiple-purpose facilities constructed in the 1960's and 1970's in North America.

local government involvement. Thirdly, the estimation of appropriate intangible benefits is a vital component when assessing the suitability of government involvement in a wider cost-benefit analysis.

The paper begins with a review of the scholarly literature on the economic case for government involvement in financing sports facilities in Section 2, followed by the development of the Westpac Stadium in Section 3. Ex-post econometric models are developed to examine the ex-post impact of stadium construction on employment in Section 4, the results of which are presented and discussed in Section 5. Estimates of intangible benefits associated with the Stadium are quantified and evaluated in a cost-benefit context in Section 6, and the paper concludes in Section 7.

2. LITERATURE REVIEW

The central question that needs to be answered in any analysis of subsidisation of sports facilities is whether the public investment in the facility is justified on economic grounds. Communities can potentially benefit from sports facilities, and these benefits include both tangible and intangible benefits. The roles of both types of benefits should be considered in the context of the type of evaluation conducted. The role of evaluation is discussed in the following sub-section.

2.1. Economic impact analysis versus cost-benefit analysis and the role of intangible benefits

There has been wide variation in how pro-subsidy arguments in different cities employed both economic and non-economic justifications for publicly financed stadiums (Eckstein and Delaney, 2002). Earlier stadiums were promoted by economic justifications; in more recent times they have been "…increasingly tied to community self-esteem and community collective conscience" (Eckstein and Delaney, 2002, p. 237). Economic impacts are often given as justification for government involvement (Burgan and Mules, 2001; Kesenne, 2005). Governments are, in most cases, interested in what effect public investment will have on the welfare of the local constituency (Dwyer, Forsyth, and Spurr, 2004). Indeed, the definition of economic development as an increase in income or GDP has been criticised within the literature as being too narrow in focus (Chema, 1996).

Some have claimed that an economic impact evaluation may merely be more convenient than an evaluation of the original intentions of hosting the event, which may include social or cultural benefits among others (O'Sullivan, Pickernell, and Senyard, 2009). Johnson and Sack (1996) suggested that restricting an evaluation of an event that was financed with non-economic intentions to its economic dimension would result in the project being assessed in an inappropriate policy context (Johnson and Sack, 1996). A project that includes both economic and non-economic characteristics should be evaluated in an overall community development context rather than a more narrowly defined economic evaluation (Johnson and Sack, 1996).

There are different views within the literature on what constitutes an appropriate evaluation of tangible outcomes of sports events and facilities from a public-sector funding perspective. Noll and Zimbalist (1997) noted that a "valid" economic impact study should be a calculation of the net benefits associated with public investment that includes not only the impact on income and the associated multiplier effect, but also consumption value, the value of externalities, and the opportunity costs (Noll and Zimbalist, 1997). An accurate economic impact analysis can provide information on the increase in tax revenues from a public investment, and thus can be considered an important evaluation tool for governments (Hefner, 1990). Indeed, if the maximisation of economic impacts is the intention of local government, then an economic impact study will be particularly informative (Burgan and Mules, 2001).

On the other hand, two comprehensive analyses have cast doubt on the reliability of these types of studies, showing that many economic impact studies adopted assumptions that inflated their economic impact (Crompton, 1995; Hudson, 2001). The inherently political nature of the stadium construction process has also been identified as a compelling explanation for the findings within the literature of over-stated benefits and under-stated costs within economic impact studies (Baade and Dye, 1988; Noll and Zimbalist, 1997). Kesenne (2005) has argued that even a properly conducted economic impact study does not provide justification for government involvement in such projects, advocating a cost-benefit analysis as a superior analysis.

Cost-benefit analysis (CBA) is the technique most commonly used to evaluate projects from an economic efficiency perspective. CBA incorporates measures of consumer and producer surplus, as well as opportunity cost, to fully evaluate a public investment (Burgan and Mules, 2001; Gillespie, 1999). Like economic impact analysis and computable general equilibrium (CGE) analysis, it has a fixed method, but its focus is on evaluating resource allocation implications of a project or policy decision (Gillespie, 1999; Hunn and Mangan, 1999). CBA is also similar to other evaluative tools in that it is not necessarily immune from potential manipulation to reflect the interests of a study's sponsors (Gillespie, 1999).

CBA and input-output analyses are fundamentally different techniques that assess different things. Input-output analysis estimates the impact of a project on key economic variables including employment and incomes, whereas CBA is designed to value the resource in question (Hunn and Mangan, 1999). Economic impact analyses hence typically ignore changes in consumer surplus that occur as a result of a project, instead measuring the gains and losses for particular sectors of the economy and representing these as gross rather than net changes (Edwards, 1990). This is not to say that economic impact analysis is entirely inappropriate as an evaluative tool. Burgan and Mules (2001) argued that in the case of events that attract substantial attendees from outside the locality, an economic impact study can, under certain conditions, approximate producer surplus gains from hosting an event. They argue that cost-benefit analysis emphasises consumer surplus, and when combined with the "prohibitive" cost of a full cost-benefit analysis for smaller events (Burgan and Mules, 2001, p. 322), cost-benefit analysis may be inappropriate for measuring the benefits associated with events that have a large proportion of non-local attendees.

Further strengthening the potential evaluative role of economic impact analysis, Burgan and Mules (2001) drew attention to the fact that supply constraints of factors such as labour and capital associated with events tended to be short-term and potentially non-existent if the event was signalled well in advance. The absence of supply constraints meant an event was unlikely to affect prices or input costs within the economy (Burgan and Mules, 2001). Dwyer, et al., (2004) noted that for smaller local analyses, the absence of a supply constraint was a feasible assumption because labour and capital could more easily come into the locality from outside. The larger the area in question, however, the less realistic the assumption and thus the greater the need for a more detailed analysis of impacts (Dwyer, et al., 2004).

Consumer surplus is defined as the economic surplus gained by buyers in a market, as measured by the difference between buyers' willingness to pay and the market price (Frank and Bernanke, 2004). Consumer surplus is considered an important theoretical component of the benefits accruing from a sports event or facility. In the case where the sport in question is of considerable importance to the local community (i.e. demand is inelastic), consumer surplus can potentially be a large proportion of the overall benefits from a sports event (Hone and Silvers, 2006; Siegfried and Zimbalist, 2000). The importance of consumer surplus as a benefit can be diminished if pricing practices by event promoters (for example, season tickets, family concessions, luxury seating and personal seat licences, among others) are effective in capturing this surplus (Johnson, Mondello, and Whitehead, 2007). Burgan and Mules (2001) have argued that consumer surplus is an inappropriate measure of benefit for a sporting event when the relevant consumers of event tourism are non-local. The relevant consumer surplus from a local government perspective is the surplus that accrues to local residents. Between 5 and 20 percent of attendance at professional sport in North America has been thought of as originating from outside the local area (Siegfried and Zimbalist, 2002). Although the importance of consumer surplus benefits can and have been questioned as grounds for government subsidisation (Johnson, et al., 2007), they should be at least considered in any evaluation of a facility or event.

Further economic justification for public sector involvement of the public sector in events and facilities in cost-benefit analysis occurs in the presence of market failure. Market failure is when the costs and benefits to society are different from those of private consumers and producers, and the market may, as a result, provide a socially inefficient level of output. Two major types of market failure may justify government involvement to some degree, namely the presence of externalities and public goods.

Positive externalities, also known as spillover benefits, include tangible benefits such as increased visitor spending in sectors of the economy that do not contribute towards the funding of the event or facility, and intangible benefits that accrue to people who do not attend the event (Siegfried and Zimbalist, 2000) and include such things as increased civic pride and synergistic effects (Harvey, Lavoie, and Saint-Germain, 1998). The presence of positive externalities results in the market under-providing the activity when compared to the socially efficient outcome. Likewise, negative externalities, or spillover costs, cause the market to over-provide the activity.

Public goods are the extreme case of goods with positive externalities, and as such are considered by many as perhaps the most compelling reason for government involvement (Crompton, 2004). Siegfried and Zimbalist (2000) identify the "major league city" argument of image enhancement as having characteristics of a public good. In the absence of government assistance, such public goods will not be provided and the market will be inefficient. Nearly all analyses of sport franchises and facilities on local economies have accepted the contribution of public goods associated with sports to a metropolitan area's quality of life. However, due to their largely non-quantifiable nature, little attention was typically been given beyond the acknowledgement of their existence (Rappaport and Wilkerson, 2001). Such benefits, though, are not universally accepted as genuine economic benefits (Meder and Leckrone, 2002).

Public good benefits have been measured in various contexts throughout the literature with the contingent valuation method. Johnson and Whitehead (2000) calculated the value of public goods generated by a proposed new facility (the University of Kentucky's new basketball arena).[3] Over one-third of those surveyed who were willing to pay higher taxes for a new stadium revealed perceived economic impacts as their primary reason, despite no information about any economic impacts being provided in the hypothetical valuation scenario (Johnson and Whitehead, 2000). The authors termed this as a form of "stadium illusion" – the belief that activity associated with a stadium represents a net increase in income (Johnson and Whitehead, 2000). Interestingly, Santo (2007), when applying the contingent valuation method to estimate the value of a potential major league baseball team to the city of Portland, Oregon, found that survey respondents also perceived tangible economic benefits from stadium construction, with these anticipated benefits contributing almost one-third of estimated willingness to pay that totalled US$74 million (Santo, 2007).

Results from Johnson and Whitehead (2000) indicated that the non-use values were less than the use values, with the use values being between two and eight times as large as non-use values (Johnson and Whitehead, 2000). The values of the combined benefits were found to be much lower than proposed construction costs. The non-use value of the public goods generated by the Pittsburgh Penguins NHL team to Pittsburgh residents was over twice as large as the use values (Johnson, Groothuis, and Whitehead, 2001). The values of total benefits were approximately 25% of the construction costs of a proposed new arena (Johnson, et al., 2001). The present discounted value of the public goods (non-use value) associated with the Jacksonville (Florida) Jaguars NFL franchise was substantially less than the sum of public subsidies previously outlaid to the Jaguars franchise (Johnson, et al., 2007). Likewise, the non-use values associated with Spanish football club Deportivo were estimated as being four times as large as the use values enjoyed by match attendees (Castellanos, García, and Sánchez, 2011).

A particularly interesting finding from across the three Johnson, et al., studies was that when the hypothetical scenario was phrased in terms of civic ownership of the team, non-use values were found to substantially exceed use values as a proportion of total willingness to pay. The

[3] A proposed new baseball stadium was also valued as a separate part of the analysis, and the results were similar in nature to those found for the basketball arena.

study where the valuation scenario was pitched as a facility contribution (Johnson and Whitehead, 2000) resulted in use values that were 2.3 times greater than non-use values. This may be because a facility is perhaps considered as part of the value of the major activities which it hosts rather than as a valuable commodity or asset in its own right. Other contingent valuation studies conducted in the United States have reinforced the argument that although use- and non-use values can be quantified, they are not by themselves sufficient to justify the extent of government subsidisation (Fenn and Crooker, 2009; Owen, 2006).

3. WESTPAC STADIUM: THE CATALYST FOR CHANGE

Several factors contributed to the development and construction of the Westpac Stadium in Wellington, New Zealand. What follows is a chronological summary of these factors, and their importance to the realisation of the new facility.

The home of many major events in Wellington for most of the 20th century was Athletic Park. A thorough history of the Park can be found in Donoghue (1999). The major user of the facility was rugby, and the Park hosted rugby at all levels, including club, provincial, Super 12 and international matches. In the early 1990s, the Wellington Rugby Football union's annual rent at the Park rose by 500% to approximately NZ$90,000 (Donoghue, 1999). There were also structural problems with the Millard Stand, the major stand in the Park, around this time. Athletic Park also hosted many international concert acts up until the early 1990s, when local residents successfully complained about the noise and other negative impacts to the Environment Court. This resulted in the Park being unable to host concerts (Donoghue, 1999).

Faced with an upgrade bill of NZ$13 million for the Park, the city began to look for other options (Donoghue, 1999). Despite approval being given for a NZ$18 million upgrade in 1994, the city put the upgrade on hold while it evaluated the suitability of the city's other major sporting ground, the Basin Reserve, as a multi-purpose facility (Donoghue, 1999). In 1995, the upper level of the Millard Stand was given a five-year life expectancy due to engineering concerns with the steel in the structure (Donoghue, 1999). In 1996, the Wellington Rugby Union signed a heads of agreement with the Wellington Stadium Trust, the group responsible for the new multipurpose facility, which signalled the end for the Park (Donoghue, 1999). Athletic Park continued to host international rugby up until the opening of the new stadium after a NZ$300,000 upgrade of the facility saw it meet New Zealand Rugby Union standards (Donoghue, 1999). The upgrade was funded by the Capital Trusts-owned liquor chain, Nicholson's, a deal that also involved the naming rights to the Park (Currie, 1997).

Local and central government played key roles in the development of the new stadium. Central Government provided the 6.5 hectare rail yards site in Thorndon, on the waterfront of the city. In July 1995 the Wellington City council agreed to loan NZ$15 million of the cost, and this was followed a month later by the Wellington Regional Council loaning NZ$25 million, making the combined local government contribution approximately one-third of construction costs (excluding the value of land) (Westpac Stadium, 2010b). By way of an

international comparison, Rappaport and Wilkerson (2001) pointed out that for the 17 football and baseball stadiums built in the United States in the period 1994-2001, the average public contribution was 66 percent of the total cost. For basketball and hockey arenas the public contribution was 45 percent (Rappaport and Wilkerson, 2001). The loans were granted on the basis that the stadium would create "…economic and community benefits for the Wellington Region" (Arcus, et al., 2004, p. 5). In mid-1995, the Wellington Regional Council commissioned a survey of residents to gauge public opinion on the proposal to contribute NZ$25 million towards the Stadium. Of the 2000 respondents, 70 percent were in favour of the $25m contribution, with only 14 percent opposed to any council involvement (Wellington Regional Council, 1995). The loans were originally intended to be one-off grants; however, the prediction of surpluses from corporate renewals resulted in the grants becoming non-recourse loans (Aldridge, 1997).[4]

The stadium was viewed as an important factor in the Wellington community even before it had been officially opened. During stadium construction, the stadium attracted so much interest from the public that Fletcher Construction opened a visitors' centre on the site in December 1998 (McConnell, 1998). Bedford (1998) reported that in October 1998, an Evening Post-Business Research Centre poll of 314 business leaders in the Wellington region found that employers were expecting improved trading conditions, which was likely to result in future increased employment. Reasons for increased optimism included the construction of the stadium and the growth of tourism due to the newly built national museum, Te Papa Tongarewa (Bedford, 1998).

The Business Roundtable commissioned a report into the suitability of government subsidisation of stadiums and sporting events for submission to the stadium decision. Cowen's 1999 report observed that no relationship had been found between stadium subsidies and economic growth, employment and tax bases. The report was dismissive of the distributional effects of subsidies for stadiums. Several arguments against subsidies were made, including the fact that many proposed social benefits tended to be internalised through mechanisms like ticket sales, and that the multiplier argument typical of economic impact studies blurred expenditure switching and real income creation (Cowen, 1999). Subsidies merely caused spending to be switched from one area of the economy to another and benefited special-interest groups rather than the taxpaying public (Cowen, 1999).

A pre-construction economic assessment by consultants Business and Economic Research Limited (BERL) in 1996 indicated that the construction of the stadium would inject NZ$43 million into the Wellington region and create 498 full-time jobs (Johnson, 1999). Recent information on the Westpac Stadium website indicated that on event days, the number of total staff employed ranged from 400 to 1000 workers, while on non-event days, between 25 and 50 workers are typically employed (Westpac Stadium, 2010a).

Much of the stadium construction work was completed by local firms. Lilley (1998) noted that of the NZ$80 million in components contracts for the stadium that were awarded by

[4] Essentially, non-recourse loans mean that as surpluses become available, the loans are to be repaid. Surplus funds were defined as funds after costs, liabilities, debt reductions and capital expenditures.

December 1998, three-quarters of this value was awarded to firms outside Wellington city. The breakdown of this work is shown in Table 1.

Table 1: Allocation of Components Contracts for Regional Stadium (December 1998)

Local Area	Value of contract work
Otaki	$16 million
Lower Hutt	$13 million
Porirua and Tawa	$11 million
Timaru	$7.5 million
Upper Hutt	$5.5 million

Source: Lilley (2008)

The majority of the work, however, was completed by firms within the Wellington region. Smaller contracts were also awarded to firms based in Bulls, Taranaki, Wairarapa, Palmerston North, Auckland, and local subsidiaries of Australian companies (Lilley, 1998).

Construction of the stadium took place from August 1997 to December 1999 (Fletcher Challenge Construction, 2004b), and the facility was opened in January 2000. 250 staff were employed on-site during construction, with 230 employed off-site (Williamson, 2009). Westpac Stadium, named after the sale of the facility's naming rights, is a day/night venue, with multiple uses as a sporting venue and as a concert/show venue. The stadium has 34,500 permanent fully enclosed seats, with parking for 850 cars beneath the stadium. The Stadium is renowned for its very close proximity to the city centre – it is only a few minutes' walk from the Stadium to the central entertainment district (1.7km) – as well as major public transport hubs, including the harbour, railway station, and bus terminal. This enables easy access to and from the facility. It has been estimated that one-third of spectators at the Westpac Stadium utilise the rail network to attend events at the Stadium (Arcus, et al., 2004).

The new stadium was designed with multiple purposes in mind, not only replacing Athletic Park, but also complementing the existing home of cricket, the Basin Reserve, through the hosting of one-day internationals. Sports hosted at the Stadium since it opened included rugby, rugby league, cricket and football (soccer). One of the reasons for building the stadium was to attract the types of events that hadn't previously taken place in Wellington due to the lack of a suitable facility, including major concerts. The Westpac Stadium has attracted major performers including Robbie Williams, David Bowie, The Rolling Stones, Elton John, and The Police in recent years, as well as numerous trade shows, community events, and stadium tours. A summary of the attendance for each year from 2000 to 2009 is shown in Table 2.

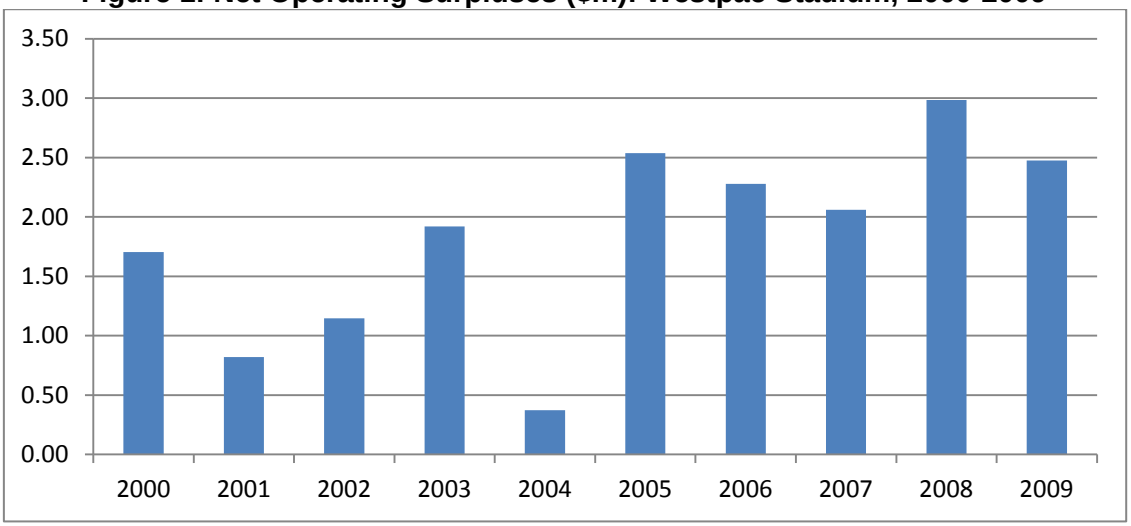
Table 2: Annual Attendance at Westpac Stadium, 2000-2009

Year	Attendance
2000	401,659
2001	645,710
2002	537,353
2003	535,955
2004	410,508
2005	594,986
2006	506,928
2007	483,000
2008	550,492
2009	528,038

Source: Wellington Regional Stadium Trust Annual Reports, 2000-2009.

In 1999-2000 the Stadium posted a NZ$1.7 million operating surplus in its first financial year of operation (The Dominion, 2000). In 2001-2002 the surplus was $1.15 million, and the 2002-2003 financial year resulted in an operating surplus of $1.92 million on revenues of almost $14 million (Wellington Regional Stadium Trust (Inc.), 2003). The operating surplus figures between 2000 and 2009 can be seen graphically in Figure 1.

Figure 1: Net Operating Surpluses ($m): Westpac Stadium, 2000-2009



Source: Wellington Regional Stadium Trust Annual Reports, 2000-2009.

Cost overruns resulting from an increase in construction costs between 1995 and 1999 resulted in the Stadium Trust borrowing $33.65 million from the ANZ Bank, which was more than double the $15 million forecast in 1997.[5] Stadium chief executive David Gray said in 2003 that the bank debt would be fully serviced before the loans from the city and regional councils would be repaid (Loh Ho-Sang, 2003). Bank debt was planned to be serviced by a $1.5 million payment each year, taking an estimated 20 years to pay off (Loh Ho-Sang, 2003).. The debt was at $18.3 million in June, 2009. As a result, no repayments were made to

[5] Projected costs in 1995 were $72 million. The stadium's business plan projected that the bank debt was to be repaid in 15 years.

the local and regional council debts in the first ten years of operation. In September 2008, stadium chairman Paul Collins said that repaying the publicly funded portion of the stadium cost was a low priority for the facility (Churchouse, 2008).

3.1. The First Ten Years: An Evaluation

In 2004 and 2010, economic consultants BERL were commissioned by the Wellington Regional Stadium Trust to put together a report on the outcomes achieved in the first five and years of operation of the Westpac Stadium respectively. As mentioned in the previous section, BERL also conducted the pre-construction economic impact analysis, and when looking back, found that their projections for annual direct spending, employment generated and value added in 1996 were less than half of what eventuated between 2000 and 2009. Details of these are as shown in Table 3.

Table 3: Predicted Ex-Ante Impacts Versus Estimated Ex-Post Impacts

	1996 (annual estimate)	**2000-2004 (average)**	**2005-2009 (average)**	**2000-2009 (average)**
Direct spending by spectators (2009$, million)	19.9	42.6	54.2	48.4 (+143%)
Employment generated (FTEs)	270	590	755	673 (+149%)
Total Value Added (2009$, million)	15.4	36.7	47.2	42.0 (+172%)

Source: Norman and Sanderson (2010).

During 2000-2009, BERL estimated that activity at the Westpac Stadium sustained an annual average of 673 full time equivalent (FTE) positions. As a percentage of total employment in the Wellington region, the BERL estimates in each year were between 0.35 and 0.5 percent of total FTE positions for an annual average of 0.41 percent throughout the first ten years. These calculations are shown in Table 4.

Table 4: Estimated Employment Effects on Wellington Region, 2000-2009

Year	Estimated Total Employment Effect	Regional FTE (at December quarter)	Percentage of employment
2000	529	153,100	0.35
2001	602	156,800	0.38
2002	611	158,600	0.39
2003	581	156,200	0.37
2004	629	159,700	0.39
2005	649	164,500	0.39
2006	696	172,900	0.40
2007	796	177,300	0.45
2008	859	173,000	0.50
2009	777	165,700	0.47
Average	673	163,780	0.41

Sources: Norman and Sanderson (2010), Statistics New Zealand, author calculations.

The estimates of total employment effect in Table 4 are not (and should not be interpreted as) estimates of net gains in employment to the Wellington region. Employment in sports-related sectors of the economy was sustained prior to 2000 by event-related activity at Athletic Park and other venues elsewhere in Wellington. As Westpac Stadium was essentially a replacement facility for Athletic Park, the expectations for a substantial economic impact from event-related activity at the Westpac Stadium should be lowered somewhat. As Baade and Sanderson (1997) put it:

> Once the construction phase of the project is over, the new facility cannot contribute significantly more to community output and employment than the old facility did unless the new structure is far more successful in attracting fans from beyond the community's borders. In the case of replacement facilities, it is more accurate to promise that they will maintain current employment. To suggest or imply that a replacement facility creates new jobs, without inducing an increase in spending overall, has no theoretical foundation and almost certainly exaggerates its economic impact (Baade and Sanderson, 1997, p. 473).

Arcus, et al., (2004) used a newspaper article quote to illustrate the importance of rugby's Bledisloe Cup to Wellington:
"It makes New Year's Eve look tame. It's like we have three New Year's Eves in a row" (Johnson, 2004).
In the same article, Wellington Tourism estimated that the game would result in an injection of $5 million to $6 million into the local economy (Johnson, 2004). By way of contrast, an article on the 1996 Bledisloe Cup clash at Athletic Park quoted Tourism Wellington as anticipating a $4m boost to the local economy (Schouten, 1996). Assuming that the estimates are accurate, the real impact (adjusted using the Consumer Price Index) of the 1996 game in 2004 dollars was approximately $4.6 million. The impact of hosting the 2004 game on the Wellington region that could be considered directly attributable to the new facility was most likely somewhere in the order of $0.4m to $1.4m.

Likewise, throughout each of the reports, the terms ‘impact’ and ‘benefit’ are used almost interchangeably. For instance:

> This new report, which estimates the actual benefits that have occurred in the Wellington Region, shows that on average over the first five years the Stadium has generated $35 million of direct spending from outside of the Region, employment of 569 FTEs and total value added of $27 million per annum. This is more than double the expected impact in the 1996 report (Arcus, et al., 2004, p. 2).

and:

> The Stadium has created around 440 direct permanent FTEs (full-time equivalents) on average across the 10 years. Taking into account upstream and downstream effects, this is an average of 670 FTEs added to the economy. This impact is between 2.4 and 2.7 times the forecast benefits of the Stadium estimated in the 1996 report (Norman and Sanderson, 2010, p.10).

It should also be emphasised that economic impacts are not necessarily economic benefits. In order to judge impacts as being beneficial in nature, one must be certain of the counterfactual scenario. It must be the case that that the spending generating the impact would not have occurred in the absence of the stadium for the impact to be considered as a benefit. This is difficult to justify when one considers the variety of events hosted at the new facility. If the stadium was not built, it is possible (although unlikely) that Athletic Park may have been upgraded, or another facility such as the Basin Reserve (the alternative project put on the backburner before the Stadium came to fruition) may well have been upgraded. Because it is difficult to say what would have happened in the absence of the stadium, it is therefore difficult to justify the impacts as benefits. For the purposes of this analysis, these outcomes are referred to as impacts and not benefits.

The interpretations given to the results of the Arcus, et al. (2004) and Norman and Sanderson (2010) reports contrast with the findings of much of the independent ex-post economic impact research, and thus constitute an interesting context for a case study analysis. A pertinent question at this juncture is whether these estimated impacts on employment were actually realised given that the economic benefits in the form of jobs created were given as a reason for government involvement in the stadium’s construction. There are thus two hypotheses to be tested at this point of the analysis. The first hypothesis is that stadium construction was associated with an increase in employment in the Wellington region. The second hypothesis is that the first ten years of the stadium’s operation was associated with an increase in employment in the Wellington region. What follows next is the development of an empirical model that is used to test these hypotheses.

4. EVALUATING THE TANGIBLE EMPLOYMENT IMPACTS: MODELS AND DATA

In this section, the models used to evaluate the impact of the Westpac Stadium on the Wellington regional economy are outlined. The purpose of this chapter is firstly to examine whether stadium construction and post-construction activity has positively impacted upon employment in the Wellington region. If stadium construction and post-event activity are found to have a positive effect on employment, then it can potentially justify local government involvement in the construction of the facility, as well as lending support to those who advocate stadiums as investments to stimulate economic growth.

4.1. Employment Models

The analysis of the employment effects of stadium construction in this paper is derived from a combination of Hudson's (1999) and Miller's (2002) studies. Both types of models are supply-side models, with employment growth determined by economy- and industry-specific variables as well as stadium dummy variables.

The models estimated in this analysis are shown below in equations 1 and 2:

$$FTE_t = \beta_0 + \beta_1 FTE\_NZ + \beta_2 LF_t + \beta_3 RAWE_t + \beta_4 INT_t + \beta_5 STAD_t + \beta_6 TEPAPA_t + \sum \delta Q_t + \beta_7 TIME + e_t \quad (1)$$

$$FTE_t = \beta_0 + \beta_1 FTE\_NZ + \beta_2 LF_t + \beta_3 RAWE_t + \beta_4 INT_t + \beta_5 STAD_t + \sum \gamma POSTSTAD_t + \beta_6 TEPAPA_t + \sum \delta Q_t + \beta_7 TIME + e_t \quad (2)$$

where:
FTE_t is the level of employment in the Wellington region in quarter *t*,
FTE_NZ_t is the national level of employment in quarter t,
LF_t is the level of the labour force in the Wellington region,
$RAWE_t$ is the (real) level of wages and salaries in the Wellington region,
INT_t is the value of the 90-day bank bill rate,
$STAD_t$ is a dummy variable equal to 1 in the time periods in which the Westpac Stadium was being constructed and zero otherwise,
$TEPAPA_t$ is a dummy variable equal to 1 in the periods in which Te Papa was built and zero otherwise,
Q_t are quarterly dummy variables (with the fourth quarter dummy omitted),
$POSTSTAD_t$ are alternative dummy variable specifications of the post-construction period,
TIME is a yearly time trend, and
e_t is the error term.

Equation 1 is estimated to assess the effect of construction of the stadium on the Wellington region, while equation 2 is estimated to assess the effect of post-construction stadium activity

for the first five years of operation. In equation 2, the alternative $POSTSTAD_t$ specifications include dummy variables for the first five years (*FIRST_FIVE_YEARS*, which takes a value of one for each quarter between 2000:1 and 2004:4, zero otherwise) and the first ten years (*FIRST_TEN_YEARS*, which takes a value of one for each quarter between 2000:1 and 2009:4, zero otherwise).

Hudson (1999) found that variables representing market size, energy prices, and education levels of the local labour force were important variables in regional employment growth analyses. As the variables used in this analysis are specified in levels, the labour force and real wages are included in the market size category, which has been found to be an important determinant of employment from the firm's perspective. The less expensive labour is, the more labour will likely be hired, and vice versa. The national level of FTE employment is included to capture the influence of nationwide economic performance on the local economy. One would expect that national economic activity strongly influences economic activity in regional economies. If the national economy is doing well, then we would expect there to be flow-on effects to the regions. The close theoretical and empirical relationship between employment and investment is incorporated into this model with the inclusion of the 90-day bank bill rate as a proxy for short-term interest rates. The greater the yield on investment, economic theory tells us, the greater investment and employment should be as a result (Miller, 2002). An alternative possibility is that an increase in short term real interest rates increases the cost of borrowing and would thus reduce investment and employment, other things equal. A variable is also needed in this analysis to control for the effect of the construction of the $317 million Museum of New Zealand, Te Papa Tongarewa, which was built in Wellington between December 1993 and July 1996 (Fletcher Challenge Construction, 2004a). The New Zealand Institute of Economic Research conducted an economic impact analysis for Te Papa on the Wellington region and noted that Te Papa sustained 672 full-time equivalent jobs (Ballingall and Walton, 2002). Without explicitly taking the influence of Te Papa's construction in the economy into account, other variables within the analysis may unintentionally capture some of this influence.

The $STAD_t$ variable is the variable of particular interest in this analysis. If it takes a significantly positive value, then it may provide evidence to support arguments that stadium construction boosted overall employment in the local economy. The $POSTSTAD_t$ variables are utilised in equation 2 to assess the employment outcome of the first five years of stadium operation.

A check of the correlation coefficients between the variables to be used in the models prior to model estimation revealed possible multicollinearity between some variables. To eliminate multicollinearity between the *FTE_NZ*, *RAWE* and *LF* series with the time trend, and after the analysis of the stationarity properties of these variables (see Section 4.2), these variables were modified accordingly. *FTE_NZ* and *RAWE* were re-specified as growth rates (*GFTE_NZ* and *GRAWE*), and *LF* was first differenced (*DLF*). Subsequent examination of these modified variables revealed no issues with multicollinearity between any of the variables or the time trend. The adjusted variables are then used alongside levels of *FTE* and *INT* and the dummy variables already identified in the model estimations. Corrections also needed to be made within the models to control for the potential differences between the Quarterly Employment

Survey (QES) and Earnings and Employment Survey (EES) measurements of each of the *FTE*, *GFTE_NZ*, and *GRAWE* time series. There is a measurement break for each of these series at the third quarter of 1999 where the QES is discontinued and the EES begins. A one period dummy variable (*d99Q3*) for this quarter is thus added to each model to control for this break.[6]

The final models to be estimated are those shown in equations 3 and 4 below.

$$FTE_t = \beta_0 + \beta_1 GFTE\_NZ + \beta_2 GRAWE_t + \beta_3 DLF_t + \beta_4 INT_t + \beta_5 STAD_t + \beta_6 TEPAPA_t + \sum \delta Q_t + \beta_7 TIME + \beta_8 d99Q3 + e_t \quad (3)$$

$$FTE_t = \beta_0 + \beta_1 GFTE\_NZ + \beta_2 GRAWE_t + \beta_3 DLF_t + \beta_4 INT_t + \beta_5 STAD_t + \sum \gamma POSTSTAD_t + \beta_6 TEPAPA_t + \sum \delta Q_t + \beta_7 TIME + \beta_8 d99Q3 + e_t \quad (4)$$

4.2 Data

The data set used for this analysis consisted of quarterly data from the third quarter of 1989 to the fourth quarter of 2009, and were obtained from Statistics New Zealand's Infoshare database. The definitions and summary statistics for the variables utilised in this analysis are as shown in Table 5.

[6] Initial specifications of this model included dummy variables that were interacted with the variables affected by the measurement break. There was a noticeable increase for each of the series in the third quarter of 1999 but no change in the trend – hence a single period dummy variable is utilised in this analysis.

Table 5: Variable Definitions and Summary Statistics

Variable	Definition	Infoshare (Statistics New Zealand) source category:	Mean	Standard Deviation	Minimum	Maximum
FTE	Full Time Equivalent employment numbers in Wellington region (Total Male and Female), in thousands.	Quarterly Employment Survey (1989:1 to 1999:3), then Earnings and Employment Survey (1999:3 to 2009:4)	144.96	143.80	121.40	172.70
GRAWE	Quarterly growth in Average Total (Ordinary + Overtime) Weekly dollar Earnings in Wellington region (Total Male and Female), adjusted with CPI data (base quarter: 2006:2), in percent.	Quarterly Employment Survey (1989:1 to 1999:3), then Earnings and Employment Survey (1999:3 to 2009:4)	0.1927	0.0867	-3.4516	5.5933
GFTE_NZ	Quarterly growth in Full Time Equivalent employment numbers in New Zealand (Total Male and Female), in percent.	Quarterly Employment Survey (1989:1 to 1999:3), then Earnings and Employment Survey (1999:3 to 2009:4)	0.2283	0.0252	-3.9530	2.9663
DLF	Quarterly change in Total Labour Force in Wellington Regional Council (Total Male and Female), in thousands.	Household Labour Force Survey	240.93	238.10	201.60	298.10
INT	90 Day Bank Bill rate, in percent.	Financial Statistics	7.2663	6.9700	2.7700	14.290
STAD	Dummy variable for Westpac Stadium construction (1 during construction, zero otherwise).	Construction period: 1997:3 – 1999:4	0.1042	0.0000	0.0000	1.0000
TEPAPA	Dummy variable for Te Papa construction (1 during construction, zero otherwise).	Construction period: 1993:4 – 1996:3	0.1042	0.0000	0.0000	1.0000

The variables chosen were selected for consistency across the sample period and for ease of interpretation. Employment and earnings data were available specifically for the Wellington region, as was the labour force measure. The interest rate data was only available at the national level.

Because this analysis involves time-series data, caution is needed to avoid potentially spurious findings caused by the presence of non-stationary variables in the estimated equations. The effect of non-stationarity in time series models can be serious, resulting in unreliable and misleading estimates and test statistics. The results of non-stationarity tests for the non-dummy variables used in this analysis are presented below in Table 6.

Table 6: Unit Root Tests for Stationarity

Variable	Trend and intercept	p-value
FTE	-3.495381	0.0465
GRAWE	-10.05022	0.0000
GFTE_NZ	-9.856430	0.0000
DLF	-12.18822	0.0000
INT	-3.414400	0.0587

Note: p-values reported are MacKinnon (1996) one-sided p-values (MacKinnon, 1996).

The tests used for each variable series were Augmented Dickey-Fuller tests. Each variable was tested with both trend and intercept. As we can see from the above results, the null hypothesis of non-stationarity (i.e. that each variable had a unit root) was rejected for each of the variables at the 10% level of significance or lower (p-value $\leq$ 0.0587), hence the data do not need further adjustment for non-stationarity before use in model estimation.

5. RESULTS

Equations 3 and 4 were estimated and the results for (i) the during-construction impact, and (ii) the post-construction impacts, are presented in sub-sections 5.1 and 5.2 respectively.

5.1. Facility Construction Effects

Equation 3 was estimated to evaluate the effect of stadium construction on employment growth in the Wellington region during the period of construction. The results are presented in Table 7.

The static model (column (1) in Table 7) was initially estimated using ordinary least squares (OLS). Tests for autocorrelation (Breusch-Godfrey LM test) and heteroskedasticity (White's test) indicated that errors were homoskedastic but that the model needed to be adjusted for autocorrelation. Autocorrelation is a common problem with such time-series models as these,

Table 7: Stadium Construction and Employment – Estimated Parameters

	Model 3: OLS (static) Dependent variable: FTE		Model 3: OLS (dynamic) Dependent variable: FTE		Model 4(i): OLS (dynamic) Dependent variable: FTE		Model 4(ii): OLS (dynamic) Dependent variable: FTE	
	(1)		(2)		(3)		(4)	
Variable	**Coefficient**	**Prob.**	**Coefficient**	**Prob.**	**Coefficient**	**Prob.**	**Coefficient**	**Prob.**
C	96.189	0.000	15.536	0.015	14.907	0.022	17.629	0.016
GFTE_NZ	0.619	0.033	1.273	0.000	1.296	0.000	1.246	0.000
GRAWE	0.298	0.356	0.254	0.140	0.238	0.171	0.280	0.116
GRAWE(-1)	0.129	0.679	-0.188	0.261	-0.210	0.223	-0.151	0.396
DLF	-0.027	0.598	-0.003	0.901	-0.002	0.953	-0.004	0.889
INT	1.787	0.000	0.348	0.019	0.307	0.059	0.394	0.018
STAD	-1.865	0.107	-0.269	0.665	-0.357	0.577	0.086	0.918
FIRST_FIVE_YEARS	-	-	-	-	-0.316	0.545	-	-
FIRST_TEN_YEARS	-	-	-	-	-	-	0.776	0.533
TEPAPA	-5.031	0.000	-0.651	0.348	-0.709	0.314	-0.522	0.473
TIME	0.649	0.000	0.122	0.004	0.115	0.009	0.122	0.005
Q2	-0.205	0.846	0.312	0.576	0.291	0.607	0.346	0.541
Q3	-0.093	0.933	1.114	0.063	1.108	0.065	1.138	0.059
Q4	-0.228	0.833	-0.465	0.420	-0.508	0.385	-0.404	0.492
d99Q3	6.402	0.064	8.112	0.000	8.090	0.000	8.101	0.000
FTE(-1)	-	-	0.826	0.000	0.835	0.000	0.835	0.000

Adjusted R-squared	0.956	0.988	0.987	0.987
F statistic	142.437	482.265	443.570	443.731
White's LM test	20.695	20.118	21.781	19.913
(p-value)	(0.295)	(0.451)	(0.412)	(0.527)
Breusch-Godfrey LM test	14.064	1.075	1.170	0.780
(p-value)	(0.000)	(0.304)	(0.283)	(0.381)

and one of the causes of the presence of autocorrelation is model misspecification (Hendry, 1995). The model was subsequently re-estimated in column (2) of Table 7 as a dynamic model, with the inclusion of a lagged dependent variable in the model estimation. The dynamic model explained the variation in employment well (adjusted R-squared of 0.988) and a Jarque-Bera test for normality revealed that the errors were normally distributed (p-value of 0.207).

Seven of the fourteen coefficients are statistically significant at the 10% level or better, and have signs that are consistent with their use in similar models in the literature. Growth in national employment was positively and significantly (p-value = 0.000) correlated with FTE employment in Wellington, indicating that growth of 1% in national employment was associated with an increase of 1273 jobs in the Wellington region. Growth in real average weekly earnings was not found to be significantly different from zero. To ensure that there were no undetected lagged effects at work, a first period lag (*GRAWE(-1)*) was also included, and was found to be statistically insignificant. A change in the level of the labour force did not significantly affect employment. Interest rates were found to positively affect employment in the Wellington region (p-value = 0.019). A 1% increase in interest rates was associated with an increase of approximately 348 FTE positions. The time trend was positive and significant (p-value = 0.000). Of the quarterly dummies, only the third quarter was found to be significantly negative (p-value = 0.063), suggesting a fall in employment of 1114 jobs. The 1999:3 dummy variable included to control for the break in the time series was significantly different from zero (p-value = 0.000). The lagged dependent variable was also significantly different from zero, (p-value = 0.000), suggesting that the dynamic specification is appropriate. A further test of the Breusch-Pagan LM test for autocorrelation revealed that there were no issues with autocorrelation after the inclusion of the lagged dependent variable and results of White's test for heteroskedasticity showed errors were homoskedastic.

The Westpac Stadium construction coefficient (p-value = 0.665) and the Te Papa construction coefficient (p-value = 0.348) were negative and not significantly different from zero at conventional levels of significance (10% level or better). This result indicates that the effect of stadium construction on overall employment in the Wellington region was statistically insignificant. It is possible that employment in specific sectors could have increased during stadium construction; this result suggests, however, that if employment in one sector (e.g. construction) had in fact increased during the construction period, then employment in another sector was likely to have fallen at the same time.

5.2. Post-Construction Stadium Activity: The First Ten Years

Equation 4 was estimated to evaluate the effect of post-construction stadium activity in the first five years on employment in the Wellington region. Two alternative specifications for the $POSTSTAD_t$ variable in equation 4 were utilised – equation 4(i), in which a dummy variable that spanned the first five years of post-construction activity (*FIRST_FIVE_YEARS*) was included, and equation 4(ii), in which a dummy variable spanning the first ten years (*FIRST_TEN_YEARS*) was included. The results are presented in columns (3) and (4) of Table 7.

Following the same estimation procedure as for equation 3, the final estimation of each variation of equation 4 was a dynamic model. The Jarque-Bera test of normality of the errors of each of the models indicated that residuals were normally distributed for equation 4(i) (p-value = 0.234), and also for equation 4(ii) (p-value = 0.283). Both models explained the variation in employment well (adjusted R-squared of 0.987 for both equation 4(i) and 4(ii)). As for the earlier models, results from tests for autocorrelation and heteroskedasticity for each of the models indicated that the errors were not in need of adjustment.

The results of the control variables are very similar to those obtained from the dynamic estimation of equation 3 (column (2) in Table 7). The coefficients that are significant in columns (3) and (4) are consistent with those shown in column (2). The variables of particular interest in this section are the alternative $POSTSTAD_t$ variables. In column (3) the coefficient on the *FIRST_FIVE_YEARS* dummy variable is negative (-0.316) but not significantly different from zero (p-value = 0.545). The $STAD_t$ coefficient is also negative and statistically insignificant (p-value = 0.577), as it was in column (2). A test of the joint significance of *STAD* and *FIRST_FIVE_YEARS* showed that the two coefficients were jointly insignificant (p-value = 0.462). In column (4), however, the coefficient on the *FIRST_TEN_YEARS* dummy variable is positive (0.776) but not significantly different from zero (p-value = 0.533). The $STAD_t$ coefficient is also positive (0.086) and statistically insignificant (p-value = 0.918). A test of the joint significance of *STAD* and *FIRST_TEN_YEARS* showed that the two coefficients were also jointly insignificant (p-value = 0.653).

5.3. Discussion

Summarising across columns (1) and (2) of Table 7, these results indicate that the Westpac Stadium did not appear to significantly influence aggregate employment in the Wellington region during the period in which it was built. This is an unsurprising result when one considers it was essentially a replacement and not a new facility. It is also unlikely to have a sizeable impact given the value of the facility relative to the region's GDP. The Wellington region's real GDP from the September 1997 quarter to the December 1999 quarter inclusive was approximately $38 billion (data provided by Infometrics regional database). The $122 million cost of the Stadium was less than four tenths of a percent (0.32%) of regional GDP during that period.

A very similar picture is painted when one considers the effects on regional employment of the first five and ten years of the Stadium's operations in columns (3) and (4). Neither of the specifications of the post-construction period found statistically significant employment outcomes. Even when combined with the stadium construction period, there were no significant changes to employment – that is, the presence of the stadium did not increase overall employment. As mentioned earlier, one cannot rule out the possibility that employment in certain sectors could have increased during these periods. The analysis does, however, call in to question the appropriateness of government funding in the Stadium project that would appear to have, on the surface, done nothing more than change the composition of regional employment. The intention of channelling local and regional government funding towards the construction of the

Stadium was to create economic benefits for the city and the region. This analysis suggests that the employment impacts calculated by Arcus, et al. (2004) and Norman and Sanderson (2010) did not materialise as benefits (i.e. new jobs) at the aggregate level. The benefits of the Stadium were thus almost certainly not employment-related. The fact that Westpac Stadium was essentially a replacement facility meant that it was highly likely that employment levels would be merely maintained and not increased.

An alternative interpretation of these results would be that employment may have been lost in the absence of the Stadium, in which case these results could potentially support an argument that the Stadium was beneficial to the region in that it retained, rather than created, employment at an aggregate level. It is also possible that stadium-related jobs may have been created in the local Wellington area rather than at a regional level given its location in Wellington city. Results from this analysis suggest that if job creation at the local level did occur, it was likely to have come at the expense of jobs elsewhere in the region.

A change in the composition of employment may have important implications for the regional economy. Previous scholarly research in this area has identified a potential issue that may bring about a worsening in economic development relative to other regions. In particular, if a subsidised sports facility project results in the creation of low-skill employment at the expense of high-skill employment, the host region may well experience a deterioration in economic development (Baade and Dye, 1990). This paper does not provide evidence as to whether this actually happened in the Wellington region. Nonetheless, it remains a possibility that local governments should consider when deciding whether to contribute public funding toward a facility project.

6. EVALUATING THE INTANGIBLE CONSUMER SURPLUS BENEFITS

The general limitations of the nature of intangible benefits discussed in the literature review of Section 2 notwithstanding, a logical next step in the absence of tangible benefits accruing from a stadium investment is to consider the nature of intangible benefits generated by the facility. It has been noted that many of the intangible benefits associated with sporting events may not be fully captured by event organisers through traditional revenue channels (Layson, 2005; Siegfried and Zimbalist, 2000). In the case of consumer surplus, however, Johnson, et al. (2007) argued that monopoly sports franchises would be highly likely to appropriate much of the surplus due to their ability to adopt a variety of pricing practices. Layson (2005) considers a facility to be a worthwhile investment from the perspective of local government if "... the discounted sum of consumer surplus plus revenue over time must ... exceed the discounted sum over time of the facility's costs" (Layson, 2005, p.222).

Two studies in the literature have attempted to quantify consumer surplus of major league sports in the United States. One such study derived consumer surplus from estimating a demand equation for baseball (Irani, 1997), while the other estimated consumer surplus values from

ticket revenues from each of the four major league sports (baseball, football, basketball and hockey) utilising different assumed values of price elasticity of demand (Alexander, Kern, and Neill, 2000). This paper adopts the method developed by Alexander, et al., (2000) and suggests some modifications to ensure the resulting values are appropriate in the context of a facility evaluation.

Alexander, et al., (2000) derived an approximation of consumer surplus as the following formula:

$$CS = -p_0 q_o / 2\eta \quad (5)$$

where $p_0 q_o$ is ticket revenue, and η is the price elasticity of demand for attendance.[7]

This analysis differs from the Alexander, et al., (2000) analysis in that it considers stadium event revenues rather than ticket revenues captured by franchises using the facility. The stadium earns revenues from events through a combination of stadium hire (which can come from a per-head ticket levy, a percentage of ticket income or a fixed fee depending upon the event), match catering revenues and other revenues including parking, merchandise stall rentals, etc (Thompson, 2012). Figures for Westpac Stadium event revenues are reported annually in the Wellington Regional Stadium Trust's annual reports (see http://westpacstadium.co.nz/annual-reports/ for these). Two alternative price elasticities are utilised in these calculations. A price elasticity of demand value of -1 can be justified on the grounds that promoters set ticket prices where revenue is maximized, assuming sufficient capacity within the facility (Layson, 2005). The effect of a price elasticity of demand value of -0.5 is also considered, given that several studies of sporting attendance conducted on Australian and New Zealand sports, have found that demand was price inelastic and around -0.5 (Alchin and Tranby, 1995; Borland and Lye, 1992; Richardson, 2012b).

Both the Irani (1997) and Alexander, et al., (2000) estimates of consumer surplus suffer from two important shortcomings. Firstly, the consumer surplus measures are based on total expenditure on tickets, a proportion of which is non-local. Estimates based on total ticket expenditures will overstate the relevant consumer surplus within such an analysis. The relevant figure to assist local government decisions should be local consumer surplus, and as such, aggregate figures need to be modified. This is done below with a simple adjustment:

$$CS^{adj} = -\theta(p_0 q_o)/2\eta \quad (6)$$

where θ is the fraction of event revenues accruing from local event attendees.

Secondly, the relevant consumer surplus of a new facility that may justify government involvement is not total consumer surplus but the incremental consumer surplus that is generated

[7] See Alexander, et al., (2000) pp.327-329 for derivation of this formula.

above the consumer surplus associated with the previous facility. Ideally, a new facility should provide benefits that exceed the original facility. It is also likely, though, that a new facility will provide event promoters with the opportunity to adjust prices so as to capture more of the consumer surplus area generated by events hosted at the new facility. As such, although there may well be greater surplus, it is not known to what extent this surplus will be captured by event promoters.

In the absence of an original facility estimate of consumer surplus, incremental consumer surplus may be difficult to derive. The scholarly literature on the novelty effect, or honeymoon effect, of new facilities suggest that an increase in attendance due to the new facility is transitory and ranges between seven and ten years in duration before attendances return to pre-upgrade or pre-facility levels (Baade and Sanderson, 1997; Clapp and Hakes, 2005; Coates and Humphreys, 2005; Leadley and Zygmont, 2005). In the case where a new (that is, non-replacement) facility is built, the consumer surplus generated may well be wholly attributed to the new facility.

Although consumer surplus is an important welfare consideration for a facility evaluation (Sanderson, 2000), the mere presence of consumer surplus from ticket sales does not in itself justify government subsidization. Some have argued that it should not be included in the cost-benefit calculation at all given that monopoly facility promoters can set ticket prices so as to appropriate much of this surplus (Johnson, et al., 2007).

The Westpac Stadium was an important factor in the attraction of the annual IRB Sevens tournament (which began in 2000), the Wellington Phoenix A-League football team (which began in 2007), as well as the return of major concerts to the city (Wellington Regional Stadium Trust, 2012). The consumer surplus associated with these activities would fit the incremental consumer surplus definition discussed above[8]. The majority of events, though, including rugby (to a certain extent[9]), cricket and community events might reasonably have been hosted elsewhere within the city or region if the Stadium was not built. Consumer surplus attributed to these events would therefore not be included as incremental consumer surplus from the new facility.

In the case where a replacement facility is built or an existing facility is upgraded, one could argue that the entire consumer surplus associated with the new facility (as opposed to incremental consumer surplus as defined above) is a relevant benefit in that it reflects consumer surplus that might have been lost if the new facility had not been built (Sanderson, 2000). As such, the cost-benefit calculation should at least include this benefit in the absence of an incremental consumer surplus measure.

[8] It is not possible to separate event revenues into event-specific revenues, unfortunately, as the revenues reported in Annual Reports are aggregated event revenues per year.

[9] The New Zealand Rugby Union threatened to take All Black test matches away from Wellington if the Athletic Park facility was not upgraded (Wellington Regional Stadium Trust, 2012).

Unlike some franchise/facility arrangements in the United States, event promoters using the Westpac Stadium have to pay a proportion of their event revenues as facility rental. These rentals may potentially be associated with substantial consumer surplus. Given that the facility has limited recourse to capture the consumer surplus associated with the promoters' revenues beyond imposing alternative facility rental arrangements on events, it is therefore important to examine the possible extent of consumer surplus associated with the facility itself, rather than the events hosted.

The analysis therefore progresses in two stages. Firstly, the total consumer surplus associated with event revenues accruing to the Westpac Stadium between 2000 and 2009 is estimated and applied in a simplified cost-benefit calculation along the lines of the analyses conducted by Alexander, et al., (2000) and Layson (2005). An adjustment for the proportion of local consumers is applied and updates the cost-benefit calculation.

6.1. Total consumer surplus and the cost-benefit calculation

Nominal event revenues for the 2000-2001 to 2009-2010 years (a total of nine years) were converted to real (1999 dollar) revenues. The average yearly real event revenue for Westpac Stadium was $5,638 million. Using this figure in equation (5), average consumer surplus is derived and then converted into present value terms. The results of these calculations are as shown in Table 8 below.

Table 8: Present Value of Annual Consumer Surplus

	Price elasticity of demand	
Present value (1999 dollars, millions)	**η = -1.0**	**η = -0.5**
30 years @ 6%	$39.1	$78.1
30 years @ 10%	$26.7	$53.5

The figures in Table 8 are sensitive to both the price elasticity of demand and the discount rate used. When compared to the $40m in public funding outlaid for the Westpac Stadium, a simple cost-benefit calculation can be performed by subtracting the public contribution from the present value of consumer surplus benefits. If the price elasticity of demand takes a value of -0.5, the Stadium passes the cost-benefit test. The simple cost-benefit figure is aided if the annual operational surpluses that the Stadium returned between 2000 and 2009 are factored in (assuming the facility runs at the same average surplus over the projected 30-year lifespan). The average surplus during this period was $1.8 million, which, when added to the $39.1 million that assumes η = -1, causes the Stadium to pass the cost-benefit test.

To put the smaller figures in context, it is helpful to examine the cost-benefit test at an annual level. To repay the public funding of $40m over 30 years at 6 percent interest requires an annual repayment of $2.9 million. The average annual real consumer surplus is $2.837 million assuming η = -1. To make the stadium investment economically viable, it must be that the value of other

intangible public good benefits should total at least $63,000 in the absence of any operational surpluses. Given that there were approximately 162,987 households in the Wellington region according to the 2001 Census, these benefits would have to be in the order of $0.39 per household or greater per year.

6.2. Adjusted consumer surplus and the cost-benefit calculation

The extent to which non-locals attend events is largely dependent on the nature of the event hosted. It has been suggested that as many as 60% of the attendees at major events at Westpac Stadium have been non-local (Wellington Regional Stadium Trust, 2012). A conservative estimate of non-local attendees during the first ten years of Westpac Stadium was estimated at approximately 21% of event attendees (Norman and Sanderson, 2010). In the United States, this proportion has been estimated as being between 5 and 20% (Siegfried and Zimbalist, 2002). For sensitivity purposes, non-local proportions of 10 and 20 percent are used. The results of the adjusted consumer surplus calculations from equation 6 are presented below in Table 9.

Table 9: Present Value of Adjusted Annual Consumer Surplus

	θ = 0.9		θ = 0.8	
	Price elasticity of demand		Price elasticity of demand	
Present value (1999 dollars, millions)	**η = -1.0**	**η = -0.5**	**η = -1.0**	**η = -0.5**
30 years @ 6%	$35.1	$70.3	$31.2	$62.5
30 years @ 10%	$24.1	$48.1	$21.4	$42.8

The discounted value of consumer surplus attributable to the stadium in is further reduced with this adjustment, although the outcome of each of the cost-benefit calculations in Table 9 sees the facility investment continue to pass the cost-benefit test where the price elasticity of demand is inelastic (η = -0.5). If one accepts the case for the entire consumer surplus associated with the Westpac Stadium to be included within the cost-benefit calculation, these results indicate that if one assumes revenue-maximising pricing by event promoters at the unitary elastic point of demand, there is insufficient discounted consumer surplus to cover the cost of public funding when utilised in the simple cost-benefit test. The inclusion of the stadium's operational surpluses no longer covers the difference between the public contribution and the estimated consumer surplus when demand is unitary elastic. The necessary annual value of intangible public good benefits from the stadium per household in the Wellington region (assuming unitary elastic demand and in the absence of operational surpluses) is $2.12 when θ = 0.9, and increases to $3.87 when θ = 0.8.

The benefits estimated to this point are consumer surplus attributable to events hosted in the Westpac Stadium. In the absence of revenue information prior to the opening of the new facility, it is not possible to quantify the exact incremental consumer surplus associated with the Westpac Stadium above what was associated with Athletic Park and other venues within Wellington. It is highly likely, though, that the incremental consumer surplus attributed to the Westpac Stadium is

substantially lower than the total consumer surplus calculated in this analysis. One approach to approximate incremental consumer surplus is to consider the nature of events hosted at the Stadium, the proportion of total attendance associated with each event and whether certain events could be hosted elsewhere in the city if the facility was not built. A breakdown of event-specific attendance at Westpac Stadium between 2000 and 2009 is shown in Table 10 below.

Table 10: Event-specific attendance proportions, 2000-2009

Events		Percentage of Attendance	Marginal Attendance
Rugby	NPC	18.86	-
	Super 12/14	22.24	22.24
	Sevens	12.27	12.27
	Tests	9.14	9.14
	Concerts	7.36	7.36
	Cricket	5.73	-
Rugby League	Other	2.07	2.07
	Test	1.67	1.67
Football	A-League	5.21	5.21
	Other	1.23	1.23
	Other events	14.22	-
	TOTAL	100	61.20

Source: Norman and Sanderson (2010) and author calculations.

Factoring out events that were likely to have been held elsewhere within the Wellington region in the absence of the Westpac Stadium (a list that would potentially include NPC rugby, cricket and other community events), the proportion of total attendance associated with events attracted to the region by the stadium is 61.2 percent of total attendance. Such an estimate is inherently uncertain when the counterfactual scenario is unknown. For the purposes of completeness, however, if one reduces revenues to 61.2 percent of the total revenues[10] and assumes that the proportion of non-local attendees at events is 20%, then the resulting discounted consumer surplus figures are reported in Table 11.[11]

Table 11: Present Value of Marginal Consumer Surplus

	Price elasticity of demand	
Present value (1999 dollars, millions)	**η = -1.0**	**η = -0.5**
30 years @ 6%	$19.1	$38.2
30 years @ 10%	$13.1	$26.2

[10] This assumes that event revenues are directly proportional to attendance.

[11] One might reasonably expect the proportion of non-local attendees in the marginal attendance calculation to be even greater than the total proportion given that the events not included in the marginal calculation are likely to have a higher proportion of local attendees due to their inherently local orientation.

It is evident from Table 11 that none of the discounted incremental consumer surplus estimates exceed the cost of public funding. For the stadium investment to be justified on cost-benefit grounds, the value of intangible public good benefits would need to be as high as $9.27 per household per year. The feasibility of this assumption can be gauged by considering other research in related areas. An analysis of the benefits associated with Auckland's regional parks in 2000 suggested that the non-use benefits associated with the parks could be as high as the use values (Saunders, Cullen, and Ball, 2000). US-based research alluded to earlier in the paper indicated that non-use values associated with a facility are likely to be substantially lower than the use values. Even if the non-use values were half of the use values, the Westpac Stadium investment would still fail the cost-benefit test if $\eta = -1$ but would pass the test if $\eta = -0.5$. Determining these public good benefits is thus an important direction for future research.

It is worth noting also that as the novelty effect of the Stadium wears off and other centres build new facilities to compete with Wellington to host events, attendances and consumer surpluses generated by events are likely to fall. Lower surpluses will widen the gap between benefits and costs, thereby increasing the size of the public good benefits necessary to justify the stadium investment.

7. CONCLUSIONS

The Westpac Stadium in Wellington was built as a replacement facility when Athletic Park was no longer considered a viable proposition to continue as the city's major sports facility. Local and regional government contributed a combined $40 million, or approximately one-third of the cost, towards the new regional stadium. This investment was justified on the grounds of forthcoming economic benefits in the form of job creation, among others. Two commissioned reports were produced that estimated the economic impacts of the first five and ten years of the stadium's operation. This paper sought to determine whether the combined local and regional government share of stadium construction was justified (i) on tangible economic grounds in the form of job creation, and (ii) using a more general cost-benefit framework.

The empirical results in Section 5 are consistent with the general conclusions reached by the majority of the literature that stadium construction and operations do not stimulate employment in the host economy. No impacts on aggregate employment in the region were found either during or post-construction. In Wellington's case, a best-case interpretation of the results of this analysis would be that stadium construction and operation sustained employment that existed prior to its construction, while a more critical interpretation would be that the stadium did nothing more than change the composition of employment. Great caution should therefore be taken when interpreting economic impact studies that project increases in employment. Economic impact studies do not indicate where jobs come from. If all workers in a project were previously unemployed, then job growth is likely to be both evident and beneficial. This will be reflected in increasing employment levels. If, however, workers are transferred from other projects, the resulting effect depends upon what project is more beneficial to the local economy.

The results of this study suggest that new jobs were not created in the Wellington region; jobs created in a particular sector were likely to have offset jobs lost from somewhere else within the regional economy.

The results from the analysis of the intangible consumption benefits in Section 6 suggest that for public investment in the Westpac Stadium to be justified on the grounds of a cost-benefit test, demand by event attendees must be inelastic (that is, $\eta = -0.5$). If one assumes that event promoters seek to maximise revenues (and thereby price at the unit-elastic point of event demand), estimates of the resulting discounted consumer surplus benefits are not sufficient to cover the repayment costs of the $40 million in public funding outlaid for stadium construction. This suggests that values of public good benefits associated with the facility are likely to play a critical role in justifying the stadium investment. Although these benefits were not estimated in this paper, indications as to their necessary annual household value were provided in alternative scenarios. Public good benefits are increasingly likely to be difference-makers when an appropriate measure of consumer surplus is used to approximate consumption benefits associated with a facility. As such, the estimation of these values is an important direction for future research, particularly in the New Zealand context.

In general, governments (and ratepayers) should consider carefully what a stadium investment entails, including what benefits they receive. If economic growth via job creation is the primary expected benefit through stimulation of employment, the results of this analysis suggest that governments should look elsewhere (i.e. away from sports facilities) for projects that are better suited for this objective. This is not to say, however, that stadiums are bad investments. The difficulty in their evaluation lies in the fact that the actual benefits from a facility are highly likely to be intangible than tangible in nature. The quantification of these intangible benefits will facilitate a more complete evaluation of the appropriateness of government funding for stadium projects.

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